

**SOMERVILLE, MASSACHUSETTS**

**TECHNICAL SPECIFICATIONS  
FOR**

**BIKE PATH DRAINAGE UPGRADES**

**WILLOW AVE. TO GROVE ST.**



*Michael R. Cunningham* 11/20/17

**NOVEMBER 2017**



[THIS PAGE INTENTIONALLY LEFT BLANK]

## TABLE OF CONTENTS

### **DIVISION 1 - GENERAL REQUIREMENTS**

01010	Summary of Work
01025	Measurement and Payment
01040	Project Coordination and Meetings
01045	Cutting, Coring, and Patching
01060	Permits and Regulatory Requirements
01069	Massachusetts General Laws
01070	Abbreviations
01090	Reference Standards
01105	Rodent Control
01108	Health and Safety Procedures
01200	General Requirements for Utility Work
01300	Submittals
01310	Construction Progress Schedules
01390	Preconstruction Survey
01400	Quality Control
01500	Temporary Facilities and Controls
01505	Mobilization
01568	Erosion Control, Sedimentation and Containment of Construction Materials
01570	Maintenance and Protection of Traffic
01600	Products, Materials and Equipment
01630	Restoration of Grounds and Cleaning Up
01701	Project Closeout

### **DIVISION 2 – SITE WORK**

02010	Subsurface Investigation
02015	Geotechnical Monitoring and Instrumentation
02051	Demolition, Modification, Abandonment
02080	Soil and Waste Management
02095	Transportation and Disposal of Soil and Fill
02140	Dewatering
02160	Temporary Excavation Support Systems
02210	Earth Excavation, Backfill, Fill and Grading
02252	Manholes
02525	Paving, Surfacing, Curbs and Walkways
02604	Catch Basins
02612	Valves and Appurtenances
02622	Polyvinyl Chloride Pipe
02760	Pipeline Cleaning and Internal Inspection
02761	Bypass Flow Handling
02767	Cured-In-Place Pipelining
02900	Landscaping
02930	Tree Protection
02950	Private Property Restoration

**DIVISION 3 – CONCRETE**

03303 Gravity Block Retaining Wall

**DIVISION 7 – THERMAL AND MOISTURE PROTECTION**

07160 Bituminous Dampproofing

**APPENDIX**

Appendix A	Oil and Hazardous Materials Findings, Soil Management Recommendations
Appendix B	Boring Log
Appendix C	Record Drawings
Appendix D	32 Clifton St. (Mixit Studios Foundation Support) dated October 31, 2003
Appendix E	93 Winslow Avenue Rear Yard Renovation by Vanko Studio Architects
Appendix F	32 Clifton Street Plantings and Agreement Package and 91 Winslow Avenue Plantings and Agreement Package

## SECTION 01010

### SUMMARY OF WORK

#### PART 1 - GENERAL

##### 1.1 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.

##### 1.2 LOCATION OF WORK

- A. The work for the Contract is located in the City of Somerville, MA as shown in the Contract Drawings. The work is located north of the Somerville Community Path between Grove Street and Willow Avenue as well as on Newberne Street.

##### 1.3 SCOPE OF WORK

- A. In general and without limitation, furnish all labor, materials, equipment and incidentals for the rehabilitation and reconfiguration of the storm drain, as indicated on the Drawings and specified herein.
- B. A general description of the Work to be performed under this Contract shall consist of approximately 140 linear feet of 24-in storm drain removal and replacement, approximately 978 linear feet of 24-in storm drain CIPP lining, and selective demolition and restoration on 8 private properties impacted by the drainage upgrades.

The Work within private property shall include excavation adjacent to an existing building and 4 foot high retaining wall at 32 Clifton Street; excavation within the backyards of 91-97 Winslow Avenue properties; and CIPP lining access at 73 Winslow Avenue. The Work shall require right of entry to eight private properties and selective demolition and restoration of the private properties.

Work within 89 Winslow Avenue is not anticipated. The condition of the exist. 24" VC Drain at Sta. 5+31, the proposed connection point, is not known. The suitability of connecting to the existing pipe at Sta. 5+31 will be determined by the Engineer during construction, and under the direction of the Engineer the proposed connecti point will be determined. 89 Winslow Avenue Selective Demolition & Private Property Restoration is provided as an allowance for any Work completed as a result of connecting to a suitable section of the existing 24" VC Drain.

Additionally, the work shall include construction of approximately 100 linear feet of proposed 8-in storm drain, two new drain manholes, and the replacement of three catch basins on Newberne Street. The Work within Newberne St. is dependent on connecting the proposed 8" PVC storm drain to the existing 8" VC Storm Drain within Catch Basin 2. The condition of the existing 8" VC drain is not known, and the proposed heavy cleaning and CCTV investigation will assist the Engineer and Owner to determine if the connection to the existing 8" VC drain is feasible. Once the condition of the existing 8" VC drain is known the Engineer will notify the Contractor in writing to proceed with the Work or to remove the Work from the Contract.

C. The Work includes, but will not be limited to the following construction operations:

1. Furnish and install project signs, traffic cones, road closure barriers and other miscellaneous traffic control devices as required.
2. Prepare notifications in cooperation with the City of Somerville Communication Department.
3. Prepare a Health and Safety Plan.
4. Furnish, install and maintain all required sedimentation barriers and other items required to comply with the requirements specified hereinafter by the engineer.
5. Furnish, install, and maintain vibration monitoring and installation of structure, ground, and utility monitoring points.
6. Grading, excavating, filling, backfilling and compacting for pipe laying, access pits, and for resurfacing.
7. Demolition of existing structures and pipes as required.
8. Furnish and install all storm drain pipes, fittings, catch basins, manholes and connections to existing mains.
9. Furnish and install cured-in-place pipelining.
10. Hydraulic cleaning, inspection, and proper disposal of any removed sediment and debris.
11. By-passing flows, as necessary, to accomplish the work.
12. Disposal of excess geotechnically unsuitable excavated material.

13. Reuse of geotechnically suitable excavated material on site as backfill and disposal of excess material from excavation not required for fill or backfill as specified, and to the satisfaction of the Owner.
  14. Perform required paving operations.
  15. Protection of existing utilities as necessary and immediately repair any damage caused to existing utilities to the satisfaction of the Owner
  16. Protection of trees within the project area.
  17. Restore all signs, pavement markings, fences, walls, drives, curb lines, concrete sidewalks, berms, lawns, shrubbery, and landscaping disturbed during storm drain installation work.
- D. The work shall conform to such additional drawings, specifications and addenda to these Specifications and Drawings as may be published or exhibited prior to the opening of Bid Proposals or as may be furnished by the Engineer from time to time during the construction.
- E. Work and materials which are necessary in the construction but which are not specifically referred to in the Specification, or shown on the Drawings, but implied by the Contract shall be furnished by the Contractor and included in the Contractor's Unit and Lump Sum Prices Bid. The work and materials shall be such as will correspond with the general character of the work as may be determined by the Engineer, whose decisions as to the necessity for and character of such work and materials shall be final and conclusive. It is the intent of these specifications to produce a complete, finished job whether shown in every detail or not.
- F. For the purposes of this Contract, anywhere the term "Temporary" is used in the Specifications, in the Plans, in Contract Addenda, in any revisions made to the Contract Documents at any time prior to or during construction, verbally, in writing, in change orders or work change directives or at any other time whether listed here or not, it shall be taken to mean "Temporary" only as it relates to the duration of the Contract. All repairs, restoration, and construction shall be considered permanent.

#### 1.4 CONSTRUCTION SEQUENCE

Inclusion of the following sequencing restrictions does not relieve the Contractor from its responsibility to complete the Work with the specified contract duration, nor does it relieve the Contractor from its responsibility to sequence and carry out the work so as not to cause harm to the existing systems, environment, or community.

### Bike Path Drain Construction Sequence

- A. Contractor shall establish baseline Sedimentation and Erosion Control
- B. Contractor shall establish baseline Geotechnical Instrumentation and Monitoring
- C. Contractor shall perform baseline Preconstruction Survey and submit documentation for the record.
- D. Mobilization
- E. Layout of site work and survey control
- F. Installation of tree protection, existing building protection, and support of above ground structures adjacent to the Work as shown on the Drawings.
- G. Prior to commencing the Work the Contractor shall verify the relocation of any existing utilities that are scheduled for relocation, coordinate with the responsible utility, and relocate those utilities which are the Contractor's responsibility as per these Contract Documents.
- H. Complete Point Repairs as necessary to complete the CIPP Lining
- I. Excavate Access Pits at 93 Winslow Avenue and 32 Clifton Street and access existing 24" VC Storm Drain at limits of CIPP lining. Once work in these areas has begun Contractor shall work continuously on bid items 02767.1 and 02950.1 through 02950.7, until the work is complete.
- J. Furnish and install CIPP Liner in the existing 24-in VC storm drain.
- K. Replace existing 24-in VC Storm drain.
- L. All work may be scheduled and executed at the Contractor's discretion within the time of contract so long as it adheres to this scope and sequence of work and all plans and specifications.

### Newberne Street Construction Sequence

- A. Establish baseline Sedimentation and Erosion Control
- B. Perform baseline Preconstruction Survey and submit documentation for the record.
- C. Mobilization
- D. Layout of site work and survey control



- E. Prior to commencing the Work the Contractor shall verify the relocation of any existing utilities that are scheduled for relocation, coordinate with the responsible utility, and relocate those utilities which are the Contractor's responsibility as per these Contract Documents.
- F. Prior to beginning work on Newberne Street, the Contractor shall clean and CCTV inspect the existing 8-in VC drain as required to re-establish full connectivity between Catch Basin 2 and 24-in Bike Path Drain.
- G. Contractor shall submit post cleaning CCTV inspection logs and reports to the Engineer for review.
- H. Construction work associated with bid items 02252.1, 02604.1, 02622.2, and 02767.2 on Newberne Street shall not commence without written authorization from the Engineer, pending results from the CCTV inspection.
- I. Furnish and install proposed drainage infrastructure on Newberne Street per the Contract Specifications and Drawings.
- J. Contractor shall reconnect services to existing mains where required.
- K. All work may be scheduled and executed at the Contractor's discretion within the time of contract so long as it adheres to this scope and sequence of work and all plans and specifications.

#### 1.5 UNDERGROUND UTILITIES

- A. The underground utilities shown on the plans have been located primarily from information furnished by others and are considered approximate both as to size and location. There may be additional utilities to be encountered that are not shown on the plans, and 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, as required by Owner. Unapproved service interruptions will not be allowed. Refer to Specification Section 01200 for additional utility coordination information and requirements.

#### 1.6 SURFACE RESTORATION

- A. Any damage to the pavement, curbing, or sidewalks outside of the limits of excavation and excavation support as defined in the Contract Documents shall be the responsibility of the Contractor and all costs associated with the repair of the excavation, sub-base, pavement, curbing, and sidewalks shall be fully borne by the Contractor. Repairs shall be immediately made by the Contractor as per the Contract Documents and as required by the Engineer.

## 1.7 HOURS OF WORK

- A. The hours of work shall be Monday through Friday, 7:00 a.m. – 4:00 p.m. excluding City of Somerville Holidays.
- B. During non-work hours (4:00 p.m. – 7:00 a.m. weekdays; weekends and holidays), the Contractor shall make the following provisions:
  - 1. Access to all properties shall be maintained. Work zones shall be clean, protected and safe. The Contractor shall minimize the amount of parking restrictions.
  - 2. At the end of each work day, the Contractor shall backfill and pave and/or place steel road plates over all excavations so as to maintain emergency vehicle and pedestrian traffic access and flow. Under no circumstances will open excavations be allowed during non-work hours. All parking will be given back to the community and businesses during non-work hours. Work zones shall be cleaned, protected and made safe.

## 1.8 CONTRACTOR USE OF PROJECT SITE

- A. The Contractor's use of the project site shall be limited to its construction operations, including on-site storage of materials, and on-site fabrication facilities.
- B. The Contractor shall determine the location(s) of the staging area(s) to be used for this project and shall obtain approval of the location(s) from the City of Somerville prior to any mobilization activities. The Contractor shall not store equipment or materials on private properties, without prior negotiations with the property owner.
- C. The Contractor shall maintain access to street parking and driveway parking and access to all properties and businesses outside the work zone during off work hours.

## 1.9 LIST OF DRAWINGS

- A. The location, general characteristics, and principal details of the work are indicated on a set of drawings entitled "Bike Path Drainage Upgrades Willow Ave. to Grove St."
- B. The drawings stated above are the Contract Drawings, sometimes referred to herein as the "Drawings." Additional drawings showing details in accordance with which the work is to be done may be furnished from time to time by the Engineer, if found necessary, and shall then become a part of the Drawings.

PART 2 – PRODUCTS (Not Used)

PART 3 – EXECUTION (Not Used)

PART 4 – COMPENSATION (Not Used)

END OF SECTION 01010

[THIS PAGE INTENTIONALLY LEFT BLANK]

## SECTION 01025

### MEASUREMENT AND PAYMENT

#### PART 1 — GENERAL

##### 1.1 SUMMARY

- A. Payment for the items specified in the Bid Schedule shall include compensation for furnishing all labor, tools, equipment, supplies, and manufactured articles, and for all operations, and incidentals appurtenant to the items of work described, to complete the various items of the Work, all in accordance with the requirements of the Contract Documents, Drawings, Specifications, Addendum, and other modifications issued and approved by the Owner and Engineer.
- B. Payment for the items specified in the Bid Schedule shall include all costs for permits and compliance with the regulations of public agencies having jurisdiction including Safety and Health Requirements of the Occupational Safety and Health Administration of the U.S. Department of Labor (OSHA).
- C. The bid prices listed in the Bid Schedule shall include all Work items described or implied in the Contract Documents, Drawings, Specifications, Addendum, and other modifications issued and approved by the Owner and Engineer, and all other Work items necessary to manufacture, furnish, install and test a complete working project.
- D. The following items are considered “Incidental” to the completion of the Work included in this Contract. These incidental work items shall be included in the Bid Schedule prices and are not included for separate payment. The incidental work items include, but are not limited to:
  - a. Abandonment, removal and disposal of existing, abandoned or relocated private utilities not specified for payment elsewhere
  - b. Construction photographs
  - c. Attending Owner meetings, neighborhood meetings, and all other Construction meetings
  - d. Preparation of notifications in cooperation with the City and distribution to residents’ 1-week in advance of work.
  - e. Submitting work plans, shop drawings, and materials samples.

- f. Protection of installed materials from damage, and replacement of damaged materials as directed by the Engineer.
- g. Warrantees and Guarantees as indicated in the Contract Documents.
- h. Maintenance of plant materials as indicated in the Contract Documents.
- i. Concrete encasement of impacted utilities
- j. Dust control and air quality monitoring for dust and total volatile organic compounds. For any confined space entry air quality monitoring for methane, hydrogen sulfide, % Lower Explosive limit, and oxygen levels will be required.
- k. Street sweeping, including power sweeping as required.
- l. Removal of snow from streets and sidewalks where work is ongoing
- m. Transporting trash and recyclables out of the work area where municipal pickup is hindered
- n. Providing certificates of design where required
- o. Developing and submitting Construction Progress schedule, monthly schedule updates, and weekly construction schedule projections and updates
- p. Fulfilling all reporting requirements
- q. Clean-up and restoration of all surface features not included for payment elsewhere.
- r. Obtain all permits including payment of fees
- s. Demolition and Removal of Pipe
- t. Furnishing and installing couplings and fittings for storm drain installation.
- u. Furnishing and Placing Backfill by one of the approved methods listed below:
  - 1. Reuse excavated material, if suitable, immediately on site at the general area of excavation.
  - 2. Furnish and install imported suitable backfill

3. Transport the material to a staging area, stage and protect the material, load the material, transport the material to be used as backfill at the general area of excavation.
- v. Furnishing, installing, compacting and testing gravel sub-base by one of the approved methods listed below:
    1. Reuse excavated sub-base material, if suitable, immediately on site at the general area of excavation, as sub-base material
    2. Furnish and install imported suitable gravel sub-base
    3. Transport the material to a staging area, stage and protect the material, load the material, transport the material to be used as sub-base at the general area of excavation.
  - w. Remove and reset all signs and sign posts, meters, trash receptacles, or any other site feature or furnishing not specifically listed for separate payment elsewhere.
  - x. Rodent control.
  - y. Furnishing, installing, and maintaining temporary site fencing.
  - z. Furnishing, installing and maintaining materials to protect existing building structures and windows.
- E. No separate payment shall be made for any item that is not specifically specified in the Bid Schedule, and all costs therefore shall be included in the prices named in the Bid Schedule for the various appurtenant items of work.
- F. The Contractor and Subcontractors shall not take advantage of any apparent error or omission on the Drawings or in the Specifications. The Contractor and Subcontractors shall make corrections and interpretations as may be deemed necessary for fulfillment of the intent of the Contract Documents at no additional cost to the Owner.
- G. Anywhere in these Contract Documents, the term furnish shall mean manufacture; supply; delivery to the Project site including the actual unloading and unpacking; assembly; erection; placing; installation; anchoring; applying; working to dimension; finishing; curing; protecting; cleaning; testing; start-up; and similar operations unless stated otherwise.

## 1.2 LUMP SUM ITEMS

- A. Payment for the lump sums shall be full compensation for all labor, materials and equipment required to furnish, install, construct, startup and test the work covered under that lump sum item, whether listed in the related Compensation subsection for each item or not. All supervision; overhead items including but not limited to bonds, insurance, and labor burden; and profit are also included.
- B. Payment shall fully compensate the Contractor for any other work which is not specified or shown, but which is necessary to complete the Work.

## 1.3 UNIT PRICE ITEMS

- A. Unit prices shall be full compensation for all labor, materials and equipment required to furnish, install, construct, startup and test the work covered under that unit price item, whether listed in the related Compensation subsection for each item or not. All supervision; overhead items including but not limited to bonds, insurance, and labor burden; and profit are also included.
- B. Payment shall fully compensate the Contractor for any other work which is not specified or shown, but which is necessary to complete the Work.

## 1.4 MEASUREMENT FOR PAYMENT

- A. Work completed to date shall be submitted by the Contractor and substantiated as required by the Engineer.
- B. The Owner and Engineer will review the submittal for completeness and verification. Failure to submit any of the below requirements will be grounds for a rejection of the submitted pay request until such time as the submittals are complete, accurate, up to date, and have been approved by the Owner and Engineer.
  - 1. Include a checklist of completed items. Only items signed-off by the Engineer will be considered for payment.
  - 2. Include red-lined "As-built" drawings indicating degree of completion, as described in Section 01346 – As Built Drawings.
  - 3. Include a revised Construction Progress schedule and narrative as required in the Specifications and showing actual record information.



4. Include a copy of all required test results including, but not limited to geotechnical and settlement monitoring results, compaction test results, concrete strength test results, grain size analysis and analytical test results.
5. Certified pay-rolls for general and all sub-contractors.
6. MBE and WBE reporting and certifications as required by the Contract.

#### 1.5 ITEM DESCRIPTIONS

- A. Base bid items include all items identified in Division 01, 02, and 07. Refer to Part 4 of each section for measurement and payment.

PART 2 – PRODUCTS (Not Used)

PART 3 – EXECUTION (Not Used)

PART 4 – COMPENSATION (Not Used)

END OF SECTION 01025

[THIS PAGE INTENTIONALLY LEFT BLANK]

## SECTION 01040

### PROJECT COORDINATION AND MEETINGS

#### PART 1 – GENERAL

##### 1.1 SUMMARY

- A. This section includes general coordination requirements including preconstruction conference, site mobilization conference, and progress meetings.

##### 1.2 CONTRACTOR COORDINATION

- A. Coordinate scheduling, submittals, and the Work to assure efficient and orderly sequence of installation of interdependent construction elements.
- B. Contractor shall coordinate work with the City of Somerville Communications Department. Contractor shall prepare notifications in cooperation with the City and shall distribute them to residents 1-week in advance of the Work. Contractor shall assume that up to five (5) notifications shall be prepared, coordinated, and distributed throughout the contract.
  - a. In addition to the five notifications indicated above, the Contractor shall post a flyer notifying pedestrians and cyclists of the closure at each community path entrance effected by the detour. The flyer shall include a description of the work, a copy of the detour plan, and the dates of the closure. The flyer shall be posted and installed a minimum of 1-week in advance of the Work.
- C. Coordinate completion of the Work and clean up for Substantial Completion and for portions of Work designated for Owner's partial utilization.
- D. Coordinate access to site for correction of nonconforming Work to minimize disruption of Owner's activities where Owner is in partial utilization.
- E. Contractor to provide a project manager for the duration of the project.

##### 1.3 PRECONSTRUCTION CONFERENCE

- A. The Owner will schedule a preconstruction conference.
- B. Attendance Required: Owner's representatives, Engineer, Contractor, Contractor's Project Manager and Superintendent and major Subcontractors.
- C. Sample Agenda:
  - 1. Designation of personnel representing the parties in Contract and the Architect/Engineer.
  - 2. Description of the Project background, purpose, basis of design and major elements of the Work.
  - 3. Community Relations requirements
  - 4. Private property notification and access
  - 5. Soil and Waste Management requirements
  - 6. Major Geotechnical requirements such as temporary support of excavation; backfill and compaction; geotechnical instrumentation and monitoring, and dewatering.
  - 7. Requirements and procedures for the submission of change orders and pay requisitions.
  - 8. Requirements, procedures and processing of shop drawings and other submittals; Schedules and schedule updates; substitutions; and Requests for Information.
  - 9. Scheduling of the Work and coordination with other contractors.
  - 10. Review of Subcontractors
  - 11. Continuation of City services (trash and rubbish removal, recycling, street sweeping, dust control, tree protection, and snow removal).
  - 12. Meeting requirements (Progress, Work Shops, etc.)
  - 13. Utility coordination
  - 14. Traffic and pedestrian management requirements
  - 15. Other

#### 1.4 PROGRESS MEETINGS

- A. Project meetings shall be held at a location designated by the Owner and Engineers. Meetings shall be held at weekly intervals, or as required by the Owner or Engineer.
- B. Attendance Required: Job superintendent, Contractor's Project Manager, major Subcontractors and suppliers, Owner representatives, and Architect/Engineer as appropriate to agenda topics for each meeting.
- C. The Owner or Engineer or their representative will make arrangements for meetings, and record minutes.
- D. The Owner or Engineer or their representative will prepare the agenda and preside at meetings.
- E. Contractor shall provide required information and be prepared to discuss each agenda item.
- F. Sample Agenda:
  - 1. Review minutes of previous meetings
  - 2. Community Relations
  - 3. Review of work progress. Review of work completed, work on going and work scheduled within the coming month.
  - 4. Field observations, problems, and decisions
  - 5. Identification of problems which impede planned progress
  - 6. Review of submittals schedule and status of submittals
  - 7. Review of RFI and RFP status
  - 8. Proposed Change Orders (PCO), claims, credits, Work Change Directive, and change order status
  - 9. Review of off-site fabrication and delivery schedules
  - 10. Maintenance of progress schedule
  - 11. Corrective measures to regain projected schedules

12. Maintenance of quality and work standards
13. Effect of proposed changes on progress schedule and coordination
14. Other item relating to Work

PART 2 – PRODUCTS (Not Used)

PART 3 – EXECUTION (Not Used)

PART 4 – COMPENSATION (Not Used)

END OF SECTION 01040

## SECTION 01045

### CUTTING AND PATCHING

#### PART 1 - GENERAL

##### 1.1 SUMMARY

- A. This Section specifies administrative and procedural requirements for cutting and patching.
- B. Refer to other Sections for specific requirements and limitations applicable to cutting and patching individual parts of the Work.
  - 1. Requirements of this Section do not apply to mechanical installations.

##### 1.2 SUBMITTALS

- A. Submit proposed procedures for cutting and patching a minimum of 2 weeks in advance of the time cutting and patching will be performed. The submittal shall contain, but not be limited to the following information:
  - 1. Describe the extent of cutting and patching required and how it is to be performed; indicate why it cannot be avoided.
  - 2. Describe anticipated results in terms of changes to existing or proposed construction; include changes to structural elements and operating components.
  - 3. List firms or entities that will perform Work.
  - 4. Indicate dates when cutting and patching is to be performed.
  - 5. List utilities, service, or performance that will be disturbed or affected and indicate how long service will be disrupted.
  - 6. Where cutting and patching involves addition of reinforcement to structural elements, submit details stamped by a Massachusetts Professional Engineer to show how reinforcement is integrated with the original structure.
- B. Review by the Engineer prior to proceeding with cutting and patching does

not waive the Engineer's right to later require complete removal and replacement of a part of the Work found to not meet the requirements of the Contract.

### 1.3 QUALITY ASSURANCE

- A. Requirements for Structural and Utility Work: Do not cut and patch structural elements in a manner that would reduce their load-carrying capacity or load-deflection ratio.
  - 1. Submit the cutting and patching proposal, including a structural analysis and design of additional reinforcement, stamped by a Massachusetts Professional Engineer, before cutting and patching.
  
- B. Operational and Safety Limitations: Do not cut and patch operating elements or safety related components in a manner that would result in reducing their capacity to perform as intended, or result in increased maintenance, or decreased operational life or safety.
  - 1. Submit the cutting and patching proposal before cutting and patching the following operating elements or safety related systems:
    - a. Shoring, bracing, and sheeting.
    - b. Primary operational systems and equipment.
    - c. Control systems.
    - d. Electrical wiring systems.
  
- C. Visual Requirements: Do not cut and patch construction exposed on the exterior, in a manner that would, in the Engineer's opinion, reduce aesthetic qualities, or result in visual evidence of cutting and patching. Remove and replace Work that has been cut and patched that does not meet requirements of the Contract as determined by the Engineer.
  - 1. Retain the original installer or fabricator to cut and patch or if it is not possible to engage the original installer or fabricator, engage another recognized experienced and specialized firm acceptable to the Engineer:



## PART 2 - PRODUCTS

### 2.1 MATERIALS

- A. Use materials whose installed performance will equal or surpass that of existing materials.
- B. Where cutting and patching occurs on exposed exterior structures or work, use materials that are identical to existing materials. If identical materials are not available or cannot be used where exposed surfaces are involved, use materials that match existing adjacent surfaces to the fullest extent possible with regard to visual effect.

## PART 3 - EXECUTION

### 3.1 INSPECTION

- A. Before cutting existing surfaces, examine surfaces to be cut and patched and conditions under which cutting and patching is to be performed. Take corrective action before proceeding, if unsafe or unsatisfactory conditions are encountered.
  - 1. Before proceeding, meet at the site with parties involved in cutting and patching, including but not limited to mechanical and electrical trades. Review areas of potential interference and conflict. Coordinate procedures and resolve potential conflicts before proceeding.

### 3.2 PREPARATION

- A. Temporary Support: Provide temporary support of Work to be cut.
- B. Protection: Protect existing construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of the Project that might be exposed during cutting and patching operations.
- C. Take all precautions to avoid cutting existing pipe, conduit or duct banks that are scheduled to be removed or relocated until provisions have been made to bypass them.

### 3.3 CUTTING

- A. General: Employ skilled workmen to perform cutting and patching. Complete cutting and patching without delay.
- B. Cut existing construction to provide for installation of other components or performance of other construction activities and the subsequent fitting and patching required to restore surfaces to their original condition.
- C. Cutting: Cut existing construction using methods least likely to damage elements to be retained or adjoining construction. Where possible, review the proposed procedures with the original installer or manufacturer or with an installer or manufacturer with similar experience. Comply with the installer's and / or manufacturer's recommendations.
- D. In general, where cutting is required use hand or small power tools designed for sawing or grinding, not hammering and chopping. Cut holes and slots neatly to size required with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.
- E. Cut through concrete and masonry using a cutting machine such as carborundum saw or diamond core drill.
- F. By-pass utility services such as pipe or conduit, before cutting, where services are shown or required to be removed, relocated or abandoned. Cap, valve or plug and seal the remaining portion of pipe or conduit to prevent entrance of moisture or other foreign matter after by-passing and cutting.

### 3.4 PATCHING

- A. Inspect and test patched areas to demonstrate integrity of the installation.

### 3.5 CLEANING

- A. Thoroughly clean areas where cutting and patching is performed or used as access. Remove completely mortar, oils, reinforcing, concrete, masonry and items of similar nature. Thoroughly clean piping, conduit and similar features before finishing is applied. Restore damaged pipe to its original condition.

## PART 4 – COMPENSATION (Not Used)

END OF SECTION 01045

SECTION 01060

PERMITS AND REGULATORY REQUIREMENTS

PART 1 - GENERAL

1.1 REGULATORY AGENCIES

- A. The Contractor shall comply with all laws, rules, and regulations and ordinances promulgated by any authority having jurisdiction over the Work.
- B. The Contractor shall be fully responsible for obtaining and complying with all required permit(s). The Contractor shall be responsible for including all costs and fees required to obtain and comply with the permits, in the Bid. The Contractor shall ensure that all necessary permits from the Somerville Fire Department, Police Department, Electrical Department, Water Department, Department of Public Works, Massachusetts Water Resource Authority, Massachusetts Department of Environmental Protection and all other regulatory agencies and/or inspectional authorities having jurisdiction are obtained and paid for by the Contractor or its subcontractor (s) as appropriate.

1.2 PERMITS OBTAINED BY THE CONTRACTOR

- A. The Contractor or its subcontractor shall be responsible for obtaining; paying for; and complying with, as part of its base Bid, all permits; licenses; certifications; and approvals required for the work of this contract. The Contractor's responsibility includes but is not limited to, all permits required for his equipment, work force, and particular operations such as transportation and storage of fuel, chemicals or other materials and air emission.
- B. At a minimum, the Somerville Department of Public Works and Traffic and Parking Department permits that the Contractor shall be responsible for obtaining and complying with include, but are not limited to, the following:
  - 1. Trench Permit
  - 2. Street Opening Permit
  - 3. Sidewalk Occupancy Permit
  - 4. Traffic Management Permit

The City will waive fees associated with Department of Public Works and Traffic and Parking Department permits for this work.

- C. At a minimum, the other Permits the Contractor shall be responsible for obtaining, paying for, and complying with include, but are not limited to, the following:

1. MWRA Construction Dewatering Discharge Permit, as required.

D. The Contractor shall be responsible for scheduling and coordinating inspections and receipt of local, state, or federal permits/approvals/certifications for all Work as part of this Contract.

### 1.3 PERMITS OBTAINED BY THE OWNER

A. The Contractor is solely responsible for the implementation of the permit requirements and shall include as such in the Bid.

B. The Contractor is solely responsible for any punitive action resulting from any violation of the permit.

C. Actual permits, issued by the respective agencies will be considered part of this Contract.

D. The Contractor shall, at a minimum, include compliance with the provisions and requirements of a typical MWRA dewatering discharge permit, and the typical Somerville permits listed above. The Contractor will receive no additional compensation for compliance with any permit requirements.

PART 2 – PRODUCTS (Not Used)

PART 3 – EXECUTION (Not Used)

PART 4 – COMPENSATION (Not Used)

END OF SECTION 01060

SECTION 01069

MASSACHUSETTS GENERAL LAWS

PART 1 - GENERAL

1.1 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.

1.2 EXCERPTS FROM MASSACHUSETTS STATUTES

- A. In addition to the requirements as set forth under “Compliance with Laws” in the AGREEMENT, particular attention is directed to certain stipulations of Chapter 149 of the General Laws of Massachusetts, as amended to date as follows:

Section 25. “Every employee in public work shall lodge, board, and trade where and with whom he elects; and no person or his agents or employees under contract with the commonwealth, a county, city or town, or with a department, board, commission or officer acting therefore, for the doing of public work shall directly or indirectly require, as a condition of employment therein, that the employee shall lodge, board or trade at a particular place or with a particular person. This section shall be made a part of the contract for such employment.”

Section 26. “In the employment of mechanics and apprentices, teamsters, chauffeurs and laborers in the construction of public works by the commonwealth, or by a country, town or district, or by persons contracting or subcontracting for such works, preference shall first be given to citizens of the commonwealth who have been residents of the commonwealth for at least six months at the commencement of their employment who are male veterans as defined in clause Forth-third of section seven of chapter four, and who are qualified to perform the work to which the employment relates; and secondly, to citizens of the commonwealth generally who have been residents of the commonwealth for at least six months at the commencement of their employment, and if they cannot be obtained in sufficient numbers, then to citizens of the United States, and every contract for such work shall contain a provision to this effect”.

Section 34. “Every contract, except for the purchase of material or supplies, involving the employment of laborers, workmen, mechanics, foremen or inspectors, to which the commonwealth or any county or any town, subject to

section thirty, is a party, shall contain a stipulation that no laborer, workman, mechanic, foreman or inspector working with the commonwealth, in the employ of the contractor, subcontractor or other person doing or contracting to do the whole or part of the work contemplated by the contract, shall be required or permitted to work more than eight hours in any one day or more than forty-eight hours in any one week, or more than six days in any one week, except in cases of emergency, or in case any town subject to section thirty-one is a party to such a contract, more than eight hours in any one day, except as aforesaid...”

Section 34A. “Every contract for the construction, alteration, maintenance, repair or demolition of or addition to, any public building or other public works for the commonwealth or any political subdivision thereof shall contain stipulations requiring that the contractor shall, before commencing performance of such contract, provide by insurance for the payment of compensation and the furnishing of other benefits under chapter one hundred and fifty-two to all persons to be employed under the contract, and that the contractor shall continue such insurance in full force and effect during the term of the contract. No officer or agent contracting in behalf of the commonwealth or any political subdivision thereof shall award such a contract until he has been furnished with sufficient proof of compliance with the aforesaid stipulations. Failure to provide and continue in force such insurance as aforesaid shall be deemed a material breach of the contract and shall operate as an immediate termination thereof. No cancellation of such insurance, whether by the insurer or by the insured, shall be valid unless written notice thereof is given by the party proposing cancellation to the other party and to the officer or agent who awarded the contract at least fifteen days prior to the intended effective date thereof, which date shall be expressed in said notice. Notice of cancellation sent by the party proposing cancellation by registered mail, postage prepaid, with a return receipt of he addressee requested, shall be a sufficient notice...”

Section 34B. “Every contract for the construction, alteration, maintenance, repair or demolition of, or addition to, any public works for the commonwealth or any political subdivision thereof shall contain stipulations requiring that the contractor shall pay to any reserve police office employed by him in any city or town the prevailing rate of wage paid to regular police officers employed by him in such city or town.”

Attention is also directed to certain stipulations of Chapter 30 as follows:

Section 39F. “(1) Every contract awarded shall contain the following subparagraphs and in each case those subparagraphs shall be binding between the general contractor and each subcontractor.

- “(a) Forthwith after the general contractor receives payment on account of a periodic estimate, the general contractor shall pay to each subcontractor the amount paid for the labor performed and the materials furnished by that subcontractor, less any amount specified in any court proceedings barring such payment and also less any amount claimed due from the subcontractor by the general contractor.
- “(b) Not later than the sixty-fifth day after each subcontractor substantially completes his work in accordance with the plans and specifications, the entire balance due under the subcontract less amounts retained by the awarding authority as the estimated cost of completing the incomplete and unsatisfactory items of work, shall be due the subcontractor; and the awarding authority shall pay that amount to the general contractor. The general contractor shall forthwith pay to the subcontractor the full amount received from the awarding authority less any amount specified in any court proceedings barring such payment and also less any amount claimed due from the subcontractor by the general contractor.
- “(c) Each payment made by the awarding authority to the general contractor pursuant to subparagraphs (a) and (b) of this paragraph for the labor performed and the materials furnished by a subcontractor shall be made to the general contractor for the account of that subcontractor; and the awarding authority shall take reasonable steps to compel the general contractor to make each such payment to each such subcontractor. If the awarding authority has received a demand for direct payment from a subcontractor for any amount which has already been included in a payment to the general contractor or which is to be included in the payment to the general contractor for payment to the subcontractor as provided in sub-paragraphs (a) and (b), the awarding authority shall act upon the demand as provided in this section.
- “(d) If, within seventy days after the subcontractor has substantially completed the subcontract work, the subcontractor has not received from the general contractor the balance due under the subcontract including any amount due for extra labor and materials furnished to the general contractor, less any amount retained by the awarding authority as the estimated cost of completing the incomplete and unsatisfactory items of work, the subcontractor may demand direct payment of that balance from the awarding authority. The demand shall be by a sworn statement delivered to or sent by certified mail to the awarding authority, and a copy shall be delivered to or sent by certified mail to the general contractor at the same time. The demand shall contain a detailed breakdown of the balance due under the subcontract and also a statement of the status of completion of

the subcontract work. Any demand made after substantial completion of the subcontract work shall be valid even if delivered or mailed prior to the seventieth day after the subcontract work. Within ten days after the subcontractor has delivered or so mailed the demand to the awarding authority and delivered or so mailed a copy to the general contractor, the general contractor may reply to the demand. The reply shall be by a sworn statement delivered to or sent by certified mail to the awarding authority and a copy shall be delivered to or sent by certified mail to the subcontractor at the same time. The reply shall contain a detailed breakdown of the balance due under the subcontract including any amount due for extra labor and materials furnished to the general contractor and of amount due for each claim made by the general contractor against the subcontractor.

- “(e) Within fifteen days after receipt of the demand by the awarding authority, but in no event prior to the seventieth day after substantial completion of the subcontract work, the awarding authority shall make direct payment to the subcontractor of the balance due under the subcontract including any amount due for extra labor and materials furnished to the general contractor, less any amount (i) retained by the awarding authority as the estimated cost of completing the incomplete or unsatisfactory items of work, (ii) specified in any court proceedings barring such payment, or (iii) disputed by the general contractor in the sworn reply; provided, that the awarding authority shall not deduct from any direct payment any amount as provided in part (iii) if the reply is not sworn to, or for which the sworn reply does not contain the detailed breakdown required by subparagraph (d). The awarding authority shall make further direct payments to the subcontractor forthwith after the removal of the basis for deductions from direct payments made as provided in parts (i) and (ii) of this subparagraph.
- “(f) The awarding authority shall forthwith deposit the amount deducted from a direct payment as provided in part (iii) of subparagraph (e) in the interest-bearing joint account in the names of the general contractor and the subcontractor in a bank in Massachusetts selected by the awarding authority or agreed upon by the general contractor and the subcontractor and shall notify the general contractor and the subcontractor of the date of the deposit and the bank receiving the deposit. The bank shall pay the amount in the account, including accrued interest, as provided in an agreement between the general contractor and the subcontractor or as determined by decree of court of competent jurisdiction.
- “(g) All direct payments and all deductions from demands for direct payments deposited in an interest-bearing account or accounts in a



bank pursuant to paragraph (f) shall be made out of amounts payable to the general contractor at the time of receipt of a demand for direct payment for a subcontractor and out of amounts which later become payable to the general contractor and in order of receipt of such demands from subcontractors. All direct payments shall discharge the obligation of the awarding authority to the general contractor to the extent of such payment.

“(h) The awarding authority shall deduct from payments to a general contractor amounts which, together with the deposits in interest-bearing accounts pursuant to subparagraph (f), are sufficient to satisfy all unpaid balances of demands for direct payment received from subcontractors. All such amounts shall be earmarked for such direct payments, and the subcontractors shall have a right in such deductions prior to any claims against such amounts by creditors of the general contractor.

“(i) If the subcontractor does not receive payment as provided in subparagraph (a) or if the general contractor does not submit a periodic estimate for the value of the labor or materials performed or furnished by the subcontractor and the subcontractor does not receive payment for same when due less the deductions provided for in subparagraph (a), the subcontractor may demand direct payment by following the procedure in subparagraph (d) and the general contractor may file a sworn reply as provided in that same subparagraph. A demand made for the first day of the month following that for which the subcontractor performed or furnished the labor and materials for which the subcontractor seeks payment shall be valid even if delivered or mailed prior to the time payment was due on a periodic estimate from the general contractor. Thereafter the awarding authority shall proceed as provided in subparagraph (e), (f), (g), and (h).”

Section 39N. “Every contract subject to section forty-four A of chapter one hundred and forty-nine or subject to section thirty-nine M of chapter thirty shall contain the following paragraph in its entirety and an awarding authority may adopt reasonable rules or regulations in conformity with that paragraph concerning the filing, investigation and settlement of such claims:

“If, during the progress of the work, the contractor or the awarding authority discovers that the actual subsurface or latent physical conditions encountered at the site differ substantially or materially from those shown on the plans or indicated in the contract documents either the contractor or the contracting authority may request an equitable adjustment in the contract price of the contract applying to work affected by the differing site conditions. A request for such an adjustment shall be in writing and shall be delivered by the party making such claim to the other party as soon as possible after such conditions

are discovered. Upon receipt of such a claim from a contractor, or upon its own initiative, the contracting authority shall make an investigation of such physical conditions, and if they differ substantially or materially from those shown on the plans or as indicated in the contract documents or from those ordinarily encountered and generally recognized as inherent in work of the character provided for in the plans and contract documents and are of such a nature to cause an increase or decrease in the cost of performance of the work or a change in the construction methods required for the performance of the work which results in an increase or decrease in the cost of the work, the contracting authority shall make an equitable adjustment in the contract price and the contract shall be modified in writing accordingly.”

Section 39O. “Every contract subject to the provisions of section thirty-nine M of this chapter or subject to section forty-four A of chapter one hundred forty-nine shall contain the following provisions (a) and (b) in their entirety...

“(a) The awarding authority may order the general contract in writing to suspend, delay, or interrupt all or any part of the work for such period of time as it may determine to be appropriate for the convenience of the awarding authority; provided however, that if there is a suspension, delay or interruption for fifteen days or more or due to a failure of the awarding authority to act within the time specified in this contract, the awarding authority shall make an adjustment in the contract price for any increase in the cost of performance of this contract but shall not include any profit to the general contractor on such increase; and provided further, that the awarding authority shall not make any adjustment in the contact price under this provision for any suspension, delay, interruption or failure to act to the extent that such is due to any cause for which this contract provides for an equitable adjustment of the contract price under any other contract provisions.

“(b) The general contractor must submit the amount of a claim under provision (a) to the awarding authority in writing as soon as practicable after the end of the suspension, delay, interruption or failure to act and, in any event, not later than the date of final payment under this contract and, except for costs due to a suspension order, the awarding authority shall not approve any costs in the claim incurred more than twenty days before the general contractor notified the awarding authority in writing of the act or failure to act involved in the claim.

Section 39P. “Every contract subject to section thirty-nine M of this chapter or section forty-four A of chapter one hundred forty-nine which requires the awarding authority, any official, its architect or engineer to make a decision on interpretation of the specifications, approval of equipment, material or any other approval, or progress of the work, shall require that the decision made

promptly and, in any event, no later than thirty days after the written submission for decision; but if such decision requires extended investigation and study, the awarding authority, the official, architect or engineer shall, within thirty days after the receipt of the submission, give the party making the submission written notice of the reasons why the decision cannot be made within the thirty-day period and the date by which the decision will be made.”

Section 39R. ‘(a) The words herein shall have the meaning stated below whenever they appear in this section:

- “(1) “Contractor” means any person, corporation, partnership, joint venture, sole proprietorship, or other entity awarded a contract pursuant to section thirty-nine M of chapter thirty, sections forty-four A through H, inclusive, of chapter one hundred and forty-nine and sections thirty B through thirty P, inclusive, of chapter seven.
- “(2) “Contract” means any contract awarded or executed pursuant to sections thirty B through thirty P, inclusive, of chapter seven and any contract awarded or executed pursuant to section thirty-nine M of chapter thirty, or sections forty-four A through H, inclusive, of chapter one hundred and forty-nine, which is for an amount or estimated amount greater than one hundred thousand dollars.
- “(3) “Records” means books of original entry, accounts, checks, bank statements and all other banking documents, correspondence, memoranda, invoices, compute printouts, tapes, discs, papers and other documents or transcribed information of any type, whether expressed in ordinary or machine language.
- “(4) “Independent Certified Public Accountant” means a person duly registered in good standing and entitled to practice as a certified public accountant under the laws of the place of his/her residence or principal office and who is in fact independent. In determining whether an accountant is independent with respect to a particular person, appropriate consideration should be given to all relationships between the accountant and that person or any affiliate thereof. Determination of an accountant’s independence shall not be confined to the relationships existing in connection with the filing of reports with the awarding authority.
- “(5) “Audit”, when used in regard to financial statements, means an examination of records by an independent certified public accountant in accordance with generally accepted accounting

principals and auditing standards for the purpose of expressing a certified opinion thereon, or, in the alternative, a qualified opinion or a declination to express an opinion for stated reasons.

“(6) “Accountant’s Report”, when used in regard to financial statements, means a document in which an independent certified public accountant indicates the scope of the audit which he/she has made and sets forth his/her opinion regarding the financial statements taken as a whole with a listing of noted exceptions and qualifications, or an assertion to the effect that an overall opinion cannot be expressed. When an overall opinion cannot be expressed the reason therefore shall be stated. An accountant’s report shall include as part thereof a signed statement by the responsible corporate officer attesting that management has fully disclosed all material facts to the independent certified public accountant, and that the audited financial statement is a true and complete statement of the financial condition of the contractor.

“(7) “Management”, when used herein, means the chief executive officers, partners, principals or other person or persons primarily responsible for the financial and operational policies and practices of the contractor.

“(8) Accounting terms, unless otherwise defined herein, shall have a meaning in accordance with generally accepted accounting principals and auditing standards.

“(b) Subsection (a)(2) hereof notwithstanding, every agreement of contract awarded or executed pursuant to sections thirty B through thirty P, inclusive, of chapter seven, and pursuant to section thirty-nine M of chapter thirty or to section forty-four A through H, inclusive, of chapter one hundred and forty-nine, shall provide that:

“(1) The contractor shall make, and keep for at least six years after final payment, books, records, and accounts which in reasonable detail accurately and fairly reflect the transactions and dispositions of the contractor, and

“(2) until the expiration of six years after final payment, the officer of inspector general, and the deputy commissioner of capital planning and operations shall have the right to examine any books, documents, papers or records of the contractor or his/her subcontractors that directly pertain to, and involve transactions relating to, the contractor or his/her subcontractors, and

“(3) if the agreement is a contract as defined herein, the contractor shall describe any change in the method of maintaining records or recording transactions which materially affect any statements filed with the awarding authority, including in his/her description with a letter from the contractor’s independent certified public accountant approving or otherwise commenting on the changes, and

“(4) if the agreement is a contract as defined herein, the contractor has filed a statement of management on internal accounting controls as set forth in paragraph (c) below prior to the execution of the contract, and

“(5) if the agreement is a contract as defined herein, the contractor has filed prior to the execution of the contracts and will continue to file annually, an audited financial statement for the most recent completed fiscal year as set forth in paragraph (d) below.

“(c) Every Contractor awarded a contract shall file with the awarding authority a statement of management as to whether the system of internal accounting controls of the contractor and its subsidiaries reasonably assures that:

“(1) transactions are executed in accordance with management’s general and specific authorization;

“(2) transactions are recorded as necessary i. to permit preparation of financial statements in conformity with generally accepted accounting principles, and ii. to maintain accountability for assets;

“(3) access to assets is permitted only in accordance with management’s general or specific authorization; and

“(4) the recorded accountability for assets is compared with the existing assets at reasonable intervals and appropriate action was taken with respect to any difference.

“Every contractor awarded a contract shall also file in the awarding authority a statement prepared and signed by an independent certified public accountant, stating that he/she has examined the statement of management on internal accounting controls, and expressing an opinion as to

“(1) whether the representations of management in response to this paragraph and paragraph (b) above are consistent with the

result of management's evaluation of the system of internal accounting controls; and

“(2) whether such representations of management are, in addition, reasonable with respect to transactions and assets in amounts which would be material when measured in relation to the applicant's financial statements.

“(d) Every contractor awarded a contract by the commonwealth or by any political subdivision thereof shall annually file with the deputy commissioner of capital planning and operations during the term of the contract a financial statement prepared by an independent certified public accountant on the basis of an audit by such accountant. The financial statement filed shall include the date of final payment. All statements shall be accompanied by an accountant's report. Such statements shall be made available to the awarding authority upon request.

“(e) The office of inspector general, the deputy commissioner for capital planning and operations and any other awarding authority shall enforce the provisions of this section. The deputy commissioner of capital planning and operations may after providing an opportunity for the inspector general and other interested parties to comment, promulgate pursuant to the provisions of chapter thirty A such rules, regulations and guidelines as are necessary to effectuate the purposes of this section. Such rules, regulations and guidelines may be applicable to all awarding authorities. A contractor's failure to satisfy any of the requirements of this section may be grounds for debarment pursuant to section forty-four C of chapter one hundred and forty-nine.

“(f) Records and statements required to be made, kept or filed under provisions of this section shall not be public records as defined in section seven of chapter four and shall not be open to public inspection; provided, however, that such records and statements shall be made available pursuant to the provisions of clause (2) of paragraph (b).

### 1.3 MINIMUM WAGE RATES

- A. A schedule of minimum wage rates excerpted from that for “Mechanics, Apprentices, Teamsters, Chauffeurs, and Laborers” issued for this work by the Commissioner of Labor and Industries of Massachusetts, in accordance with Chapter 461, Acts of 1935, are included in Appendix A of these specifications.

### PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION 01069

[THIS PAGE INTENTIONALLY LEFT BLANK]



SECTION 01070

ABBREVIATIONS

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Wherever in these Specifications references are made to the standards, specifications, or other published data of the various international, national, regional, or local organizations, such organizations may be referred to by their acronym or abbreviation only. As a guide to the user of these Specifications, the following acronyms or abbreviations which may appear in these Specifications shall have the meanings indicated herein.

1.2 ABBREVIATIONS

AA	Aluminum Association
AAMA	Architectural Aluminum Manufacturer's Association
AAR	Association of American Railroads
AASHTO	American Association of State Highway and Transportation Officials
ACI	American Concrete Institute
ADA	American Disabilities Act
AFBMA	Anti-Friction Bearing Manufacturer's Association, Inc.
AGA	American Gas Association
AGMA	American Gear Manufacturers Association
AI	The Asphalt Institute
AIA	American Institute of Architects
AISC	American Institute of Steel Construction
AISI	American Iron and Steel Institute
AITC	American Institute of Timber Construction
AMCA	Air Moving and Conditioning Association
ANSI	American National Standards Institute, Inc.
APA	American Plywood Association or American Parquet Association, Inc.
API	American Petroleum Institute
APWA	American Public Works Association
ARI	Air-Conditioning and Refrigeration Institute
ASCE	American Society of Civil Engineers
ASLE	American Society of Lubricating Engineers
ASME	American Society of Mechanical Engineers
ASQC	American Society for Quality Control
ASSE	American Society of Sanitary Engineers

ASTM	American Society for Testing and Materials
AWS	American Welding Society
AWWA	American Water Works Association
BBC	Basic Building Code, Building Officials and Code Administrators International
BHMA	Builders Hardware Manufacturer's Association
CABO	Council of American Building Officials
CDA	Copper Development Association
CGA	Compressed Gas Association
CLFMI	Chain Link Fence Manufacturer's Institute
CMA	Concrete Masonry Association
CRSI	Concrete Reinforcing Steel Institute
DCDMA	Diamond Core Drill Manufacturer's Association
DCR	Department of Conservation and Recreation
DHI	Door and Hardware Institute
DIPRA	Ductile Iron Pipe Research Association
EIA	Electronic Industries Association
ETL	Electrical Test Laboratories
EPA	Environmental Protection Agency
FCC	Federal Communications Commission
FCI	Fluid Controls Institute
FM	Factory Mutual System
FPL	Forest Products Laboratory
HI	Hydronics Institute
HPMA	Hardwood Plywood Manufacturers Association
IAPMO	International Association of Plumbing and Mechanical Officials
ICBO	International Conference of Building Officials
IEEE	Institute of Electrical and Electronics Engineers
IES	Illuminating Engineering Society
IP	Institute of Petroleum (London)
IPC	Institute of Printed Circuits
IPCEA	Insulated Power Cable Engineers Association
ISDSI	Insulated Steel Door Systems Institute
ISA	Instrument Society of America
ISEA	Industrial Safety Equipment Association
ISO	International Organization for Standardization
ITE	Institute of Traffic Engineers
MADEP	Massachusetts Department of Environmental Protection
MassDOT	Massachusetts Department of Transportation
MBMA	Metal Building Manufacturer's Association
MIL	Military Standards (DoD)
MBTA	Massachusetts Bay Transit Association
MHD	Massachusetts Highway Department
MPTA	Mechanical Power Transmission Association
MSS	Manufacturers Standardization Society

MUTCD	Manual of Uniform Traffic Control Devices
MWRA	Massachusetts Water Resource Authority
MTI	Marine Testing Institute
NAAMM	National Association of Architectural Metal Manufacturer's
NACE	National Association of Corrosion Engineers
NAGDM	National Association of Garage Door Manufacturers
NB	National Board of Boiler and Pressure Vessel Inspectors (alternate NBBPVI)
NBS	National Bureau of Standards (Now NIST)
NCCLS	National Committee for Clinical Laboratory Standards
NEC	National Electrical Code
NEMA	National Electrical Manufacturer's Association
NETA	International Electrical Testing Association
NFPA	National Fire Protection Association or National Fluid Power Association or National Forest Products Association
NISO	National Information Standards Organization
NLGI	National Lubricating Grease Institute
NMA	National Microfilm Association
NPDES	National Pollution Discharge Elimination
NRCA	National Roofing Contractors Association
NSF	National Sanitation Foundation
NWMA	National Woodwork Manufacturers Association
NWWDA	National Wood Window and Door Association
OSHA	Occupational Safety and Health Administration
PCA	Portland Cement Association
PPI	Plastics Pipe Institute
RCRA	Resource Conservation and Recovery Act
RIS	Redwood Inspection Service
RMA	Rubber Manufacturers Association
RVIA	Recreational Vehicle Industry Association
RWMA	Resistance Welder Manufacturer's Association
SAE	Society of Automotive Engineers
SAMA	Scientific Apparatus Makers Association
SDI	Steel Door Institute
SMA	Screen Manufacturers Association
SMACCNA	Sheet Metal and Air Conditioning Contractors National Association
SPI	Society of the Plastics Industry, Inc.
SPIB	Southern Pine Inspection Bureau
SPR	Simplified Practice Recommendation
SSA	Swedish Standards Association
SSBC	Southern Standard Building Code, Southern Building Code Congress
SSPC	Society for Protective Coating
SSPWC	Standard Specifications for Public Works Construction
TAPPI	Technical Association of the Pulp and Paper Industry

TFI	The Fertilizer Institute
TIA	Telecommunications Industries Association
TPI	Truss Plate Institute
UBC	Uniform Building Code
UL	Underwriters Laboratories, Inc.
WCLIB	West Coast Lumber Inspection Bureau
WCRSI	Western Concrete Reinforcing Steel Institute
WEF	Water Environment Federation
WIC	Woodwork Institute of California
WRI	Wire Reinforcement Institute, Inc.
WWPA	Western Wood Products Association

PART 2 – PRODUCTS (Not Used)

PART 3 – EXECUTION (Not Used)

PART 4 – COMPENSATION (Not Used)

END OF SECTION 01070

## SECTION 01090

### REFERENCE STANDARDS

#### PART 1 - GENERAL

##### 1.1 SUMMARY

- A. Titles of Sections and Paragraphs: Captions accompanying specification sections and paragraphs are for convenience of reference only, and do not form a part of the Specifications.
- B. Applicable Publications: Whenever in these Specifications references are made to published specifications, codes, standards, or other requirements, it shall be understood that wherever no date is specified, only the latest specifications, standards, or requirements of the respective issuing agencies which have been published as of the date that the Work is advertised for bids, shall apply; except to the extent that said standards or requirements may be in conflict with applicable laws, ordinances, or governing codes. No requirements set forth herein or shown on the Drawings shall be waived because of any provision of, or omission from, said standards or requirements.
- C. Specialists, Assignments: In certain instances, specification text requires (or implies) that specific work is to be assigned to specialists or expert entities, who must be engaged for the performance of that work. Such assignments shall be recognized as special requirements over which the Contractor has no choice or option. These requirements shall not be interpreted so as to conflict with the enforcement of regulations governing the Work; also they are not intended to interfere with local union jurisdiction settlements and similar conventions. Such assignments are intended to establish which party or entity involved in a specific unit of work is recognized as "expert" for the indicated construction processes or operations. Nevertheless, the final responsibility for fulfillment of the entire set of Contract requirements remains with the Contractor.

##### 1.2 REFERENCE SPECIFICATIONS, CODES, AND STANDARDS

- A. Without limiting the generality of other requirements of the Specifications, all work specified herein shall conform to or exceed the requirements of applicable codes and the applicable requirements of the following documents.
- B. References herein to "Building Code" or "Uniform Building Code" shall mean Uniform Building Code of the International Conference of Building Officials (ICBO). Similarly, references to "Mechanical Code" or "Uniform Mechanical Code," "Plumbing Code" or "Uniform Plumbing Code," "Fire Code" or

"Uniform Fire Code," shall mean Uniform Mechanical Code, Uniform Plumbing Code and Uniform Fire Code of the International Conference of the Building Officials (ICBO). "Electric Code" or "National Electric Code (NEC)" shall mean the National Electric Code of the National Fire Protection Association (NFPA). The latest edition of the codes as approved by the Municipal Code and used by the local agency as of the date that the Work is advertised for bids, as adopted by the agency having jurisdiction, shall apply to the Work herein, including all addenda, modifications, amendments, or other lawful changes thereto.

- C. In case of conflict between codes, reference standards, drawings and the other Contract Documents, the most stringent requirements shall govern. All conflicts shall be brought to the attention of the Engineer for clarification and directions prior to ordering or providing any materials or furnishing labor. The Contractor shall bid for the most stringent requirements.
- D. The Contractor shall construct the Work specified herein in accordance with the requirements of the Contract Documents and the referenced portions of those referenced codes, standards, and specifications listed herein.
- E. Applicable Standard Specifications: References in the Contract Documents to "Standard Specifications" or SSPWC shall mean the Standard Specifications for Public Works Construction, 1991 Edition unless otherwise stated in the specification section.
- F. References herein to "OSHA Regulations for Construction" shall mean Title 29, Part 1926, Construction Safety and Health Regulations, Code of Federal Regulations (OSHA), including all changes and amendments thereto.
- G. References herein to "OSHA Standards" shall mean, Title 29, Part 1910, Occupational Safety and Health Standards, Code of Federal Regulations (OSHA), including all changes and amendments thereto.
- H. References herein to "MUTCD Standards" shall mean, the latest edition of the Manual for Uniform Traffic Control Devices (MUTCD) published by the US DOT, including all changes and amendments thereto.
- I. References herein to "MHD Standards" and/or "MASSDOT Standards" shall mean, the Massachusetts Highway Department Standard Specifications for Highways and Bridges, latest edition, including all changes and amendments thereto.
- J. References herein to "ADA Standards" shall mean, the Americans with Disabilities Act of 1990 including all changes and amendments thereto.

- K. ASTM: American Society for Testing Materials
- L. AASHTO: American Association of State Highway and Transportation Officials
- M ACI: American Concrete Institute
- N. Final Rule for the Accessibility Guidelines for Recreational Facilities and Outdoor Developed Areas by the Recreational Access Advisory Committee, US Architectural and Transportation Barriers Compliance Board, most recent edition, including all changes and amendments thereto.
- O. MAAB: Massachusetts Architectural Access Board, most current edition.

### 1.3 REGULATIONS RELATED TO HAZARDOUS MATERIALS

- A. The Contractor is responsible for ensuring that all work included in the Contract Documents, regardless if shown or not, shall comply with all EPA, OSHA, RCRA, NFPA, and any other Federal, State, and Local Regulations governing the storage and conveyance of hazardous materials, including petroleum products.

PART 2 – PRODUCTS (Not Used)

PART 3 – EXECUTION (Not Used)

PART 4 – COMPENSATION (Not Used)

END OF SECTION 01090

[THIS PAGE INTENTIONALLY LEFT BLANK]



## SECTION 01105

### RODENT CONTROL

#### PART 1 - GENERAL

##### 1.1 SUMMARY

- A. This section specifies rodent control and general pest control requirements within project areas, and bordering areas as designated by the Owner and Engineer. This work is to be performed prior to demolition, excavation, and site preparation and throughout the Contract, so that rodents and other pests do not disperse from or infest the project area.
- B. The Contractor shall develop and implement an Integrated Pest Management (IPM) approach. As part of that approach, the Contractor shall maintain a cooperative dialogue with appropriate agencies and management/representatives of neighboring properties.
- C. The Contractor shall perform the rodent control tasks described in this Scope of Work and also respond to other pest control needs when required by the Owner.

##### 1.2 SUBMITTALS

- A. Submit to the Engineer copies of pesticide applicator certifications and licenses within ten (10) days of the start of Rodent Control activities.
- B. After performing the survey described in Paragraph 3.2 below and before initiating baiting, submit to the Engineer a written description of proposed pest control procedures, indicating materials, quantities, methods, and time schedule. For all pesticides to be used, submit a copy of the pesticide manufacturer's EPA-approved pesticide label with application directions.
- C. Submit to the Engineer documentation of pest control activities and results and follows:
  - 1. Submit data sheets with locations of sites treated, amounts and types of pesticide used, number and types of traps set, survey and inspection results, sanitation conditions, complaint calls investigated, and any problem that occurred. Submit a map that shows bait stations, manholes, and catch basins where rodent baits are being maintained.

### 1.3 QUALIFICATIONS

- A. The Contractor shall perform this work at all times in accordance with the following minimum standards and as acceptable to the Owner and Engineer.
  - 1. The Contractor and key personnel shall have experience with commercial and residential accounts and construction projects; have experience and technical training in vertebrate pest management and integrated pest management; have experience with various rodent control techniques, equipment, and strategies; have training and experience with insect control; and have knowledge of and experience with techniques to reduce non-target hazards.
  - 2. The supervisor shall be licensed and certified by the Massachusetts Pesticide Bureau and certified in General Pest Control (category 41) and Vertebrate Pest Control (category 44). The supervisor shall have specific training and experience in vertebrate pest management, commercial rodent control, general pest control, and integrated pest management.
  - 3. Applicators shall be licensed by the Massachusetts Pesticide Bureau and certified in General Pest Control (category 41). Applicators shall have specific training and experience in commercial rodent control and integrated pest management.

### 1.4 COORDINATION

- A. Perform this Work in cooperation with the other Work performed under the Contract.
- B. Initiate the work on or before field mobilization begins for the Contract and with adequate timing to achieve control before environmental disruptions. Provide a maintenance program until Contract is completed and all equipment and materials are removed.
- C. Perform the Work according to the preliminary schedule described in this section and as accepted or revised by the Owner and Engineer. Estimated durations and start dates may be changed by the Owner or Engineer to suit changes in construction schedules and field conditions. The Work could potentially require performance any day of the week and any hour of the day or night, regardless of weather.
- D. Perform this work in such a manner that toxicant or other control tools do not

pose a hazard to persons, domestic animals, or non-target wildlife.

## 1.5 PERMITS

- A. Obtain and maintain in coordination with the Subcontractor appropriate permit(s) from city or state agencies for pest control activities associated with this Work.
- B. Obtain and maintain in coordination with the Subcontractor all right of entry permits required for the performance of this Work. This includes all utilities and private properties to which entrance is required.

## PART 2 - PRODUCTS

### 2.1 PRODUCTS

- A. Furnish and use only pesticide formulations registered by the U.S. Environmental Protection Agency (EPA) and the Massachusetts Department of Food and Agriculture, where appropriate according to label directions and as acceptable to the Engineer.
- B. Furnish and use devices and supplies (e.g., traps and bait stations) to facilitate the management and effectiveness of the pest control program, where appropriate and as acceptable to the Engineer.

## PART 3 - EXECUTION

### 3.1 NOTIFICATIONS

- A. Before proceeding with the Work, the Contractor shall notify the Engineer of all planned pest control methods and coordination.
- B. The supervisor shall inform the Engineer and Owner of the sequence of activities prior to performing any pest control work.

### 3.2 INTEGRATED PEST MANAGEMENT SURVEY

- A. Prior to baiting, survey the proposed construction area and accessible or observable bordering areas and record signs of rodent activity and sanitation conditions. Closely inspect all embankments, edge areas, and properties within and abutting the construction area. Maintain survey records in the manner described in Paragraph 3.7 below.

- B. Thoroughly inspect construction area and accessible or observable bordering areas and any nearby areas designated by the Owner or Engineer, for rodent activity and sanitation deficiencies weekly throughout the duration of this Contract and in accordance with the work schedule. Maintain inspection records in the manner described in Paragraph 3.7 below.
- C. Plan the control program and allocate resources based on survey and inspection data and as acceptable to the Owner.

### 3.3 APPLICATION FOR RODENT CONTROL

- A. Apply rodenticide in strict accordance with EPA-approved label directions and the Rules and Regulations of the Massachusetts Department of Food and Agriculture. Maintain records of all bait placements in the manner described in Paragraph 3.7 below.
- B. Where appropriate, especially for surface placements of rodent baits, use properly secured and tamper-resistant bait stations consistent with EPA regulation. Individually number and properly identify all bait stations.
- C. Surface Applications

- 1. Initial Surface Baiting

- Rid the construction area of all detectable rodents before construction begins, or as acceptable to the Owner. Bait all observable rodent burrows. Install and secure bait stations at regular and appropriate intervals and locations, and document rodent activity (burrows, droppings, bait consumed, dead rodents). Replenish bait and shift bait stations as necessary to ensure complete control of rodent populations. Bait edge and accessible bordering areas as necessary to ensure that rodents will not be dispersed by construction activities and that rodents will not infest work areas.

- 2. Maintenance Surface Baiting

- Establish a maintenance baiting program prior to mobilization by the Contractor, including construction areas and accessible bordering areas, as acceptable to the Owner. Check bait placements weekly. Use survey and baiting data to determine the most effective distribution of baiting locations and bait quantities. Shift and distribute bait and bait stations as appropriate to ensure continued control.

## D. Subsurface Applications

### 1. General

For situations involving underground construction/demolition, utility relocation, or utility construction, and for other situations when determined necessary by the Owner or Engineer, initiate subsurface baiting and rid underground environments of all detectable rodents before construction begins. Assign an identifying number to each manhole and catch basin where bait is placed so that locations of bait placements can be identified and rodent activity (droppings, bait consumed, dead rats) can be documented. Conduct bait applications during off-peak traffic hours unless otherwise required by the Engineer. Access manholes according to the requirements of appropriate agencies and utility companies. Coordinate the Work with appropriate municipal agencies and utility companies.

### 2. Initial Subsurface Baiting

Apply appropriate baits to control rodent populations in manholes and catch basins. This will involve suspending and securing bait using noncorrosive wire (e.g., 24 gauge plastic coated). Place bait in all accessible manholes and catch basins within the construction work area. In addition, bait an appropriate set of manholes and catch basins in the blocks bordering the work area and as acceptable to the Owner. Identify all baited manholes and catch basins with a standardized paint mark on the street and a numbered tag to be attached to the suspending wire. Approximately seven days after completion of the first baiting, check all manhole and catch basin baits and record estimates on the amount of bait consumed. Replenish or increase the amount of bait applied according to the amount consumed or as acceptable to the Owner and Engineer. Repeat this process again approximately fourteen days later and until there is little or no bait consumed. Check manholes and catch basins weekly when they repeatedly have 100 percent of the bait consumed.

### 3. Maintenance Subsurface Baiting

Prior to mobilization by the Contractor, establish a maintenance baiting program appropriate for the rodent infestation patterns identified during initial subsurface baiting. This program shall ensure continued control and shall be performed in a manner acceptable to the Owner and Engineer. Maintain bait in manholes and catch basins that have rodent activity and those that had activity during initial baitings. Check each

bait according to rodent activity levels. This could range from weekly to approximately every three months, depending upon the recent history of bait consumption. Use utility maps and baiting data to determine the most effective distribution of baiting locations and bait quantities. Shift and distribute baiting locations as necessary to ensure adequate interception points for controlling immigrating rodents.

E. Cleanup

1. Remove visible rodent carcasses and dispose of them daily consistent with the pesticide label directions and applicable codes, laws, and regulations.
2. Upon completion of any pest control operations at the site, remove remaining bait and dispose of it according to the pesticide label and applicable codes, laws, and regulations. Also remove all wires used for subsurface baiting and any bait stations or traps.

3.4 SANITATION

- A. Prior to construction and throughout the duration of this Contract, identify and document harborage and food sources available to rodents on the construction site and in observable bordering areas. This includes any littering or improper or insufficient use of trash receptacles in construction areas. It also includes any bordering areas with sanitation conditions or structural deficiencies that violate City or State sanitation codes.
- B. Maintain records of sanitation conditions in the manner described in Paragraph 3.7 below.

3.5 COMPLAINT CALLS

- A. During construction, respond to pest-related complaints from the "adjacent" neighborhood (i.e. within 200 feet of the project limits) within 12 hours when required by the Owner or Engineer. Inspect the particular premises and adjacent areas for sanitation and structural deficiencies and also signs of historic and recent pest activity. Provide sanitation and structural maintenance information to the property owner or manager. Use pesticides or traps as necessary and appropriate to resolve the complaint when there is a relationship between the pest infestation and construction activities, or when required by the Owner or Engineer.
- B. Maintain records of all complaints investigated, including location, contact person, inspection results, and actions taken. Document the relatedness of the

pest infestation to construction activities.

### 3.6 GENERAL PEST CONTROL

- A. When required by the Owner or Engineer, the Contractor shall determine appropriate methods for any pest control task not specifically identified above and shall submit them in writing to the Owner and Engineer for approval in advance. Such pest control tasks would relate to unanticipated pest control needs within construction areas or adjacent areas. This could include control of insects or vertebrates other than rats and mice.
- B. Maintain records of general pest control activities and results in the manner described in Paragraph 3.7 below.

### 3.7 RECORD KEEPING

- A. Use standardized data sheets acceptable to the Owner and Engineer to maintain accurate records of date, placement, type, and amount of pesticides or other control tools (e.g., traps) applied. Similarly, maintain records of surveys, inspections, changes in pest activity, sanitation conditions, and complaint calls. Submit data in a format acceptable to the Owner and Engineer and as required under Paragraph 1.3 (3) above.

## PART 4 – COMPENSATION (Not Used)

END OF SECTION 01105

[THIS PAGE INTENTIONALLY LEFT BLANK]

Bike Path Drainage Upgrades  
Willow Ave. to Grove St.  
Somerville, MA  
20163393.002A

RODENT CONTROL  
01105-8



## SECTION 01108

### HEALTH AND SAFETY PROCEDURES

#### PART 1 - GENERAL

##### 1.1 SUMMARY

- A. Prepare a Health and Safety Plan (HASP) that meets all applicable state and federal health and safety regulations, including, but not limited to, those listed below. The Contractor shall be solely responsible for developing a HASP suitable for the Contractor's use and all work done by their subcontractors. The Owner, Engineer and/or their representative is not responsible for establishing or enforcing the health and safety requirements of the Contractor, and that nothing herein shall relieve the Contractor from its exclusive responsibility for the health and safety of its employees, and/or its representatives, and/or subcontractors.
- B. The Contractor shall be responsible for being aware of all potential hazards at the site, and reviewing existing information which provides evidence of contamination within the limit of the work.
- C. A copy of the "Somerville Bike Path Drainage Improvements: Environmental Conditions (Clifton Street)" dated 5/25/2017 is attached as Appendix A to these Specifications.
- D. The Contractor shall also be required to defend, indemnify, and hold the City of Somerville, MA, and the Engineer harmless against any and all claims, liabilities, fines, or penalties arising out of actual or alleged failure of the Contractor and/or its agents, employees, or subcontractors to comply with any health or safety regulation, rule, ordinance, legislation, and/or health and safety plan.
- E. All work required in the Specifications regarding development and implementation of a HASP shall be in accordance with State hazardous waste site regulations (310 CMR 40.0018) and OSHA requirements (29 CFR 1910 and 1926). The HASP shall be submitted to the Engineer prior to site mobilization. Work shall not proceed at the site until the Engineer and the City of Somerville have received a copy of the Contractor's Health and Safety Plan meeting all the requirements specified herein.
- F. The Contractor shall be responsible for the construction, maintenance, and dismantling of the decontamination areas specified within the HASP. This includes providing all labor, materials, and equipment to prepare, maintain in working order, and remove the decontamination area, including collection and disposal of decontamination water and solids, and subsequent dismantling and disposal of materials.
- G. The Contractor is responsible for establishing, implementing and maintaining of ambient air and dust monitoring programs and all other environmental monitoring

programs. All such programs shall be operated by the Contractor whenever there are soils handling construction activities occurring at the site.

- H. The Contractor shall be responsible for providing all materials, equipment, and labor associated with applying dust control suppressants, including equipment that shall be required during all soil handling activities, in the event that fugitive dust or excessive odors are encountered.

## 1.2 DUST CONTROL

- A. During excavation of soil and fill material, dust shall be controlled to limit potential spread of contaminants and potential exposure of contaminants to workers and the public. The dust control measures implemented at the site shall be performed in accordance with Section and Section 02080.
- A. During the progress of the work, the Contractor will conduct his operations and maintain the area of his activities, including sweeping and sprinkling of water if acceptable to the Engineer, so as to minimize the generation and dispersion of dust.

## 1.3 AIR MONITORING

- A. Air monitoring shall involve direct reading instruments capable of providing real-time indications of air contaminants to protect on-site personnel and the local population. The Contractor's Site Health and Safety Officer and Superintendent shall be responsible for assuring that monitoring is conducted in an approved manner, that air monitoring/sampling are conducted at a frequency sufficient to ensure accurate assessments of site conditions, and that work practices, engineering controls, and/or personal protective equipment are proper for the conditions. Air monitoring shall be conducted in accordance with Section 02080.
- B. The Contractor shall keep accurate documentation of all air monitoring, which shall be made available to the Owner and Engineer for review at all times.

## PART 2 - PRODUCTS

### 2.1 HEALTH AND SAFETY PLAN AND CERTIFICATIONS

- A. The Contractor shall, prior to the start of work on the site, submit a copy of its site-specific Health and Safety Plan to the Engineer. Submit with the site-specific Health and Safety Plan, a certification that states the following:
  - 1. The Contractor hereby certifies that the Contractor and any workers engaged in work on the project meet the requirements of 29 CFR 1910.120 and the provisions of the American National Standards

Institute, Standard Z88.2, for training, medical surveillance, and respirator protection unless the operation does not involve employee exposure or the reasonable possibility for employee exposure to safety or health hazards. These requirements include, but are not limited to, the following items:

- a. The Contractor's employees have been examined by a licensed physician within the last 12 months, and have been determined to be physically able to perform the work and use the respirator and other protective or safety equipment required for this assignment.
  - b. The employees have received health and safety training for working in environments with known and unknown hazards within the past twelve months.
  - c. The Contractor has established and is maintaining a respiratory protection program that complies with the provision of 29 CFR 1910.134.
  - d. The Contractor maintains appropriate surveillance of the work area conditions and degree of employee exposure or stress.
2. The Contractor shall further certify that only respirators approved or accepted by NIOSH/MSHA shall be provided and used by the Contractor's employees; that each of the Contractor's employees has been properly fitted to the respirators provided by the Contractor, including a test of the face-to-face piece seal; that the Contractor has provided its employees with written procedures covering the use of respirators in dangerous atmospheres; and that the Contractor has established a program for inspection, maintenance, and care of the respirators.

The certification shall be signed and dated by the Contractor.

3. Work shall not proceed at the project site until the Engineer has received all certification(s) and the Contractor's Health and Safety Plan. Any delays incurred by the Contractor relating to the Health and Safety Plan shall be the responsibility of the Contractor, and constitute no additional costs or claims to the City of Somerville.

## PART 3 - EXECUTION

### 3.1 HEALTH AND SAFETY PLAN CONTENTS, MAINTENANCE, AND IMPLEMENTATION

- A. The Contractor's Plan shall address the specific work activities to be conducted by the Contractor. The HASP shall include, but not be limited to, the following:
1. All anticipated hazards based on site conditions, construction activities and the levels of contamination and information presented in previous studies.
  2. Provisions for continually updating the Plan in accordance with any new applicable state and federal regulations or any additional information regarding conditions at the site.
  3. The following information, shall be included in the HASP in accordance with the minimum standards set forth in 29 CFR 1910.120, 29 CFR 1910.1000, and 29 CFR 1926, and 310 CMR 40.0018:
    - a. Contractor's Standard Operating Procedures, including Personnel Training and Field Orientation; Personal Hygiene Requirements and Guidelines; Field Monitoring of Site Contaminants; Respiratory Protection Training and Requirements; Levels of Protection and Selection of Equipment Procedures; Zone Delineation of the Project Site; Site Security and Entry Control Procedures; Contingency and Emergency Procedures; and Listing of Emergency Contacts.
    - b. Identification of Contractor's Site Safety Officer.
    - c. Identification of Contractor's Designated Field Personnel.
    - d. Identification of hazard and risks associated with the Contractor's work.
    - e. Type of Medical Surveillance Program.
    - f. List of all hazardous materials that the Contractor shall have on site; the location of the latest Material Safety Data Sheets (MSDS) for each material listed; and the plan for notifying all on-site personnel, including, but not limited to, the Engineer and/or their representatives, of the presence of hazardous materials on site. If there are no hazardous materials to be brought on site, the Contractor shall provide a written statement to the Engineer and/or their representative, prior to initiating work activities, certifying that the Contractor shall not transport, store, or use hazardous materials on site.

- B. The Contractor shall keep a copy of the HASP on site during all operations and shall conduct daily health and safety meetings. Failure to keep a copy of the HASP on site, or any other breach of the Contractor's Plan, shall be cause for stopping work at the cost of the Contractor. Delays caused by the Contractor's failure to comply with the health and safety regulations, or any health and safety plan, shall not entitle the Contractor to recover any additional costs or time lost. The Contractor shall not be allowed to resume activities until corrective measures are implemented.
- C. Medical surveillance records, OSHA 40-hour training forms, accident forms, and all other documentation requirements of the Contractor's health and safety plan for personnel working on the site shall be up-to-date and kept on file at the site. The Contractor shall provide documentation of employee status upon request of the Engineer.
- D. The Contractor shall make available Level C personal protective equipment and clothing, not including respirators, to the Engineer and/or their representative for use during site inspections by the Engineer and/or their representative, up to a maximum of three (3) complete sets per day. These shall be supplied and maintained at no cost to the Owner and shall be returned to the Contractor upon completion of the work (except for expendable disposal protective clothing). The Contractor shall provide a repository for collection of disposed health and safety materials. Collection and disposal of contaminated expendable supplies shall be the Contractor's responsibility.
- E. The level of dermal and respiratory protection shall be determined based upon continuous air monitoring to be performed by the Contractor. The Engineer may conduct duplicate air monitoring for quality control purposes. As air monitoring indicates the levels of contaminants in the air, the personal protective equipment shall be determined based upon established standards and the standards set forth in the Contractor's Health and Safety Plan. Regardless, modified Level D protection for all on-site personnel is the minimum project requirement.
- F. The Contractor shall be aware of site-specific requirements, such as site security during non-working hours, limited work space, and minimizing the effects of soil excavation, in preparing its health and safety program.

### 3.2 ROUTINE SAFETY MEETINGS

- A. The Contractor shall keep a copy of the HASP on site during all operations, and shall conduct routine health and safety meetings to ensure that all work is being performed in accordance with OSHA regulations, the Contractor's HASP, and prior to initiating a new task, following an incident or following any changes to the HASP necessitated by site conditions. Failure to conduct routine safety meetings may be cause for stopping work at the cost of the Contractor.

PART 4 – COMPENSATION

END OF SECTION 01108

SECTION 01200

GENERAL REQUIREMENTS FOR UTILITY WORK

<b>1200.1</b>	<b>TEMPORARY UTILITY SUPPORT AND COORDINATION</b>	<b>LUMP SUM</b>
<b>1200.2</b>	<b>SURVEY CONSTRUCTION LAYOUT AND BASELINE, AS-BUILTS</b>	<b>LUMP SUM</b>
<b>1200.3</b>	<b>MWRA DEWATERING DISCHARGE PERMIT FEE</b>	<b>ALLOWANCE</b>

PART 1 - GENERAL

1.1 DESCRIPTION

- A. This Section specifies general requirements for construction, protection, support, maintenance, and restoration for underground and overhead utilities affected by construction of the Project. This section includes coordination with private utility companies. The Work includes new construction, reconstruction, relocation, and abandonment.
- B. The utility works and services that may be affected include, but are not limited to:
  - 1. Storm drain, sanitary sewer, and combined sewer
  - 2. Water distribution and transmission mains
  - 3. Gas distribution
  - 4. Electric power, heat exchange return pipelines, utility poles, and street lighting (underground and overhead)
  - 5. Telephone
  - 6. Traffic signals
  - 7. Fiber optic communications
  - 8. Cable Television
  - 9. Signal communication
  - 10. City fire signal lines and pull boxes
  - 11. Steam
- C. This Section shall be used in conjunction with the specific underground utility work sections that apply to the Contract.

1.2 RELATED TECHNICAL SECTION

- A. Section 01400 – Quality Control
- B. Section 02051 – Demolition, Modification, and Abandonment

1.3 WORK BY UTILITY COMPANIES

- A. Certain parts of the utility work shall be performed, where shown or specified, by the utility company.
- B. For all utilities, with the exception of storm drains, sanitary sewers, combined sewers, water main, and electrical conduit for street lighting, work shall be performed by the respective utility companies.
  - 1. Disconnecting and connecting of storm drains, sanitary sewers, and combined sewers services shall be the Contractor's responsibility as shown on the Drawings or required in the Specifications. In the event the Contractor determines sewer disconnections or connections must be made that are not shown on the Drawings or required by the Specifications, he shall first notify the Owner before performing this work.
  - 2. Disconnecting and connecting of water services shall be the Contractor's responsibility as shown on the Drawings or required in the Specifications. In the event the Contractor determines water service disconnections or connections must be made that are not shown on the Drawings or required by the Specifications, he shall first notify the Owner before performing this work
- C. Contact the utility companies in advance of construction to allow sufficient time for the utility companies to accomplish the work they are required to perform. Provide the utility company at least thirty (30) days advance notice prior to the scheduled date for commencement of work under this Contract.
- D. Work performed by utility companies to facilitate the Work under this Contract, and other work performed by utility companies solely for the convenience of the Contractor, shall be at no additional cost to the Owner.

#### 1.4 DEFINITIONS

- A. Abandoned means that use of a utility asset has been discontinued by the utility company.
- B. To be abandoned means that use will be discontinued as part of the Work under this Contract.
- C. Maintenance means providing continuous service that meets project requirements during construction.
- D. Maintain complete-in-place means to protect, support, and otherwise maintain the existing condition and function of a facility during construction.
- E. Restoration means replacement of a facility or portions of a facility that have been removed or made inoperative by the Contractor in the performance of the Work.



- F. Utility Company means the company, agency, owner, or operator of the facility concerned.
- G. Temporary Facility means a facility provided, in lieu of an existing or new facility, to ensure continuity of service. When a temporary facility is not shown on the Contract Drawings, but is provided for the convenience of the Contractor, it shall be constructed at no additional cost to the Owner.

## 1.5 SUBMITTALS

- A. Shop Drawings: Submit the following in accordance with Section 01300 - SUBMITTALS
  - 1. Submit working drawings and, if applicable, shop drawings showing the details, procedures, and scheduling for performance of each utility work. Show actual verified field locations of existing utility facilities that are affected by the Work under this Contract; interferences which these facilities present to the new work; location of settlement markers; method proposed to proceed with the construction; and, if applicable, procedures for restoration and method of testing to demonstrate restoration was performed satisfactorily.
  - 2. Submit to the Engineer specifications and drawings describing the method to be used to temporarily support existing subsurface, surface and overhead utilities during construction. Include working drawings that indicate proposed materials and details.
  - 3. Submit to the Engineer for review a detailed excavation procedure for subsurface utilities. At a minimum, the procedure shall include:
    - a. Equipment to be used for anticipated subsurface utility investigation and excavation.
    - b. Personnel to be used and designated utility coordinator.
    - c. Duration and schedule of investigation and excavation.
    - d. Techniques proposed to isolate and protect existing utilities.
    - e. Method for the Contractor to provide utility information derived from subsurface investigation to field personnel doing excavation.
    - f. A disciplinary plan that delineates all steps to be taken as a result of a utility disruption caused by negligence or failure to follow proper procedures or the Contract requirements,

including possible removal of Contractor personnel from the site.

5. Submit an emergency action plan outlining procedures to be followed by the Contractor in case of unplanned utility interruptions or unplanned damage to utilities in service. Obtain concurrence from each affected utility company.
  - a. List Contractor's personnel assigned responsible charge for emergency action on site for each shift, and those on call.
  - b. List phone notification numbers for each utility company, fire, and police departments, and other relevant agencies.
  - c. Include copies of utility plans showing the valve or switch locations to isolate each line.
- B. Transmit to the Engineer the as-built utility location survey data as specified in Article 3.11 of this Section.

#### 1.6 APPROVAL BY UTILITY COMPANIES

- A. All personnel performing work on to expose and support existing utility facilities shall be fully qualified and able to meet the standards of the affected utility company. If the Contractor does not have the required utility experience, Contractor shall retain a specialist firm acceptable to the affected utility company to perform the Work.
- B. Prior acceptance of temporary support methods for each affected utility facility shall be obtained by the Contractor from each utility company concerned.
- C. Prior permission for disrupting a utility shall be obtained by the Contractor from each utility company concerned.
- D. Prior approval for disrupting fire signal lines, high pressure fire water mains and hydrants, and fire service lines shall be obtained from the Somerville Fire Department.

#### 1.7 NOTIFICATION

- A. In addition to the initial 30 day utility company notification, the Contractor shall notify the appropriate utility companies and the Engineer at least fourteen (14) days prior to starting any work involving or adjacent to surface, subsurface, or overhead utility facilities.
- B. Eversource Gas Requirements:

1. The Contractor shall coordinate and sequence relocations and replacements with Eversource Gas as necessary.
2. If cut-off or connection is expected, notify the Eversource Gas Company Engineering Department four (4) weeks prior to cut-off or connection to gas main.
3. At locations where the sand bedding material of gas mains are excavated and removed by the Contractor, the Contractor shall put back or replace the bedding material, in kind. Crushed stone shall not be used as backfill for bedding material beneath gas mains.
4. Buried gas caution tape shall be replaced if disturbed or removed. In the case of any damage to the tracer wire for the gas main, the Contractor is to notify Eversource Gas prior to backfilling the trench.
5. Immediately notify the Gas Company Engineering Department if surface or subsurface settlement or movement in excess of the design amount is observed, regardless of the proximity to an existing gas facility.
6. Eversource Gas to immediately be notified if gas main or service breaks during construction and the Somerville Fire Department (911) to be called. If an odor is detected, but there is no break, Contractor to notify Eversource Gas only.
7. Existing steel gas mains found within the project area potentially contain asbestos fibers on the coal tar pipe coating of the main. Where required for removal, the Contractor shall use hand tools for removal. Contractor to notify and coordinate removal of pipe with Eversource. Eversource will be responsible for disposing of removed steel mains and the Contractor will be responsible, where required, to remove steel mains with use of hand tools.

## 1.8 STANDARD SPECIFICATIONS OF UTILITY OWNERS

- A. Specifications and construction methods from each utility owner apply to individual utility specification sections.
- B. It is the Contractor's responsibility to ensure that, unless otherwise specified, the standards for materials and construction methods required by the utility owner are met.

## PART 2 - MATERIALS

### 2.1 GENERAL

- A. Materials for temporary and permanent work shall be of the type, grade, and class specified by reference to utility company standards.

## PART 3 - EXECUTION

### 3.1 GENERAL CONSTRUCTION REQUIREMENTS

- A. Unless otherwise noted, conform to the construction standards, specifications, and standard practices of the affected utility companies. Coordinate with each utility company the work to be done by the Contractor and the work to be done by utility company. Ensure continuity of all existing utility services to all users, except when the utility company determines that temporary interruption is acceptable.
- B. Unless otherwise indicated, maintain all utility facilities complete in place. Provide temporary support of utilities during construction only by methods acceptable to the utility company concerned.
- C. Provide and maintain all temporary facilities required to provide interim utility service when a utility facility is to be relocated and when a utility facility to be replaced is abandoned prior to replacement.
- D. Where an existing utility facility is encountered that is not indicated or that is determined to be a different utility facility than that indicated, promptly notify the Engineer. The Contractor is responsible for determining the owner of the facility and the disposition of the facility.
- E. All water, sanitary, and storm services must be maintained throughout the project through the use of temporary pumps and piping. Unless otherwise noted, no service interruptions will be permitted.
- F. The Contractor shall dewater existing utility manholes and structures prior to beginning construction. Any dewatered material shall be properly treated and disposed.

### 3.2 SUBSURFACE UTILITY INVESTIGATION

- A. The Contractor shall excavate test pits where indicated on the Contract Drawings and as specified.

### 3.3 UNSAFE AND UNSUITABLE UTILITY STRUCTURES

- A. If, upon exposure, the condition of a facility to be maintained complete-in-place is found to be unsafe, the Contractor shall notify the utility company, for support or for maintenance of service, the Contractor shall replace or reconstruct or coordinate the replacement or reconstruction of the facility

with the utility Owner and shall promptly notify the Engineer of additional costs anticipated prior to beginning the work.

#### 3.4 ABANDONED FACILITIES

- A. Demolish and remove abandoned utility facilities that interfere with the Work of this Contract. Abandoned facilities that do not interfere with the Work of this Contract may remain.
- B. Do not undertake demolition or removal until permission for such Work has been obtained from the utility company.
- C. When abandoned facilities are to be left in place, plug or cap the ends of conduits and pipes, and fill with controlled density fill (CDF) unless otherwise indicated. Remove abandoned utility manholes, junction boxes, and similar structures to a minimum depth of 4 feet below finished grade, and puncture or break the bottom slabs of manholes and similar structure to allow drainage. Backfill and compact excavations resulting from removal of utility facilities as required to restore original grade.

#### 3.5 SETTLEMENT OR MOVEMENT

- A. In case of settlement or other movement that causes or could cause damage, take immediate remedial measures to correct the conditions and repair the damage.

#### 3.6 ACCESS

- A. At all times permit free and clear access to the affected facilities by personnel of the utility companies.
- B. Throughout the construction period, maintain access to all utility vaults and structures.

#### 3.7 SERVICE CONNECTIONS

- A. Work required for maintaining, supporting, relocating, restoring, and constructing all service connections is included as part of the Work of this Contract, even though some existing service connections, for which record information is not available, may not be shown on the Contract Drawings.

#### 3.8 REPAIR AND RESTORATION

- A. Repair all damage to utilities caused by Work under this Contract. Clean all utility structures of dirt caused by Work under this Contract. Immediately notify the Engineer and the utility company of damage to utilities.

#### 3.9 EXCAVATION AND BACKFILL

- A. Perform excavation and backfill in accordance with Section 02210 – EARTH EXCAVATION, BACKFILL, FILL AND GRADING.
- B. Excavation and handling of contaminated soil is specified in Sections 02080 - SOIL AND WASTE MANAGEMENT, and 02095 – TRANSPORTATION AND DISPOSAL OF SOIL AND FILL.

### 3.10 CLEANING UP

- A. In accordance with Section 01630 – RESTORATION OF GROUNDS AND CLEANING UP, the Contractor shall, upon completion of the Work, remove all temporary construction facilities, equipment, debris, and unused materials, and shall restore the project area and adjacent affected areas to a neat and clean condition.

### 3.11 AS-BUILT UTILITY LOCATION SURVEY

- A. For each new or relocated utility installed, including those installed or relocated by others in the Project Area, perform an as-built location survey by coordinates prior to backfilling the excavation.
- B. The survey work, including verification of the existing survey data, shall be performed by a licensed Professional Land Surveyor registered in Massachusetts or the Contractor to accurately record progress of the work throughout the duration of the Contract.
  - 1. All coordinates shall be geographically registered in the project datum coordinate system using the control points for horizontal and vertical controls.
  - 2. Horizontal accuracy shall be 0.01 feet.
  - 3. Elevation accuracy shall be 0.1 feet except benchmarks, topography, and structure foundations (including manholes pipe inverts) shall be accurate to 0.01 feet.
  - 4. Digital As-built drawings, including surface data shall be provided in AutoCAD Civil 3D format to match the text styles and line types of the design drawings provided by the Engineer.
- C. The Contractor shall also maintain red line record documents at the site to accurately record progress of the work throughout the duration of the Contract.
  - 1. Contractor shall delegate the responsibility for maintenance of the record documents to one person on the Contractor's staff as approved by the Owner.

2. Changes to the record documents shall be coordinated with adequate and proper entries on each page of the specifications and each sheet of drawings and other documents where such entry is required to show progress and changes properly, including change orders, approved shop drawings, RFIs, and other modifications.
3. Record information shall be updated within 24 hours of installation or survey.

#### PART 4 - COMPENSATION

##### **Item 1200.1 – Temporary Utility Support and Coordination**

###### METHOD OF MEASUREMENT:

Measurement for payment for Temporary Utility Support and Coordination will be on a percent of the Lump Sum bid calculated by dividing the elapsed time to date by the contractual construction time limit as approved by the Engineer.

###### BASIS OF PAYMENT/INCLUSIONS:

Payment for Temporary Utility Support and Coordination will be based on the bid for this item in the proposal. Under the Lump Sum Price bid for this item, the Contractor shall furnish all labor, materials, tools, equipment and incidentals required to maintain continuity of gas, telephone, electric, telecommunications, cable TV, steam, and privately owned utilities. The work includes all trunk, supply, transmission, service, heat exchange pipelines and main lines impacted by the Work. Under the Lump Sum Price bid for this item, the Contractor shall also furnish all labor, materials, tools, equipment and incidentals to coordinate and/or temporarily support all utilities exposed during the excavation for the installation of the Work; submission of all utility coordination and support work plans and shop drawings; coordinate the protection of and protect all overhead utilities; excavation and relocation of the electric conduit noted on the drawings in coordination with the electric company; and perform all coordination with the utility companies for the relocation, abandonment, protection, support, and other work required to facilitate the completion of the project. This Item further includes utility location (Dig Safe); provide, install, maintain, and disconnect portable generators to maintain electrical service to dwellings; coordination of construction with existing utility owners and operators; providing access for utility owners and operators to their respective utilities; coordination with the City of Somerville Communications Department; and communicating with affected homeowners and residents.

###### EXCLUSIONS:

The following items are not included for payment under this item and are included for payment elsewhere; labor, materials, tools, equipment and incidentals required to maintain continuity of water mains; restoration of curbing, sidewalks, and bituminous concrete pavement.

##### **Item 1200.2 – Survey Construction Layout and Baseline, As-Builts**

###### METHOD OF MEASUREMENT:

Measurement for payment for Survey Construction Layout and Baseline, As-Builts will be made on a percent of half of the Lump Sum bid calculated by dividing the elapsed time to date by the contractual construction time limit as proposed by the Engineer. The remaining

half of the Lump Sum bid will be made upon acceptance of the As-Builts by the Engineer.

**BASIS OF PAYMENT:**

Payment for Survey Construction Layout and Baseline, As-Built will be based on the bid for this item in the proposal. Under the Lump Sum Price bid for this item, the Contractor shall furnish all labor, professional services, technician, equipment, and incidentals for the Contractor to establish survey control, survey construction baseline and layout and provide as-builts as required and not included in other pay items. The work includes, but is not limited to, survey control, survey construction baseline and layout and as-builts.

**Item 1200.3 – MWRA Dewatering Discharge Permit Fee**

**METHOD OF MEASUREMENT:**

Payment will be made against the allowance based on invoices submitted by the General Contractor on a monthly basis. Incomplete or incorrect invoices will not be approved.

**BASIS OF PAYMENT:**

The allowance for this item shall be reimbursement to the General Contractor to pay MWRA Dewatering Discharge Permit Fee.

END OF SECTION 01200



## SECTION 01300

### SUBMITTALS

#### PART 1 - GENERAL

##### 1.1 SUMMARY

- A. This section includes general requirements for project submittals by the Contractor.

##### 1.2 PROGRESS REPORTS, RECORDS AND DATA

- A. The Contractor shall submit to the Owner such schedules of quantities and costs, progress schedules, payrolls, reports, estimates, records and other data as outlined in Section 01310 – CONSTRUCTION PROGRESS SCHEDULES and as the Owner may request concerning work performed or to be performed under this Contract.

##### 1.3 SHOP DRAWINGS, SAMPLES, PROJECT DATA

- A. Shop Drawings and engineering data (submittals) covering all equipment and all fabricated components and building materials which will become a permanent part of the Work under this Contract shall be submitted to Engineer for review, as required. Submittals shall verify compliance with the Contract Documents, and shall include drawings and descriptive information in sufficient detail to show the kind, size, arrangement, and the operation of component materials and devices; the external connections, anchorages, and supports required; the performance characteristics; and dimensions needed for installation and correlation with other materials and equipment.
  1. Each submittal shall cover items from only one section of the specification unless the item consists of components from several sources. Contractor shall submit a complete initial submittal including all components. When an item consists of components from several sources, Contractor's initial submittal shall be complete including all components.
  2. All submittals, regardless of origin, shall be clearly identified with the name and number of this Contract, Contractor's name, and references to applicable specification paragraphs and Contract Drawings. Each submittal shall indicate the intended use of the item in the Work. When catalog pages are submitted, applicable items shall be clearly identified and inapplicable data crossed out. The current revision, issue number, and date shall be indicated on all drawings and other descriptive data. Engineer will not accept submittals from anyone but Contractor. Submittals shall be consecutively numbered in direct sequence of submittal and without

division by subcontracts or trades.

3. All deviations from the Contract Documents shall be identified as deviations on each submittal and shall be tabulated in Contractor's letter of transmittal. Such submittals shall, as pertinent to the deviation, indicate essential details of all changes proposed by Contractor (including modifications to other facilities that may be a result of the deviation) and all required piping and wiring diagrams.
4. Contractor shall submit shop drawings electronically. For electronic submittals, drawings and the necessary data shall be submitted electronically to Engineer as specified below. Submittal documents shall be in black and white unless color is required for the review of the submittal. All electronic files shall be in Portable Document Format (PDF) as generated by Adobe Acrobat Professional Version 7.0 or higher. The PDF file(s) shall be fully indexed using the Table of Contents, searchable with thumbnails generated. PDF images must be at a readable resolution. For most documents, they should be scanned or generated at 300 dots per inch (dpi). Optical Character Recognition (OCR) capture must be performed on these images so that text can be searched, selected and copied from the generated PDF file. The PDF documents shall have a bookmark created in the navigation frame for each major entry ("Section" or "Chapter") in the Table of Contents. Thumbnails shall be generated for each page or graphic in the PDF file.

The opening view for each PDF document shall be as follows:

- Initial View: Bookmarks and Page
- Magnification: Fit In Window
- The file shall open to the Contractor's transmittal letter, with bookmarks to the left. The first bookmark shall be linked to the Table of Contents.

PDF document properties shall include the submittal number for the document title and the Contractor's name for the author. Electronic submittal file sizes shall be limited to 10 MB. When multiple files are required for a submittal the least number of files possible shall be created. The contractor shall transmit submittals and receive the Engineer's submittal review comments via email. Instruction on procedures for transmitting and receiving submittals will be provided after award of the Contract. Facsimiles (fax) will not be acceptable. Engineer will not accept submittals from anyone but Contractor. Submittals shall be consecutively numbered in direct sequence of submittal and without division by subcontracts or trades.

5. In addition, two hard copies of each *full size* drawing shall be submitted to Engineer and will return two marked copies (or one marked reproducible copy) to Contractor.

6. Engineer's submittal review period shall be 14 consecutive calendar days and shall commence on the first calendar day following receipt of the submittal or resubmittal on the project website. The time required to mail any hard copies of the submittal or resubmittal back to Contractor shall not be considered a part of the submittal review period.
  7. Contractor shall accept full responsibility for the completeness of each resubmittal. Contractor shall verify that all corrected data and additional information previously requested by Engineer are provided on the resubmittal. When corrected copies are resubmitted, Contractor shall direct specific attention to all revisions in writing and shall list separately any revisions made other than those called for by Engineer on previous submittals. Requirements specified for initial submittals shall also apply to resubmittals. Resubmittals shall bear the number of the first submittal followed by a letter (A, B, etc.) or a unique identification that indicates the initial submittal and correct sequence of each resubmittal. If more than one resubmittal is required because of failure of Contractor to provide all previously requested corrected data or additional information, Contractor shall reimburse Owner for the charges of Engineer for review of the additional resubmittals. This does not include initial submittal data such as shop tests and field tests that are submitted after initial submittal. Resubmittals shall be made within 60 days of the date of the letter returning the material to be modified or corrected, unless within 30 days Contractor submits an acceptable request for an extension of the stipulated time period, listing the reasons the resubmittal cannot be completed within that time. The need for more than one resubmittal, or any other delay in obtaining Engineer's review of submittals, will not entitle Contractor to extension of the Contract Times unless delay of the Work is the direct result of a change in the Work authorized by a Change Order or failure of Engineer to review and return any submittal to Contractor within the specified review period.
- B. When submitted for the Engineers' review, all shop drawings shall bear the Contractor's certification that he has reviewed, checked and approved the shop drawings, that they are in harmony with the requirements of the Project and with the provisions of the Contract Documents, and that he has verified all field measurements and construction criteria, materials, catalog numbers and similar data. The Contractor shall also certify that the work represented by the shop drawings is recommended by the Contractor and the Contractor's Guaranty will fully apply.
- C. All samples called for in the Specifications or required by the Engineer shall be furnished by the Contractor and shall be submitted to the Engineer for his review. Samples shall be furnished so as not to delay fabrication, and to allow the Engineer reasonable time for the consideration of the samples submitted.
- D. Checking of submittals is only for general conformance with the design concept

of the project and general compliance with the information given in the contract documents. Any action shown is subject to the requirements of the plans and specifications. Contractor is responsible for: dimensions which shall be confirmed and correlated at the job site; fabrication processes and techniques of construction; coordination of his work with that of all other trades; and the satisfactory performance of his work.

- E. The Contractor may only proceed with fabrication and construction of items with returned submittals marked "No Exception Taken", "Make Corrections as Noted" or "Noted : No Action Required". Resubmit submittals if marked "Rejected", "Revise and Resubmit" or "Submit Specified Item."
- F. The Contractor shall furnish such samples of material as may be required for examination and test. All samples of materials for tests shall be taken according to ASTM Specifications or as provided in the Contract Documents.
- G. All samples shall be submitted by the Contractor with a covering letter indicating that such samples are recommended by the Contractor for the service intended and that the Contractor's Guaranty will fully apply.
- H. All materials, equipment and workmanship shall be in accordance with samples guaranteed by the Contractor and reviewed by the Engineer.
- I. Submittals requiring a Certificate of Design will be considered incomplete and not acceptable unless a complete Certificate of Design is submitted.
- J. The Certificate of Design requires that the engineer providing the submittal carries Professional Liability insurance meeting the requirements laid out in the "General Terms and Conditions" and additionally meeting the requirements of the "Supplemental General Conditions" to the Contract.

#### 1.4 CONTRACTOR'S ORDER OF CONSTRUCTION

- A. The Contractor shall submit schedules and reporting information in accordance with the requirements of Section 01310 – Construction Progress Schedules

#### 1.5 CONTRACTOR'S COST BREAKDOWN

- A. The Contractor shall submit a schedule of values.

#### 1.6 CERTIFICATE OF DESIGN

## CERTIFICATE OF DESIGN

The undersigned hereby certifies that he/she is a Professional Engineer registered in the state of \_\_\_\_\_ and that he/she has been employed by (Name of Contractor) \_\_\_\_\_ to design \_\_\_\_\_ in accordance with Specifications Section \_\_\_\_ for the (Name Project) \_\_\_\_\_. The undersigned further certifies that he/she has performed similar designs previously and has performed the design of the \_\_\_\_\_; and regulations and professional practice standards; that his/her signature and Professional Engineer (P.E.) Stamp have been affixed to all calculations and drawings used in, and resulting from, the design; and that the use of that stamp signifies the responsibility of the undersigned for that design.

The undersigned hereby certifies that he/she has Professional Liability Insurance and a Certificate of Insurance is attached.

The undersigned hereby agrees to make all original design drawings and calculations available to the City of Somerville or Owner's representative with seven (7) days following written request therefore by the Owner.

\_\_\_\_\_  
P.E. Name

\_\_\_\_\_  
Contractor's Name

\_\_\_\_\_  
P.E. Registration Number, State of Registration and Discipline

\_\_\_\_\_  
Signature

\_\_\_\_\_  
Signature

\_\_\_\_\_  
Title

\_\_\_\_\_  
Title

\_\_\_\_\_  
Address

\_\_\_\_\_  
Address

\_\_\_\_\_  
Telephone

\_\_\_\_\_  
Telephone

\_\_\_\_\_  
Email Address

\_\_\_\_\_  
Email Address

PART 2 – PRODUCTS (Not Used)

PART 3 – EXECUTION (Not Used)

PART 4 – COMPENSATION (Not Used)

END OF SECTION 01300

## SECTION 01310

### CONSTRUCTION PROGRESS SCHEDULES

#### PART 1 - GENERAL

##### 1.1 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.

##### 1.2 SUMMARY

- A. The scheduling of the Work under the Contract shall be performed by the Contractor in accordance with the requirements of this Section. Contractor shall prepare and submit to Engineer for review within 15 days after the date of commencement stated in the Notice to Proceed, a construction progress schedule.
- B. No work shall be done between 4:00 p.m. and 7 a.m., nor on Sundays or legal holidays, except where required, without written permission of OWNER. Emergency work may be done without prior permission.
- C. Night work may be established by CONTRACTOR as regular procedure with written permission of OWNER. Such permission, however, may be revoked at any time by OWNER if CONTRACTOR fails to maintain adequate equipment and supervision for proper prosecution and control of work at night.
- D. No work beyond a five-day week or 9-hour day which requires the Engineer to be present shall be allowed. If the Contractor wishes to work beyond the number of hours or days stated herein, he shall submit his request in writing to the Engineer for review. Contractor completion times will be adjusted to reflect extended work periods.
- E. The City moratorium period is typically November 1 – April 1 at the discretion of the City DPW Commissioner.

##### 1.3 FORM OF SCHEDULES

- A. Prepare schedules in form of a horizontal bar chart.
  - 1. Provide separate horizontal bar for each trade or operation.
  - 2. Horizontal time Scale: Identify first work date of each week.
  - 3. Scale and spacing to allow space for notations and future revisions.

B. Format of Listings: Chronological order of start of each item of work.

C. Identification of Listings: By major specification section numbers.

#### 1.4 CONTENT OF SCHEDULE

A. Within 15 calendar days after the commencement date stated in the Notice to Proceed, the Contractor shall submit for review by the Owner an electronic and hard copy of the Construction Progress schedule. This submittal shall have already been reviewed and approved by the Contractor's Project Manager, Project Superintendent, and the Project Estimator prior to submission.

B. The Construction Progress Schedule shall show a complete interdependence and sequence of construction and project related activities reasonably required to complete the Work. The Construction Progress Schedule shall also describe the activities to be accomplished and their logical relationships and show a discernible Critical Path. Show dates for beginning and completion of each major element of construction and installation dates for major terms of equipment. Elements shall include, but not limited to, the following:

1. Shop drawing submittal – review periods.
2. Material and equipment order, and delivery.
3. Pre-Construction Survey
4. Traffic Management and Detour Setup
5. Storm Drain Access Pit Excavation
6. Storm Drain installation and rehabilitation.
7. Testing
8. Backfilling, grading, seeding, landscaping, and paving.
9. Subcontractor's items of work.
10. Final cleanup.
11. Allowance for inclement weather.

B. Revisions to the Original Construction Progress Schedule: The Owner reserves the right to require that the Contractor adjust, add to, or clarify any portion of the schedule which may later be discovered to be insufficient for the monitoring of the Work, coordinating the Work with the work of other contractors in the area or approval of partial payment requests. No additional compensation will be provided for such adjustments, additions or clarifications.

C. Acceptance: The acceptance of the Contractor's schedule by the Owner will be based solely upon the schedule's compliance with the Contract requirements. By way of the Contractor assigning activity duration and proposing the sequence of the Work, the Contractor agrees to utilize sufficient and necessary management and other resources to perform the work in accordance with the schedule. Upon submittal of a schedule update, the updated schedule shall be considered the "current" project schedule.



- D. Submission of the Contractor's progress schedule to the Owner shall not relieve the Contractor of total responsibility for scheduling, sequencing, and pursuing the Work to comply with the requirements of the Contract Documents, including adverse effects such as delays resulting from ill-timed work.
- E. Updates and Periodic Construction Progress Schedule Submittals: Following the acceptance of the Contractor's Original Construction Schedule, the Contractor shall monitor the progress of the Work and adjust the schedule to reflect actual progress and any changes in planned future activities. Each schedule update submitted must be complete including all information requested in the original schedule submittal. Each update shall continue to show all work activities including those already completed. These completed activities shall accurately reflect the "as built" information by indicating when the work was actually started and completed.
- F. Neither the submission nor the updating of the Contractor's original schedule submittal nor the submission, updating, change or revision of any other report, curve, schedule or narrative submitted to the Owner by the Contractor under this Contract, nor the Owner's review or acceptance of any such report, curve, schedule or narrative shall have the effect of amending or modifying, in any way, the Contract completion date or milestone dates or of modifying or limiting, in any way, the Contractor's obligations under this Contract. Only a signed, fully executed change order can modify these contractual obligations.

## 1.5 SCHEDULE REVISIONS

- A. Every 30 days CONTRACTOR shall revise construction schedule to reflect changes in progress of work.
- B. Indicate progress of each activity at date of submittal.
- C. Show changes occurring since previous submittal of schedule.
  - 1. Major changes in scope.
  - 2. Activities modified since previous submittal.
  - 3. Revised projects of progress and completion.
  - 4. Other identifiable changes.
- D. Provide a narrative report as needed to define.
  - 1. Problem areas, anticipated delays, and impact on schedule.
  - 2. Corrective action recommended and its effect.

3. Effect of changes on schedules of other CONTRACTORS.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION 01310

SECTION 01390

PRE CONSTRUCTION SURVEY

**1390.1 INTERNAL AND EXTERNAL BUILDING INSPECTIONS LUMP SUM**

**1390.2 INTERNAL AND EXTERNAL BUILDING INSPECTION LUMP SUM  
NEWBERNE ST.**

**1390.3 PRIVATE PROPERTY YARD INSPECTION LUMP SUM**

PART 1 - GENERAL

1.1 SUMMARY:

- A. Work under this section includes photography and video recording of surface conditions of interior and exterior of the following building and exterior areas or as otherwise required by the Geotechnical Engineer before commencement of the work.

Address	Survey Requirements
#32 Clifton Street	<u>Building Exterior:</u> southern wall and 50 ft. along southern end of east and west walls <u>Interior:</u> southern wall and 20 feet along southern end of east and west walls. <u>Yard Inspection:</u> Extent of inspection within property limits of 32 Clifton St. and the Clifton St ramp access to the existing Somerville Community Path
71, 73, 89, 91, 93, 95 and 97 Winslow Avenue	<u>Building Exteriors:</u> southern walls <u>Interior:</u> interior survey not required <u>Yard Inspection:</u> Extent of inspection within property limits of 71, 73, 89, 91, 93, 95 and 97 Winslow Avenue
Two properties at the southern end of Newberne Street, as indicated on the drawings	<u>Building Exterior:</u> within 50 ft. east and west of proposed work. <u>Interior:</u> within 50 ft. east and west of proposed work.

- B. Perform post-construction survey at properties where a damage claim has been reported at the Contractor's expense.

1.2 QUALITY ASSURANCE

A. Qualifications

1. The company engaged to perform the pre- and post-construction surveys shall, during the past 5 years, have successfully completed photographing and video recording three construction projects of similar scope and dollar value as the construction project which is the subject of this Contract.
2. Qualifications of the firm performing the pre- and post-construction building surveys:
  - a. Inspections shall be performed by or under the direct supervision of a Registered Professional Engineer, licensed in the Commonwealth of Massachusetts. This individual shall have at least 3 years' experience in the inspection or design of residential and commercial structures.

1.3 SUBMITTALS:

- A. Submit in accordance with Section 01300 Submittals.
- B. Submit prior to performing any photography and video work, the qualification of the firm performing the photography and video recording work. Include a list of projects to demonstrate compliance with paragraph 1.2.A.1 of this section. For each project, include project name, location, owner, year(s), name of general contractor, and current address and phone number of the owner or owner's representative.
- C. Within 30 days of Notice to Proceed, or 2 weeks prior to mobilization, whichever is earlier, submit four (4) copies of pre-construction ("before") Building Condition Survey reports for each building indicated herein to ENGINEER. Building Condition Survey reports shall be PDF reports provided by DVD. Reports shall include the following:
  1. Descriptions and sketches documenting the detailed visual examination of the interior and exterior of structures, buildings, and outside areas.
  2. DVD including pre-construction video and photographs for each property.
  3. Log of Videos
  4. Log of Photographs
- D. Submit written release(s) from the photographer and photographic studio covering all videos photos taken as specified. Submit each release at the time of development of the subject video and/or photograph.

1.4 SEQUENCING AND SCHEDULING:

- A. Pre-construction photography and video, including pre-construction building surveys and exterior areas shall be completed prior to beginning of construction.
- B. Post-construction building condition survey work: only of areas where a damage claim has been reported.
- C. Dates for other photography and video recording at the site shall be coordinated with the ENGINEER.

1.5 WORKSITE CONDITIONS

- A. Right of entry for building conditions survey: The OWNER will obtain the right of entry for all structures to be surveyed.
  - 1. Prior to contacting the individual building owners, the OWNER will provide a general notice describing the project and the need to obtain access to each building. The Contractor shall not contact individual building owners until after the OWNER has provided notice to the building owners.

PART 2 - PRODUCTS

2.1 MATERIALS:

- A. Video:
  - 1. Format: Digitally recorded and submitted on DVD.
  - 2. Video Identification:
    - a. Video Number:####-yyy  
  
Where: ### = Contract Number  
yyy = video number, sequentially numbered from 001
    - b. Clearly identify and indicate:
      - 1) Project name and Contract No.
      - 2) General description of the subject(s) of the video.
      - 3) Date (s)
  - 3. Log of Videos: Provide a tabular log of all videos taken for this Contract. The log shall include a description of each video that includes all the information specified in paragraph 2.1.A.2 of this section.

B. Photographs:

1. Electronic format, submitted on DVD

2. Identification:

a. Photograph number: ####-yyy-zz

Where: #### - Contract Number  
yyy – Building identifier from 001  
zz – Photograph number, sequentially numbered from 01  
for each building

b. Clearly identify and indicate:

- 1) Project name and Contract No.
- 2) The location (e.g., station number) where the photograph was taken.
- 3) The view/orientation of the photograph (compass direction and vertical declination of view (e.g., horizontal, looking up, looking down, etc.))
- 4) Identification of main features in view.
- 5) Any other data and information pertinent to the purpose and identification of the exposure.
- 6) Date and time.
- 7) Weather conditions (for exterior shots).

3.

4. Master Log of Photographs:

- a. Include a separate tabular log of all photographs and cross-reference which photo numbers are included for each property.

PART 3 - EXECUTION

3.1 GENERAL PHOTOGRAPH AND VIDEO RECORDING:

A. General:

1. All views shall contain a relative dimension reference that is easily recognizable. In views where dimensions are critical use a recognizable measuring device such as folding ruler or measuring tape in a manner that the markings are clean and sharp in the photograph and the device located in close relationship to the subject of the photograph.
- B. Detailed examination of the accessible areas of structures, buildings and outside areas shall include documentation of exterior visual survey of the property, on-site improvements, private property landscaping and hardscaping features and plantings; detailed video inspections of the exteriors of buildings; color photographs of the exteriors showing visually evident structural faults, including but not limited to:
1. exterior façade and interior for structures indicated herein.
  2. location and size of cracks in exterior/interior walls, especially instances of cracked or missing plaster within defined survey areas;
  3. damaged masonry or roofing with the defined survey areas;
  4. damaged windows or doorway within the defined survey areas;
  5. walls which are not vertical within the survey area;
  6. damage to foundation, including exterior/interior basement walls; and tightness of fit of doors and windows with respective jambs.;
  7. sidewalks, paved areas, utility poles, stairways, patios, retaining walls, and landscaped areas.

#### PART 4 – COMPENSATION

##### **Item 1390.1 – Internal and External Building Inspections**

###### METHOD OF MEASUREMENT:

Measurement for payment for Internal and External Building Inspections will be based on a percent of the Lump Sum bid calculated by dividing the elapsed time to date by the contractual construction time limit as approved by the engineer.

###### BASIS OF PAYMENT/ INCLUSIONS:

Under the Lump Sum Price for Internal and External Building Inspections, the Contractor shall furnish all labor, materials, instrumentation, tools, equipment, and incidentals required to complete internal and external building and exterior area within the property limits inspections for the 8 buildings adjacent to the work, irrespective of the number of units within a building. The 8 properties to be paid for under this item include 71 Winslow Avenue, 73 Winslow Ave., 89 Winslow Ave., 91 Winslow Ave., 93 Winslow Ave., 95 Winslow Ave., 97 Winslow Ave., and 32 Clifton St. Payment under this Item includes, but

is not limited to, up to 3 documented attempts to notify the property owner(s) via certified mail; video inspection and documentation of internal and external conditions; submitting DVD and report of internal and external inspection to the Engineer.

**SPECIAL NOTES/ EXCLUSIONS:**

Performing a post-construction survey at properties where a damage claim has been reported shall not be paid for under this Bid Price Item and are at the Contractor's expense.

**Item 1390.2 – Internal and External Building Inspections Newberne St.**

**METHOD OF MEASUREMENT:**

Measurement for payment for Internal and External Building Inspections will be based on a percent of the Lump Sum bid calculated by dividing the elapsed time to date by the contractual construction time limit as approved by the engineer.

**BASIS OF PAYMENT/ INCLUSIONS:**

Under the Unit Price for Internal and External Building Inspections, the Contractor shall furnish all labor, materials, instrumentation, tools, equipment, and incidentals required to complete internal and external building and exterior area within the property limits inspections for 2 buildings adjacent to the work. The 2 properties to be paid for under this item include the Moriarty Property and Thalia Tringo Property identified on the drawings at the southern end of Newberne St. Payment under this Item includes, but is not limited to, up to 3 documented attempts to notify the property owner(s) via certified mail; video inspection and documentation of internal and external conditions; delivering DVD and report of internal and external inspection; and re-inspection of internal and external building and exterior areas as determined by the Engineer.

**SPECIAL NOTES/ EXCLUSIONS:**

Performing a post-construction survey at properties where a damage claim has been reported shall not be paid for under this Bid Price Item and are at the Contractor's expense.

**Item 1390.3 – Private Property Yard Inspection**

**METHOD OF MEASUREMENT:**

Measurement for payment for Private Property Yard Inspection will be based on a percent of the Lump Sum bid calculated by dividing the elapsed time to date by the contractual construction time limit as approved by the engineer.

**BASIS OF PAYMENT/ INCLUSIONS:**

Under the Unit Price for Internal and External Building Inspections, the Contractor shall furnish all labor, materials, instrumentation, tools, equipment, and incidentals required to complete private property yard inspection adjacent to the work. The 8 properties to be paid for under this item include the 32 Clifton St., 71, 73, 89, 91, 93, 95, and 97 Winslow Ave. Payment under this Item includes, but is not limited to, up to 3 documented attempts to notify the property owner(s) via certified mail; video inspection and documentation of



existing yard conditions; delivering DVD and report of private property yard inspection; and private property yard inspection as determined by the Engineer.

**SPECIAL NOTES/ EXCLUSIONS:**

Performing a post-construction survey at properties where a damage claim has been reported shall not be paid for under this Bid Price Item and are at the Contractor's expense.

END OF SECTION 01390

[THIS PAGE INTENTIONALLY LEFT BLANK]

SECTION 01400

QUALITY CONTROL

**1400.1                      QUALITY CONTROL AND TESTING                      ALLOWANCE**

PART 1 - GENERAL

1.1    DESCRIPTION

- A.    This section includes quality assurance and control of installation and manufacturer's field services and reports.

1.2    RELATED TECHNICAL SECTION

- A.    Section 01200 – General Requirements for Utility Work
- B.    Section 02210 – Earth Excavation, Backfill, Fill, and Grading

1.3    WATERTIGHTNESS

- A.    All structures, pipes, and equipment which are to contain water shall be watertight under all operating conditions for which they are intended. The Contractor shall furnish all labor, materials and equipment and do all work required by the Engineer to make all such parts of the work watertight, or to replace them if in the opinion of the Engineer any leakage is excessive. All such parts of the work filled with water for testing watertightness shall be left filled as required by the Engineer.

1.4    CARE OF WATERCOURSES

- A.    The Contractor shall maintain the flow in all watercourses, whether open channels or in pipes, in all sewers and other pipes interfered with in the line of work and convey the flow to a suitable point of discharge so as not to flow upon the work or create a nuisance. In the discharge of water removed from the excavations by pumping or by gravity similar precautions shall be observed as well as those outlined in specifications relating to contaminated and hazardous materials.

1.5    HYDRANTS

- A.    Fire hydrants on or adjacent to the work shall be kept accessible to fire-fighting equipment at all times.

1.6    MANUFACTURER'S FIELD SERVICES AND REPORTS

- A.    When specified in individual specification sections, provide material or

product supplier's or manufacturer's technical representative to observe site conditions; conditions of surfaces and installation; quality of workmanship; start-up of equipment; operator training, testing, adjustment, and balance of equipment as applicable; and to initiate operation, as required. Conform to minimum time requirements for start-up operations and operator training if defined in specification sections.

- B. At the Owner's or Engineer's request, submit qualifications of the manufacturer's representative 15 days in advance of required representative's service. The representative shall be subject to approval of the Owner and Engineer.
- C. Manufacturer's representative shall report observations and site decisions or instructions given to applicators or installers that are supplemental or contrary to manufacturer's written instructions. Submit reports within 14 days of observation to Engineer for review.

PART 2 – PRODUCTS (Not Used)

PART 3 – EXECUTION (Not Used)

PART 4 – COMPENSATION

**Item 1400.1 – Quality Control and Testing**

**METHOD OF MEASUREMENT:**

Payment will be made against the allowance based on invoices submitted by the General Contractor on a monthly basis. Labor, professional services, technician, and other invoices shall include a breakdown of hours, labor rates, direct expenses all sub-consultant and contractor mark-ups, material costs, shipping, taxes and all other costs included in the request. Incomplete or incorrect invoices will not be approved.

The General Contractor is allowed up to a 5% Mark-up on labor, professional service, technician, and other costs related to testing.

**BASIS OF PAYMENT:**

The allowance for this item shall be reimbursement to the General Contractor to furnish all labor, professional services, technician, equipment, and incidentals for testing required in this contract and not included in other pay items. The work includes, but is not limited to, testing for: backfill compaction, concrete and Hot Mix Asphalt standard paving compaction testing items.

**SPECIAL NOTES/EXCLUSIONS:**

Contamination testing, pipe and manhole testing, water main testing, test pits and all other testing not explicitly called out in this Section will not be paid for under this item and are covered under separate pay items.

END OF SECTION 01400

Bike Path Drainage Upgrades  
Willow Ave. to Grove St.  
Somerville, MA  
20163393.002A

QUALITY CONTROL  
01400-3

[THIS PAGE INTENTIONALLY LEFT BLANK]

## SECTION 01500

### TEMPORARY FACILITIES AND CONTROLS

#### PART 1 - GENERAL

##### 1.1 PLANT

- A. The Contractor shall furnish plant and equipment which will be efficient, appropriate and large enough to secure a satisfactory quality of work and a rate of progress which will insure the completion of the work within the time stipulated in the Contract. If at any time such plant appears to the Engineer to be inefficient, inappropriate or insufficient for securing the quality of work required or for producing the rate of progress aforesaid, he may order the Contractor to increase the efficiency, change the character or increase the plant equipment, and the Contractor shall conform to such order. Failure of the Engineer to give such order shall in no way relieve the Contractor of his obligations to secure the quality of the work and rate of progress required.

##### 1.2 SUBMITTALS

- A. The Contractor shall submit a complete work plan including: proposed hours of operation, sequencing of work, number of shifts, number of work crews, and anticipated conflicts with existing utilities and facilities throughout the project. The work plan shall also include dates for temporary facility service interruption and required utility relocation. The plan shall also include a detailed schedule of all cooperation requirements with owners/operators of existing utilities and facilities.

##### 1.3 PRIVATE LAND

- A. The Contractor shall not enter or occupy private land outside of easements, except by permission of the Owner through right of entry documents.

##### 1.4 PIPE LOCATIONS

- A. Pipelines shall be located substantially as indicated on the Drawings, but the Engineer reserves the right to make such modifications in locations as may be found desirable to avoid interference with existing utilities, structures or for other reasons.
- B. Where fittings are noted on the Drawings, such notation is for the Contractor's convenience and does not relieve him for laying and jointing different or additional items where required.

## 1.5 HAULING, HANDLING AND STORAGE OF MATERIALS

- A. The Contractor shall, at his own expense, handle and haul all materials furnished by him and shall remove any of his surplus materials at the completion of the work. The Contractor shall provide suitable and adequate storage for equipment and materials furnished by him and shall be responsible for any loss or damage to any equipment or materials by theft, breakage, or otherwise. The Contractor shall be responsible for all damages to the work under construction during its progress and until final completion and acceptance even though partial payments have been made under the Contract.

## 1.6 OPEN EXCAVATIONS

- A. All open excavations shall be adequately safeguarded by providing temporary barricades, steel plates, construction and caution signs, concrete barriers, protective 7' tall fencing, lights and other means to prevent accidents to persons, vehicles, and damage to property. The Contractor shall, at his own expense, provide suitable and safe means for completely covering all open excavations and for accommodating pedestrian and/or vehicular travel when work is not in progress. Bridges provided for access to private property during construction shall be removed when no longer required. The length of open trench will be controlled by the particular surrounding conditions but shall always be confined to the limits prescribed by the Engineer. If the excavation becomes a hazard, or if it excessively restricts traffic at any point, then special construction procedures shall be taken, such as limiting the length of open trench.

## 1.7 TEST PITS

- A. Test pits for the purpose of locating underground pipeline or structures in advance of the construction shall be excavated and backfilled by the Contractor in accordance with the requirements of the Engineer, as shown on the Drawings, or described in the Specifications, or as directed by the Owner or Engineer. Test pits shall be backfilled and compacted immediately after their purpose has been completed and the surface restored and maintained as required by the Engineer.

## 1.8 PROTECTION AND RELOCATION OF EXISTING STRUCTURES AND UTILITIES

- A. The Contractor shall assume full responsibility for the protection of all buildings, structures, and utilities, public or private, including, but not limited to, poles, signs, services to buildings, utilities in the street, gas pipes, water pipes, hydrants, sewers, drains, and electric and telephone cables, fiber optic lines, fire signals, cable television cables, whether or not they are shown on the Drawings. The Contractor shall carefully support and protect all such structures



and utilities from injury of any kind. The Contractor shall notify the owner/operator of the proposed work and proposed protection plan so the owner/operator can review and approve protection measures. The Contractor is required to comply with all provisions of Massachusetts General Laws Chapter 353 entitled "Excavations-Public Ways-Notice Requirements" otherwise known as Dig Safe. Any damage resulting from the Contractor's operations shall be repaired by him at his expense.

- B. The Contractor shall bear full responsibility for obtaining all locations of underground structures, utilities, and services. Services to buildings shall be maintained and all costs or charges resulting from damage thereto shall be paid by the Contractor.
- C. Protection and temporary removal and replacement of existing utilities and structures as described in this section shall be a part of the work under the Contract. The Contractor will be responsible for the removal and replacement of existing utilities or coordination with the owners/operators of the existing utilities and assisting the existing utilities where required.
- D. If, in the opinion of the Engineer, permanent relocation of a utility owned by the City of Somerville is required, that is not shown on the plans or the specifications; he may require the Contractor, in writing, to perform the work. Work so ordered will be paid for as extra work under provisions of the General Conditions. If relocation of a privately owned utility is required, the Contractor will notify the utility to perform the work as expeditiously as possible. The Contractor shall fully cooperate with the Owner and utility, and shall have no claim for delay due to such relocation. The Contractor shall notify public utility companies in writing at least seven days (excluding Saturdays, Sundays and legal holidays) before excavating or working in any public way. The Contractor shall notify public utilities 30 days prior to any service call wherever possible.

#### 1.9 WATER FOR CONSTRUCTION PURPOSES

- A. The Contractor will be allowed to purchase water from the Owner for construction testing and start-up purposes.
- B. The express approval of the Somerville Water Department shall be obtained before water is used. Water shall be metered as specified by the Somerville Water Department. Hydrants shall only be operated under the supervision of Somerville Water Department personnel. Meters and backflow preventers shall be procured from the Somerville Water Department. Contractor shall coordinate with the Somerville Water Department in advance of procuring a meter and backflow preventer to provide all documentation required.

- C. No direct cross connections will be permitted between the public water supply and the new water mains, or any other point where the possibility of backflow of contaminated water exists. All connections to points where there is the possibility of backflow shall be arranged to prevent backflow and shall be approved by the City's Water Superintendent or his representative before they are put into operation.

#### 1.10 PROTECTION OF CONSTRUCTION AND EQUIPMENT

- A. All newly constructed Work shall be carefully protected. No driving or wheeling, walking or placing of heavy loads on newly constructed Work shall be allowed. All portions damaged shall be reconstructed, repaired, or replaced by the Contractor at his own expense.
- B. All elements of the Work shall be protected in a manner approved by the Engineer. Should any part of the Work become heaved, cracked, or otherwise damaged, all such damaged portions of the Work shall be completely repaired and made good by the Contractor at his own expense as required by of the Engineer.
- C. If, in the final or any daily inspection of the Work, any defects, faults or omissions are found, the Contractor shall cause the same to be repaired or removed and replaced by proper materials and workmanship without extra compensation for the materials and labor required. Further, the Contractor shall be fully responsible for the satisfactory maintenance and repair of the construction and other work undertaken herein for at least the guarantee period described in the Contract Documents.
- D. The Contractor shall take all necessary precautions to prevent damage to all elements of the Work due to water pressure during and after construction and until such Work is accepted and taken over by the Owner.

#### 1.11 CARE AND PROTECTION OF PROPERTY

- A. The Contractor shall be responsible for the preservation of all public and private property, and shall use every precaution necessary to prevent damage thereto. If any direct or indirect damage is done to public or private property by or on account of any act, omission, neglect, or misconduct in the execution of the Work on the part of the Contractor, such property shall be restored by the Contractor at his expense to a condition similar or equal to that existing before the damage was done or he shall make good the damage in another manner acceptable to the Owner and Engineer.
- B. Along the location of this Work, all fences, walks, bushes, trees, shrubbery, and other physical features shall be protected and restored in a thoroughly workmanlike manner. Fences and other features removed by the Contractor shall be replaced in their original location or at a location indicated on the

Drawings as soon as conditions permit. All grass areas beyond the limits of construction which have been damaged by the Contractor shall be graded and seeded.

- C. Trees close to the work shall be boxed or otherwise protected against injury. No trees shall be cut, braced, or damaged without prior notification and the approval of the City Arborist.
- D. The protection, removal, and replacement of existing physical features along the line of work shall be a part of the work under the Contract, and all costs in connection therewith shall be included in the Bid Proposal unless a Bid Item has been established elsewhere in these Construction Documents for the express payment of that specific item of Work.

#### 1.12 INSTALLATION OF EQUIPMENT

- A. All wedges, shims, filling pieces, keys, packing, red or white lead grout, or other materials necessary to properly align, level and secure apparatus in place shall be furnished by the Contractor. All parts intended to be plumb or level must be proven exactly so. Any grinding necessary to bring parts to proper bearing after erection shall be done at the expense of the Contractor.

#### 1.13 REJECTED MATERIALS AND DEFECTIVE WORK

- A. Materials furnished by the Contractor and condemned by the Engineer as unsuitable or not in conformity with the specifications shall forthwith be removed from the work by the Contractor, and shall not be made use of elsewhere in the work. Any errors, defects or omissions in the execution of the work or in the materials furnished by the Contractor, even though they may have been passed or overlooked or have appeared after the completion of the work, discovered at any time before the final payment is made hereunder, shall be forthwith rectified and made good by and at the expense of the Contractor as required by the Owner and Engineer. The Contractor shall reimburse the Owner for any expenses, losses or damages incurred in consequence of any defect, error, omission or act of the Contractor or his employees, as required by the Owner and Engineer, occurring previous to the final payment.

#### 1.14 TEMPORARY UTILITIES

- A. Temporary Light and Power: The Contractor shall at his own expense, provide his own temporary light and power as required for the prosecution and completion of work, including light and power for the construction and engineering field office as well as light and power for dewatering pumps, and trench and staging area lighting.
- B. Temporary Heat: The Contractor shall, at his own expense, provide sufficient temporary heat to maintain minimum temperatures specified elsewhere, in all

areas designated elsewhere in these documents.

- D. Temporary Water: Water for drinking purposes and other usage will be provided by the Contractor at his own expense.
- E. Sanitary Provisions: The Contractor shall provide and maintain sanitary accommodations for the use of his employees and the Engineer, as may be necessary to comply with the requirements and regulations of the local and state departments of health.
- F. Maintaining Operation of the Existing Facilities:
  - 1. The Contractor shall provide temporary utilities and/or cooperate with utilities to maintain full service to the residences and buildings in the project area. The Contractor shall be responsible for careful consideration of the construction scheduling and anticipation of potential interferences with existing utilities, operations and structures. The Contractor shall maintain close communications with the Engineer and provide the Engineer with a detailed description of each proposed activity sufficiently in advance of its commencement for review and comments to be made.
  - 2. Temporary facilities which may be required include, but are not limited to, electrical power; lighting; heating; cooling; ventilating; telephone; cable television; potable water; fire protection; drainage; sanitary facilities; trench covers; protection of existing utilities; structures; streams; trees and shrubs; access roads; sewage conveyance; piping; and pumping. The Contractor will be responsible for providing, connecting, and maintaining emergency generators to serve homes in the event temporary electrical services cannot be established by the power company. The Contractor will be responsible to furnish a licensed electrician to connect the houses to the emergency generators, maintain the generators 24 hours a day, and disconnect the houses when service can be reestablished to the power lines. The generators will be provided and maintained at no additional cost to the Owner.
  - 3. The Contractor shall coordinate efforts with the owners and/or operators of the existing facilities to avoid any service interruption. The Contractor shall keep utilities informed of proposed work activity and notify utilities of required work four weeks in advance. The Contractor must schedule work to avoid repeated, unnecessary, or last minute service calls by the owners/operators of existing facilities.

#### 1.15 ACCESS TO THE WORK

- A. The Contractor shall provide sufficient and proper facilities at all times for inspection of all work under this project in preparation or in progress, by the

Owner, the agents and employees of the Owner, by authorized representatives of the Commonwealth of Massachusetts and the Federal Government and by the Engineers.

- B. The Contractor shall furnish the Engineer or his authorized representative and other personnel mentioned above with such facilities and assistance as are necessary to ascertain performance of the work in accordance with the plans and specifications.
- C. The Contractor must provide sufficient and safe access to existing facilities for the owners/operators of existing facilities to maintain service.

#### 1.16 POLLUTION CONTROL

- A. The Contractor shall conduct clean-up and disposal operations, as necessary, to comply with state and local ordinances and anti-pollution laws.
- B. Outdoor burning of rubbish and waste material on the site will not be permitted.
- C. Disposal of volatile fluid wastes (such as mineral spirits, oil, gasoline, or paint thinner) in storm, combined, or sanitary sewer systems or into streams or waterways is not permitted.

PART 2 – PRODUCTS (Not Used)

PART 3 – EXECUTION (Not Used)

PART 4 – COMPENSATION (Not Used)

END OF SECTION 01500

[THIS PAGE INTENTIONALLY LEFT BLANK]

SECTION 01505

MOBILIZATION

**1505.1**

**MOBILIZATION**

**LUMP SUM**

PART 1 - GENERAL

1.1 SUMMARY

A. This section includes mobilization consisting of moving all plant and equipment onto the site required for the contractors operations; furnishing and erecting plants, temporary buildings, and project and other construction facilities; erecting project signs and traffic management signs; implementing security features and requirements; all as required for the proper performance and completion of the Work. Mobilization shall further include the following principal items:

1. Developing construction water supply.
2. Providing on-site sanitary facilities and potable water facilities.
3. Arranging for and erection of Contractor's work and storage/staging yard(s).
4. Having all OSHA required notices and establishment of safety programs.
5. Having the Contractor's superintendent at the job site full time and having a project manager. The project manager shall not have superintendent duties.

PART 2 – PRODUCTS (Not Used)

PART 3 – EXECUTION (Not Used)

PART 4 – COMPENSATION

**Item 1505.1 - Mobilization**

**METHOD OF MEASUREMENT:**

Under the lump sum price bid for this item, the Contractor shall move his equipment, materials and personnel to the site and begin construction. At the completion of the work, Contractor shall demobilize all equipment, materials and personnel. Mobilization costs are

Bike Path Drainage Upgrades  
Willow Ave. to Grove St.  
Somerville, MA  
20163393.002A

MOBILIZATION  
01505-1

the costs of initiating the Contract, and closing out the Contract, exclusive of the cost of materials.

**BASIS OF PAYMENT:**

Under the Lump Sum price bid for Mobilization, the Contractor shall move his equipment to the site and prepare to begin construction. Mobilization shall include all costs of initiating the Contract, exclusive of the cost of materials. Mobilization includes securing and constructing a staging area(s) for materials; furnishing and paying for all utilities; furnishing and installing pre-construction traffic management signage; fabrication and installation of project sign; distributing contact numbers for Contractor's staff to Owner and Engineer; submission and approval of initial shop drawings; submission and approval of Traffic Management Plans; submission and approval of initial work plans and sequencing plans; installing temporary power, lighting and water for construction purposes; implementing security features; furnishing and installing temporary sanitary facilities; transporting all necessary trucks and construction equipment to the site necessary to begin construction; and all other work necessary to start Construction.

Payment for mobilization will be at the lump sum price bid for this item and will be limited to 50% of the lump sum amount of this item until the work is complete and the contractor has completely demobilized, which consists of removal of all equipment, unused products, and material. The initial payment of 50% mobilization costs shall be payable when the Contractor is operational on site. Operational shall mean the substantial commencement of work on site, not prior to commencement. The lump sum price bid for mobilization shall not exceed 5 percent of the total of all items excluding this item.

END OF SECTION 01505



SECTION 01568

EROSION CONTROL, SEDIMENTATION AND CONTAINMENT  
OF CONSTRUCTION MATERIALS

**1568.1                    SEDIMENTATION AND EROSION CONTROL                    LUMP SUM**

PART 1 - GENERAL

1.1 SUMMARY

- A. The Contractor shall provide all work and take all measures to control soil erosion resulting from construction operations, prevent flow of sediment from construction site.

1.2 SUBMITTALS

- A. Shop Drawings: Submit the following in accordance with Section 01300 - SUBMITTALS:
  - 1. Two weeks prior to the start of the work, the Contractor shall submit for review, a plan with detailed sketches showing the proposed methods to be used for controlling erosion during construction.
  - 2. Contractor shall submit manufacturer's literature describing products, installation procedures, and routine maintenance of the sediment filter device.

1.3 QUALITY ASSURANCE

- A. Use acceptable procedures, including water diversion structures, diversion ditches, settling basins, and sediment filter devices.
- B. Operations restricted to areas of work indicated on Contract Drawings.
- C. If construction materials are washed away during construction, contractor shall remove materials from fouled areas.

PART 2 – PRODUCTS

2.1 SEDIMENT FILTER DEVICE

- A. Sediment filter device shall be manufactured to fit the opening of the catch basin or drop inlet. The sediment filter device shall have the following features:
  - 1. Two dump straps attached at the bottom to facilitate the emptying of the device and shall have lifting loops as an integral part of the system.

2. Yellow restraint cord approximately halfway up the sack to keep the sides away from the catch basin walls. Yellow restraint cord is also a visual means of indicating when the sack should be emptied.
3. Fabric shall consist of a woven polypropylene geotextile and be sewn by a double needle machine, using a high strength nylon thread.
4. Sediment filter device shall have a certified average wide width strip tensile strength of 165 lbs/in per ASTM Standard D-4884.
5. The Contractor shall remove and restore sediment filter devices for anticipated weather events as required by the City or the Resident Engineer.

### PART 3 – EXECUTION

#### 3.1 GENERAL

- A. The Contractor shall not discharge chemicals, fuels, lubricants, bitumen, raw sewage, and other harmful waste into or alongside any body of water or into natural or manmade channel.
- B. It is the intent of these Specifications to prevent the unnecessary occurrence of sedimentation or siltation of waterways and private properties. In the event the sedimentation or siltation prevention measures used by the Contractor prove to be inadequate as determined by the Owner and Engineer, the Contractor shall be required to adjust his operations to the extent necessary to prevent any such sedimentation or siltation from occurring.

#### 3.2 INSTALLATION

- A. The Contractor shall protect catch basins by installing sediment filter devices as specified in this Specification in every catch basin within and downstream of the project limits.
- B. The Contractor shall install the sediment filter device before any work begins and shall place the device so that it is flush with the material around the frame of the grate of the catch basin structure. The Contractor shall be responsible for maintenance and placement of the strap lift holes to ensure that they do not become a hazard for pedestrians.
- C. The Contractor shall maintain the sediment filter device and remove the collected debris as required by the Engineer. If any material is lost in the removal of the sediment filter device, then the Contractor shall be responsible for cleaning of the catch basin. The Contractor shall inspect the position of the device to ensure that the sediment filter device will work properly during any heavy rain or any storm greater than a 10 year flood.

- E. Existing natural drainage patterns and vegetative cover shall be preserved to the maximum possible extent.
- F. The Contractor shall use temporary vegetation, mulching, gravel, and paving to protect areas exposed during construction. He shall minimize the amount of bare earth exposed at any one time during construction, and he shall also minimize the length of time bare earth is exposed.
- H. Water that is being pumped from the trenches or excavations shall not be pumped directly into water courses or pipe conveyance systems. At a minimum, sedimentation control measures shall include portable sedimentation tanks, pumps, and piping, or other means acceptable to the Owner and Engineer to meet the water quality parameters specified in both the Dewatering Permits and these Specifications, whichever is more stringent.
- I. Spoil resulting from the trench excavation shall be leveled or removed to permit free entry of water from adjacent land surfaces without excessive erosion or harmful ponding.

#### PART 4 – COMPENSATION

##### **Item 1568.1 – Sedimentation and Erosion Control**

###### BASIS OF PAYMENT/INCLUSIONS

Payment for Sedimentation and Erosion Control will be based on the bid for this item in the proposal. Under the Unit Price bid for this item, the Contractor shall furnish all labor, materials, tools, equipment and incidentals required to furnish, install, maintain, relocate, and remove all sedimentation and erosion control measures. Under the Unit Price bid for this item, the Contractor shall also furnish all labor, materials, tools, equipment and incidentals to prepare and submit all work plans and submittals; line all existing catch basins with sediment filter devices and remove prior to inclement weather; removal and disposal of all silt and sediment collected from sedimentation and erosion control measures; and all other items of work not specifically included herein or elsewhere required to furnish, install, maintain, relocate, and remove sedimentation and erosion control devices as specified and required.

###### METHOD OF MEASUREMENT:

Measurement for payment for Sedimentation and Erosion Control will be on a percent of the Lump Sum bid calculated by dividing the elapsed time to date by the contractual construction time limit as approved by the Engineer.

END OF SECTION 01568

[THIS PAGE INTENTIONALLY LEFT BLANK]

SECTION 01570

MAINTENANCE AND PROTECTION OF TRAFFIC

<b>1570.1</b>	<b>TRAFFIC AND PEDESTRIAN MANAGEMENT</b>	<b>LUMP SUM</b>
<b>1570.2</b>	<b>SAFETY SIGNING FOR CONSTRUCTION OPERATIONS</b>	<b>LUMP SUM</b>

PART 1 - GENERAL

1.1 SUMMARY

- A. Furnish all labor, equipment, and materials and perform all operations in connection with the maintenance and protection of vehicular, bicycle, and pedestrian traffic on all roads, state and local, directly or indirectly affected by the construction. The work of this section also includes maintaining access to all properties adjacent to the work.
- B. The Contractor is responsible for preparing and submitting a plan for traffic management to the Owner and Engineer, including updates as conditions warrant. The Contractor is responsible for design and implementation of revisions to the traffic management procedures during the course of the project at the requirements of the Engineer and at no additional cost to the Owner.
- C. The Contractor shall develop and implement a detailed Traffic Management and Control Plan and obtain approval from the City of Somerville Traffic Department and Department of Public Works prior to proceeding with the work.
- D. Furnish, erect, set, reset, relocate, move, remove, and dismantle sufficient signs, temporary lighting, barrels, flashers, channelizing devices (concrete barriers), fencing, and other traffic control devices on a continuous basis as necessary to protect the work and the general public at all times during construction in accordance with Contractor's approved Traffic Management and Control Plans. The work of this Section shall also include temporary bridging for traffic across excavations.
- E. The design, application, and installation of all traffic control devices required by this section shall conform to the requirements of the Manual on Uniform Traffic Control Devices (MUTCD) published by U.S. DOT, latest edition; American Disabilities Act (ADA); Massachusetts Architectural Access Board; and the Massachusetts Department of Transportation (MassDOT), Standard Specifications for Highways and Bridges, latest edition.

- F. “Approved by the Owner” throughout this Section shall mean the approval of the Somerville Department of Public Works and Traffic and Parking Department.
- G. Traffic control during construction also includes street sweeping and snow removal from sidewalks and streets within the work zone as described in section 3.1 D. Maintaining rubbish and recyclable removal is also required and described in Section 01500 - TEMPORARY FACILITIES AND CONTROLS.

## 1.2 REFERENCES

- A. Reference is made herein to the Commonwealth of Massachusetts, Highway Department, Standard Specifications for Highways and Bridges, latest edition. References made to particular sections or paragraphs in the Standard Specifications for Highways and Bridges shall include all related articles mentioned therein.
- B. Manual of Uniform Traffic Control Devices Part VI Standard and Guides for Traffic Controls for Streets and Highway Construction, Maintenance, Utility and Incident Management Operations, latest edition.

## 1.3 SUBMITTALS

- A. Submit the following in accordance with Section 01300 – SUBMITTALS:
  - 1. Traffic Management and Control Plan: Before starting any work under this Contract, the Contractor shall prepare a plan that indicates construction equipment movement and the traffic routing proposed by the Contractor during the various stages and time periods of the work, and the location of temporary pedestrian, bicycle routes and construction facilities, temporary barricades, signs, drums, and other traffic control devices to be employed during each stage and time period of the work, to maintain traffic and access to abutting properties. Particular care shall be taken to establish and maintain methods and procedures that will not create unnecessary or unusual hazards to public safety. The Plan shall be submitted a minimum of four weeks prior to the start of construction for acceptance by the Engineer and approved by the Owner and the City prior to start of Work. The Plan shall be reviewed on a daily basis with the Engineer during construction. The Plan shall include procedures for the Contractor to coordinate daily with the Owner and City Departments (Department of Public Works, Traffic and Parking Department, Police, Fire, and Emergency Medical Services).

2. Temporary Pedestrian Access Ramp Work Plan, Temporary Pedestrian Protection Work Plan and Temporary Pedestrian Detour Plan: Contractor shall provide a work plan detailing the location and layout of ramps and their protection, type of ramps and protection to be used with manufacturer's information, and duration the ramps and protection will be utilized. All pedestrian detours required shall be submitted for approval with these plans.
- B. Shop Drawings shall be submitted for review four weeks prior to start of construction. Thereafter, the Contractor shall submit to the Engineer updated Traffic Management and Control Plans a minimum of 10 working days prior to the start of construction at any new location or updates required in the work zone resulting from progress of Work throughout the duration of construction.
1. Submit complete shop drawings and work plans for staged construction and traffic movement including temporary vehicle, pedestrian, and bicycle as needed, certified by a Professional Engineer registered in the Commonwealth of Massachusetts.
  2. Show on the shop drawings all materials, dimensions, sizes, and methods of installation.
  3. Safety Signing for Construction Operations: The Contractor shall submit temporary pedestrian, bicycle, and traffic management sign placement and sign size sketches showing the proposed sign setups intended to be used to provide the necessary traffic control and protection during the progress of work, plus the sign and legend size and layout. These sketches shall be submitted to the Engineer, Owner and City for review and approval before work begins.
  4. When a detour or by-passing of vehicular traffic is anticipated, the Contractor shall submit for approval by the Engineer, Owner and City, a detour plan showing the proposed alternative routes and location, size, and type of signs and traffic controls to be used. The traffic routing through or around the Work and provisions for control of same shall be approved by the Engineer, Owner, and City.
  5. The Contractor shall submit a Truck and Hauling Route Work Plan for all proposed truck routes prior to mobilizing. No trucking or hauling will be allowed without the approval of the City of Somerville. No trucking or hauling will be allowed outside the proposed routes without the prior approval of the Engineer, Owner, and City. The Contractor is responsible for obtaining all permits and permissions. The Contractor is further responsible for obtaining approval for and coordinating parking restrictions required to facilitate trucking and hauling.

#### 1.4 SPECIAL REQUIREMENTS

Bike Path Drainage Upgrades  
Willow Ave. to Grove St.  
Somerville, MA  
20163393.002A

MAINTENANCE AND  
PROTECTION OF TRAFFIC  
01570-3

- A. The Contractor shall provide access for fire apparatus and other emergency vehicles through the work zones to abutting properties at all times.
- B. At the end of each workday, where trenches in areas of public travel are covered with steel plates, each edge of the plates shall be either beveled or protected by a bituminous concrete ramp as accepted by the Engineer. Temporary bituminous patching material may be used to construct the ramps. The cost of patching materials, and their maintenance and removal, will be considered incidental to the Traffic Management item with no separate payment elsewhere. Plates shall be pinned or welded together to eliminate movement, noise or vibration.
- C. Open excavations adjacent to the traveled way or shoulders shall not remain open through non-work hours unless steel plated for the passage of heavy vehicles or protected by concrete barricades or barriers and specifically authorized by the Owner, City and Engineer.
- D. Do not block more than one-side of the roadway at a time when making open cut or other street crossings unless otherwise approved.
- E. The Contractor shall be responsible for the costs in obtaining all permits to perform the Work.
- F. At least one serviceable driveway access to all residences and businesses within the project shall be maintained at all times unless otherwise approved.
- G. The Contractor shall provide temporary lighting to properly illuminate the work area and approaches in the event of nighttime work.
- H. The Contractor shall not allow unnecessary idling of trucks and/or equipment throughout the entire project area. The City of Somerville prohibits idling of trucks and equipment for periods of time exceeding five (5) minutes when not in use.
- I. The Contractor shall notify the Somerville Fire and Police Departments of any street closings.

#### 1.5 SEQUENCING AND SCHEDULING

- A. All streets within or adjacent to the contract limits, not specifically cited shall have their full roadway widths available for traffic or permitted parking at all times except for such restrictions as may be approved by the Owner, City and Engineer.
- B. Notify the Owner, City and Engineer at least 48 hours in advance (not including Saturday or Sunday or Holidays) prior to the access lane restriction of the



roadway. Notification shall include the date of the restriction, the hours of the day the roadway access will be restricted, and the estimated completion date.

- C. The Owner, City and Engineer shall be notified of any re-routing of traffic 48 hours in advance (not including Saturday or Sunday or Holidays). Approval shall be obtained from the Owner, City and Engineer prior to any re-routing of traffic (except emergencies).
- D. The Contractor shall verify street sweeping schedules in the work zone. Delivery related parking restrictions will not be permitted on days where street sweeping is scheduled unless otherwise approved.

#### 1.6 HAULING AND TRUCK ROUTES

- A. The Contractor is advised that all roads and bridges within or adjacent to the project shall be subject to legal loads, heights of vehicles and vehicle type / use restrictions. The Contractor is responsible for understanding the restrictions and obtaining all necessary permits.
- B. The Contractor is advised that no agreements have been made by the Owner, the City of Somerville, MassDOT, or with surrounding cities or towns to relieve the Contractor of liability for damage to local roads and bridges caused by the Contractor's operation. The Contractor shall contact appropriate officials of the surrounding cities, towns or agencies concerning hauling over city or town roads and bridges.

#### 1.7 STORAGE OF MATERIALS, PARKING OF CONSTRUCTION EQUIPMENT AND WORKER PARKING

- A. No material shall be stored within the work area or on adjacent roadways or residential streets except that which is needed to complete the work for that day.
- B. Construction workers shall park their vehicles within the work zone during work hours, and remove them thereafter. Parking outside the work zone will be required if the vehicles obstruct traffic flow.
- C. The Contractor shall park construction equipment within the work zone and protect equipment with barriers or barricades. Parking outside the work zone will be required if the equipment obstructs traffic flow.

#### 1.8 BARRICADES, WARNING SIGNS AND OTHER PROTECTIVE DEVICES

- A. Install, inspect, remove, maintain, and reset all temporary construction controls as frequently as required and in accordance with an approved construction staging sequence and traffic management plan.

- B. Regulatory and warning devices shall be subject to removal, replacement and repositioning as often as necessary, and as directed by the Owner and Engineer.
- C. Temporary pavement markings and devices shall be used as shown on the approved plans and as required by MUTCD and ADA standards for traffic control and pedestrian safety.

#### 1.9 POLICE DETAILS SERVICE

- A. Uniformed City, Municipal, or State police officers shall be utilized to maintain safe traffic flow throughout the construction period. A Police Detail is to be present during all construction activity. Scheduling Police Details shall be the responsibility of the Contractor. To schedule a detail officer, call (617) 349-3350.
- B. The Somerville Police Department requires 24-hour advance notice to obtain a Police Detail, except in emergencies and 4-hour advance notice to cancel a detail. Contractor shall use as many police details as needed to ensure the safety of pedestrians and traffic at all times.
- C. The Contractor shall coordinate all work with the police officers including but not limited to: locations of work, delivery of materials, equipment movement, required traffic management and schedules.
- D. The Contractor must submit all signed detail forms to the project managers or engineer, so that the City of Somerville can pay all submitted and approved Police Detail invoices. Any invoices that are not approved will be the responsibility of the Contractor to pay.
- E. The City of Somerville Police Department shall bill the City of Somerville Department of Public Works or the department having oversight of the contract for the services of uniformed police officers provided by the Police Department.
- F. The Contractor will be required to reimburse the the department having oversight of the contract for Police Details, if the Contractor fails to show for the job or if the Contractor fails to cancel the detail with adequate advance notice.

#### 1.10 PEDESTRIAN TRAFFIC

- A. Sidewalks shall be maintained at all times through the construction period. Temporary sidewalks, pedestrian detours and pedestrian and construction facilities shall be constructed as needed to maintain pedestrian traffic and

business access. The Contractor shall anticipate that temporary pavement markings (paint or tape) will be required in order to comply with this provision.

- B. Pedestrian access shall be provided to abutting land uses and businesses at all times, as approved by the Owner, City and Engineer and in accordance with MUTCD and ADA requirements.
- C. Unobstructed walkways of 4-foot minimum width, unless otherwise approved by the Owner, City and Engineer shall be provided at all times.
- D. Temporary pedestrian walkways shall be separated from roadway and construction areas by barricades and fence as approved by the Owner, City and Engineer.
- E. The Contractor shall be notified by telephone of any location not providing adequate pedestrian access. The Contractor shall acknowledge notification of the call within one (1) hour by contacting the Project Engineer or the Public Works Dispatcher at (617) 666-3311.
- F. The Contractor shall respond to the work site within one and a half (1.5) hours of acknowledged notification with sufficient equipment and labor to perform the required work.
- G. The Contractor's failure to respond within the specified response time twice within the Contract time will result in a permanent deduction of \$250.00 from Contract payments due.
- H. The Contractor's failure to respond within the specified response time three times within the Contract time will result in an additional permanent deduction of \$400.00 from Contract payments due.
- I. The Contractor's failure to respond within the specified response time four or more times within the Contract time will result in an additional permanent deduction of \$500.00, per each additional occurrence, from Contract payments due.
- J. Continued failure to provide adequate pedestrian access may result in the City terminating the contract in accordance with the General Terms and Conditions of the Contract.

#### 1.11 VEHICULAR CONTROL REQUIREMENTS

- A. The Contractor shall meet the following conditions, unless otherwise specifically approved by the Owner, City, and Engineer:

1. All work shall be prosecuted with proper regard for the convenience of the public and in a manner to permit unimpeded traffic flow whenever possible. The interruption of traffic will not be permitted unless specifically allowed by the Owner, City and Engineer and in accordance with the requirements of the Owner and City and in conformance with MUTCD requirements.
2. The Contractor shall be responsible for necessary coordination with the City departments affected by the project.
3. Traffic control devices and signs shall be removed, demounted or properly covered for those periods of the day not in use.
4. The Contractor shall coordinate the work with the schedules of City Rubbish and Recycling Collection trucks and delivery trucks to the adjacent stores and property owners so as not to impede their access, and cooperate with delivery personnel to facilitate deliveries to properties within the work zone.
5. No operations shall be conducted, including the loading or unloading of equipment or materials, on or near the traveled lanes or road shoulders without first erecting warning signs and channelizing devices. These precautions shall be maintained at all times while work, loading and unloading is in progress.
6. Construction signs and channelizing devices shall be used to separate traffic from the work areas and for traffic control. Placement, other than as shown in the plans or the MUTCD, will require prior approval.
7. Temporary signs and channelizing devices shall not be set up until there is adequate visibility or appropriate construction lighting. The Contractor shall schedule his work so that temporary signs and channelizing devices are removed and traffic is returned to its normal pattern before the end of the work period.
8. Work requiring overnight lane closures shall not begin until all materials required for the completion of each night's work are delivered or available to the project site, unless otherwise approved by the Owner, City and Engineer.
9. Accesses to buildings shall be maintained at all times.
10. Any blocked disability parking spaces to be temporarily relocated to another location within a reasonable distance from the permanent space.

11. Work operations shall not be performed on the roadway in such a manner that traffic is obstructed or endangered simultaneously from both sides of the roadway unless otherwise approved.
12. The Contractor shall keep all roadway areas open to traffic as clear as possible at all times. Materials shall not be stored on any roadway area or within 4-ft. of the traveled way. Material shall be delivered to the installation areas as they are needed to provide a continuous installation. Location of storage areas shall be subject to approval.
13. The Contractor shall remove all equipment and construction vehicles from the traveled way and shoulders open to traffic during non-work hours. Vehicles shall be parked no closer than 4-feet from the traveled way in pre-approved areas unless specifically permitted.
14. Each driver of any vehicle or piece of equipment used on this contract shall be furnished written instructions concerning the manner of operation for that vehicle or piece of equipment. Specifically, these instructions shall warn against stopping on the traveled portions of the roadway, against passing other vehicles, and against traveling in close proximity to other vehicles. A copy of these instructions shall be given to the Engineer.
15. Temporary signs and channelizing devices shall not be set up in inclement weather.
16. The Contractor shall furnish 60-inch x 30-inch approved signs reading "CONSTRUCTION VEHICLE - DO NOT FOLLOW" to be used on trucks hauling to the project, when such signs are deemed necessary by the City and/or Engineer. The color, type of sheeting and size of lettering shall conform to that of the permanent construction signs.
17. The Contractor shall furnish, install, and maintain 36-inch x 36-inch approved signs reading "ROUGH ROAD" in advance of all roadway areas which have been cold-planed.
18. The Contractor shall furnish, install and maintain additional temporary cones and barrels, as required by the Engineer, after Traffic Calming devices (horizontal and vertical deflections) have been constructed.
19. The Contractor will be responsible for snow removal within active work zones.

## 1.12 BICYCLE CONTROL REQUIREMENTS

A. The Contractor shall meet the following conditions, unless otherwise specifically approved by the Owner, City, and Engineer:

1. Bicycle traffic shall be accommodated on all public streets either within bicycle lanes where existing or in vehicular travel lanes.
2. When travel lanes are restricted to less than 14-foot in width warning signage (W11-1/W16-1 combination - Bicycle warning symbol with SHARE THE ROAD plaque) shall be placed warning motor vehicle operators of the presence of bicycles in the roadway.
3. If the disruption occurs in a bicycle lanes over a short distance (approximately 500 feet or less), bicyclists should be routed to share a motor vehicle lane.
4. On projects where the disruption occurs over a longer distance (more than 500 feet), and on busy roadways, a temporary bicycle lane or wide outside lane (at least 14 foot wide) should be provided. If that is not feasible, provide access, including ramps if necessary, for bicyclists to have the option of using sidewalks, except within zones where sidewalk bicycle riding is prohibited by the City.
5. Steel plates:

When steel plates are used in the travel way warning signage (Warning Steel Plates 100 FT) shall be placed at least 100 feet in advance.

Steel plates shall be set so there is no vertical lip over 1/4 inch between the plate and adjacent pavement. This shall be accomplished in one of the following ways:

- a. Recessing the plate so that the top of the plate matches adjacent pavement (with no lip over 1/4 inch).
- b. Providing bituminous concrete lip painted reflective orange to provide a smooth transition slope up from existing pavement to top of plate.

Non-slip surface steel plates are preferred for use, and must be used where plates are in an intersection or within a crosswalk.

6. Raised castings: Where raised castings are present after cold planing and/or in anticipation of final paving, provide the following:
  - a. Advance warning signs saying: "Caution – Raised Castings Ahead."

- b. Spray paint reflective fluorescent pink the raised portions of the castings.
- 7. Cold planing and pavement installation: Where cold planing or the installation of pavement in lifts results in vertical joints greater than 1/4 inch, provide temporary bituminous concrete lip painted reflective orange to provide a smooth transition slope between the pavement layers.
- 8. When the roadway or travel lanes narrow due to construction, advance warning signs should be placed at least 20 feet in advance.
- 9. Narrow cuts that are parallel with the direction of travel create an extreme hazard for cyclists, whose tires could get caught. These should never be made and left in an area where bicyclists will be traveling. If necessary, they should be blocked off and cyclists routed around the hazard. When performing advance pavement cutting for trenching or other roadway excavation, use only saw cutting (approximately 1/4 inch or narrower).
- 10. Debris should be swept to maintain a reasonably clear riding surface in the bicycle lanes or, where there are no bicycle lanes, the outer 5 or 6 feet of roadway. Promptly remove gravel, debris, litter, sand, stone, and other obstructions from bicycle lanes and travel lanes.
- 11. Advance construction signs shall not be placed in bicycle lanes and shall not otherwise obstruct bicyclists' path.
- 12. Temporary ramps for site access ramps. The creation of ramps in the roadway is not permitted unless being created in an area that is otherwise used by on-street parking.
- 13. Restore pavement markings for bike lanes within 2 weeks of paving.

## PART 2 – PRODUCTS

### 2.1 MATERIAL

- A. All barricades, drums, cones and other channelizing devices shall meet the requirements for MassDOT Standard Specifications for Highways and Bridges Section 850 Traffic Control for Construction and Maintenance Operation (Latest Revision) and the Manual of Uniform Traffic Control Devices (Latest Revision).
- B. Traffic Control Materials

1. Materials required for the work of this Section need not be new, but must be in first-class condition and acceptable to the Owner and Engineer. Any materials that in the judgment of the Owner are unsatisfactory in appearance or performance shall be removed and immediately replaced by acceptable units.
2. Signs, portable barricades, and drums shall have “High Intensity Encapsulated Lens Reflective Sheeting” in accordance with Section M9.30.2 of the MassDOT Standard Specifications for Highways and Bridges and MUTCD requirements.
3. Signs shall be fabricated with “High Intensity Encapsulated Lens Reflective Sheeting”. Transparent red, blue, yellow or black opaque paint (ink) may be used over “High Intensity Encapsulated Lens Reflective Sheeting” in accordance with the provisions of subsection M9.30.2, “D.2 Surface”, of the MassDOT Standard Specifications for Highways and Bridges, where these colors are specified.
4. Safety signage for construction operations shall consist of furnishing, positioning, repositioning, inspecting, maintaining, and removing regulatory, warning, and guide signs and temporary bus stop signs and taxi stop signs and their supports as approved by the Owner, City and Engineer.
5. Replace all signs and posts, which are damaged or are missing from their location at no additional cost to the Owner.
6. Maintain all signs in a satisfactory manner including the removal of dirt or road film that cause a reduction in sign reflective efficiency.

C. Portable Barricades

1. Furnish, install, relocate, remove, re-install, and maintain portable barricades in accordance with MassDOT and MUTCD requirements or as directed by the Owner, City and Engineer.
2. Portable barricades shall conform with Standard Plate No. 40612 of the MassDOT (Metric Edition). Reflectorized sheeting shall conform to Section M9.30.2, of the MassDOT Standard Specifications for Highways and Bridges.
3. Eight-foot-long units of portable barricades shall be constructed, as needed.
4. Alternating 6 inches (152.4 mil) wide diagonal stripes shall be orange and white and shall slope downward at 45 a degree toward the end by which traffic is to pass. Barricades that block the passage of traffic or



designate the end of the traveled way shall have alternating vertical orange and white stripes on the rails.

5. Barricades shall be maintained in good and serviceable condition throughout the duration of the Contract.
6. Temporary pedestrian and construction facilities shall be kept clean and freshly painted as required.

D. Signs, Covered

1. Cover any existing regulatory and warning signs as required by the Owner, City and Engineer.
2. Use a cover approved by the Owner, City and Engineer which shall be securely fastened to the existing sign and shall completely cover the legend of the existing sign. The cover shall remain in place as long as necessary at which time it shall be promptly removed.
3. Signs shall be covered without causing any damage to the existing sign.

E. Traffic Signals

1. Traffic lights shall remain operable at all times throughout the duration of the contract unless approved otherwise by the City.
2. It shall be the Contractor's responsibility to maintain the traffic signal system in continuous and good working order. The Contractor at his expense, shall repair any damage to the traffic signal system resulting from the Contractor's work and notify the Somerville Traffic Department immediately if any traffic controls are damaged.

F. Temporary Precast Concrete Barriers and Work Zone Protection

1. Temporary precast concrete barriers shall be furnished and installed as shown on the approved traffic management plans and where required to protect work zones and excavations which cannot be completed and backfilled or plated within a daily work period. Barriers shall be removed or relocated when no longer required and with the approval of the Owner, City and Engineer.
2. Precast concrete median barrier shall conform with Standard Plate No. 401.15.1 of the MassDOT, as well as be acceptable for temporary pedestrian and construction facilities and signage.

3. Temporary precast barrier for use for temporary pedestrian and construction facilities shall have three sleeves cast in the barrier to receive a post for panel and fence installations.
4. Temporary chain link fence, 4-feet high, shall be erected at work zones abutting pedestrian travel paths and around work zones hazardous to pedestrians in conjunction with precast barriers to form a "safety zone" 7 feet high, or as required by the Owner, City and Engineer. The top 2-feet shall be fixed with plywood panels painted as required by the Owner and Engineer. The barriers and fencing shall be overlapped at the corners of the excavated area to provide a continuous protective screen.

## PART 3- EXECUTION

### 3.1 GENERAL

- A. Conduct the work in manner that interferes as little as possible with public travel, whether vehicular or pedestrian.
- B. Provide and maintain suitable and safe bridges, detours, or other temporary expedients for accommodation of public and private travel whenever it is necessary to cross, or obstruct roads, driveways, and walks, whether public or private.
  1. Give a minimum of 48 hours (not including Saturday, Sunday or Holidays) written notice to owners of private driveways before interfering with them.
- C. Provide temporary surfacing on shoulders when necessary.
- D. Provide snow removal and street sweeping within the work limits to maintain safe and efficient vehicular and pedestrian traffic flow, including accesses and sidewalks. Contractor shall plow snow out of the work zone in all areas where municipal snow removal is prevented by construction in the opinion of the Owner, City and Engineer. The Contractor shall also remove snow from all sidewalks in areas where construction related activities are occurring or have recently occurred. The Contractor shall sweep sidewalks, pedestrian walkways and detours, and streets within the work zone on a daily basis. In the event that the Contractors work zone restricts municipal street sweeping in the area, the Contractor shall sweep the restricted streets (including streets outside the work zone) to a point where municipal street sweeping can continue.
- E. Sufficient and adequate signs, flashers, channelizing devices, lights, arrow boards and other precautions necessary to protect the work and the public, as determined by the Engineer shall be used at all times during construction.

- F. Provide trench bituminous paving repairs on a daily basis, but at intervals no longer than weekly, unless required or allowed otherwise by the Owner, City and Engineer or applicable agency having jurisdiction.
- G. Pedestrian access shall be maintained at all times. Access shall be a minimum of 4-feet, clear of all obstructions and meet all American with Disability Act (ADA) requirements. If an existing pedestrian walkway is interrupted, temporary ADA compliant walkways with ramps shall be provided.
- H. Contractor shall post “No Parking” signs 48-hours in advance for residential permit parking locations and 24-hours in advance for metered, public, etc. If work does not take place that day, signs must be reposted. Standard Somerville signs shall be used that provide information regarding proposed construction and parking restriction hours. Signs shall be placed at a minimum of 25-foot intervals.

### 3.2 DETOURS

- A. If approved by the Owner, City, and Engineer, construct and maintain detours around the work to maintain traffic over any construction work in a public street, road, or highway where traffic cannot be maintained on alignment of original roadbed or pavement.
- B. When detours are allowed, the Contractor shall provide all detour signs approved by the City and/or Engineer with directional arrows. Signs shall be placed at all streets and intersections to provide required direction to allow motorists to return to the street location beyond the detour. The Contractor must submit a written detour plan for the City and/or Engineer's approval prior to implementation of the detour.
- C. All detouring and signing shall meet the requirements of the applicable references specified in Parts 1 and 2 above.
- D. The Contractor shall provide Police details in the work areas. Contractor shall coordinate vehicle towing with the police.
- E. The Detour Plan shall be reviewed and approved by the Owner, City, and Engineer prior to establishing any detours.
- F. The Contractor is responsible for the notification of any parties affected by the detour, including, but not limited to Somerville Police, State Police, MBTA, Somerville Traffic Department, and abutting property owners.

### 3.3 PROTECTION

#### A. Signs and Channelizing Devices:

1. Locate signs and channelizing devices with lights to protect public thoroughfares which are closed to traffic.
2. Ensure that all open trenches and other excavations have signs, channelizing devices and lights to provide protection to the public.
  - a. Provide similar warning signs and lights for obstruction such as material piles and equipment.
  - b. Ensure that the material storage and conduct of the work on or alongside streets causes minimum obstruction and inconvenience to the traveling public.
3. Install and maintain all signs, channelizing devices, lights, and other protective devices in conformity with applicable statutory requirements and as required by the municipalities or agencies having jurisdiction.
4. Illuminate all channelizing devices with flashing lights.
5. No traffic control devices shall be stored adjacent to the roadway.

### PART 4 – COMPENSATION

#### **Item 1570.1 - Traffic and Pedestrian Management**

##### METHOD OF MEASUREMENT:

Measurement for payment for Traffic and Pedestrian Management will be on a percent of the Lump Sum bid calculated by dividing the elapsed time to date by the original Contractual construction time limit as approved by the Engineer.

##### BASIS OF PAYMENT / INCLUSIONS:

Payment for Traffic and Pedestrian Management shall be based on the lump sum price bid for this item in the proposal. Under the lump sum price for this item, the Contractor shall furnish all labor, materials, tools, equipment, and incidentals required to provide, maintain, relocate, and remove Traffic and Pedestrian Management in areas directly or indirectly influenced by construction within the limits of work or outside the limits of work; along truck routes inside or outside the limits of work; as delineated in the approved Traffic and Pedestrian Management Plan, by the MUTCD, ADA, MA AAB, and MassDOT standards; and as further required by the Owner and Engineer. The work includes but is not limited to; obtaining permits; coordination with the City Department of Public Works and Traffic and Parking Department; coordination with private property owners within the limits of work; preparing, submitting, reviewing,

Bike Path Drainage Upgrades  
Willow Ave. to Grove St.  
Somerville, MA  
20163393.002A

MAINTENANCE AND  
PROTECTION OF TRAFFIC  
01570-16

implementing, and revising traffic management and control plans; work zone layouts, installing, and maintaining traffic management devices based on approved traffic management and control plans including precast concrete and/or triplex barriers with fencing and plywood panels, reflectorized drums, lane delineators, portable barricades, temporary crosswalks, and cones; temporary pavement markings; removal of temporary and existing pavement markings; restoring and maintaining existing pavement markings disturbed within work zone limits (prior to installation of final pavement marking); furnishing, installing, shimming, pinning, maintaining, and removing steel road plates; furnishing, installing, and removing cold patch pavement as necessary or as directed by the Engineer; ordering and coordinating police details; furnishing and installing temporary construction fencing; maintaining roadways and sidewalks inside or outside the limits of work; establishing and dismantling detours; covering existing traffic signs; obtaining, posting and maintaining "No Parking" signs; meeting with police details daily; coordinating police detail locations; and all incidental work, whether listed here or not, required to provide maintenance and protection of traffic and pedestrians.

**SPECIAL NOTES ON EXCLUSIONS:**

The following items are not included for payment under this item and are included for payment elsewhere; bituminous hot mix asphalt pavement; and Police Details. Police Details will be paid directly by the Owner.

**Item 1570.2 – Safety Signing for Construction Operations**

**METHOD OF MEASUREMENT:**

Measurement for payment for Safety Signing for Construction Operations shall be based on the Contractors Lump Sum bid calculated by dividing the elapsed time to date by the original Contractual construction time limit as approved by the Engineer.

**BASIS OF PAYMENT / INCLUSIONS:**

Payment for Safety Signing for Construction Operations shall be based on the lump sum price bid for this item in the proposal. Under the lump sum price for this item, the Contractor shall furnish all labor, materials, tools, equipment, and incidentals required to fabricate, furnish, install, secure, maintain, relocate and remove Safety Signing for Construction Operations as required for the management of traffic and pedestrians and as further directed by the Owner, City and Engineer. The work includes, but is not limited to; fabrication of the signs; furnishing and installing signage; mounting and securing signage; maintaining signage; protecting and storing signage not in use; relocating signage; removal of signage; and all incidental work required to fabricate, furnish, install, maintain, relocate, and remove the Safety Signing for Construction Operations

**SPECIAL NOTES ON EXCLUSIONS:**

The following items are not included for payment under this item; "No Parking" signs; signs not specified or requested or approved by the Owner or Engineer, installed for the convenience of the Contractor; and signs not fabricated by a professional shop specializing in the fabrication of Signage for Construction Operations, i.e. hand painted or fabricated. Signage damaged as a result of misuse or improper handling shall be replaced by the Contractor at no additional cost to the Owner.

Bike Path Drainage Upgrades  
Willow Ave. to Grove St.  
Somerville, MA  
20163393.002A

MAINTENANCE AND  
PROTECTION OF TRAFFIC  
01570-17

END OF SECTION 01570

Bike Path Drainage Upgrades  
Willow Ave. to Grove St.  
Somerville, MA  
20163393.002A

MAINTENANCE AND  
PROTECTION OF TRAFFIC  
01570-18

## SECTION 01600

### PRODUCTS, MATERIALS AND EQUIPMENT

#### PART 1 - GENERAL

##### 1.1 DESCRIPTION

- A. Furnish and install products, equipment and materials as specified and indicated in accordance with the Contract Documents.
- B. Provide transportation, handling, storage, and protection of all products, materials and equipment in accordance with the Contract Documents.

##### 1.2 DEFINITIONS

- A. The word "Products," as used herein, is defined to include purchased items for incorporation into the Work, regardless of whether specifically purchased for the project or taken from Contractor's stock of previously purchased products. The word "Materials," is defined as products which must be substantially cut, shaped, worked, mixed, finished, refined, or otherwise fabricated, processed, installed, or applied to form units of work. The word "Equipment" is defined as products with operational parts, regardless of whether motorized or manually operated, and particularly including products with service connections (wiring, piping, and other like items). Definitions in this paragraph are not intended to negate the meaning of other terms used in the Contract Documents, including "specialties," "systems," "structure," "finishes," "accessories," "furnishings," "special construction," and similar terms, which are self-explanatory and have recognized meanings in the construction industry.
- B. Neither "Products" nor "Materials" nor "Equipment" includes machinery and equipment used for preparation, fabrication, conveying and erection of the Work.
- C. Spare Parts are defined as subassemblies or components of the Products installed in the Work.

##### 1.3 QUALITY ASSURANCE

- A. Source Limitations: To the greatest extent possible for each unit of work, the Contractor shall provide products, materials, and equipment of a singular generic kind from a single source.
- B. Compatibility of Options: Where more than one choice is available as options for Contractor's selection of a product, material, or equipment, the Contractor shall select an option which is compatible with other products, materials, or

equipment. Compatibility is a basic general requirement of product, material and equipment selections.

#### 1.4 PRODUCT DELIVERY AND STORAGE

- A. The Contractor shall deliver and store products, materials, and equipment for the Work in accordance with manufacturer's written recommendations and by methods and means that will prevent damage, deterioration, and loss including theft. Delivery schedules shall be controlled to minimize long-term storage of materials, products, and equipment at site and overcrowding of construction spaces. In particular, the Contractor shall ensure coordination to ensure minimum holding or storage times for flammable, hazardous, easily damaged, or sensitive products, materials, and equipment to deterioration, theft, and other sources of loss.

#### 1.5 TRANSPORTATION AND HANDLING

- A. Products, materials and equipment shall be transported by methods to avoid damage and shall be delivered in undamaged condition in manufacturer's unopened containers and packaging.
- B. The Contractor shall provide equipment and personnel to handle products, materials, and equipment by methods to prevent soiling and damage.
- C. The Contractor shall provide additional protection during handling to prevent marring and otherwise damaging products, materials, equipment, packaging, and surrounding surfaces.

#### 1.6 STORAGE AND PROTECTION

- A. Products, materials and equipment shall be stored in accordance with manufacturer's written instructions and with seals and labels intact and legible. Sensitive products, materials and equipment shall be stored in weather-tight climate controlled enclosures and temperature and humidity ranges shall be maintained within tolerances required by manufacturer's recommendations.
- B. For exterior storage of fabricated products, materials and equipment, the products, materials and equipment shall be placed on sloped supports above ground. Products, materials and equipment subject to deterioration shall be covered with impervious sheet covering and ventilation shall be provided to avoid condensation.
- C. Loose granular materials shall be stored on solid flat surfaces in a well-drained area and shall be prevented from mixing with foreign matter.
- D. Storage shall be arranged to provide access for maintenance and inspection. The Contractor shall periodically inspect to assure products, materials and equipment are undamaged and are maintained under required conditions.



- E. Storage of materials and equipment in resource areas shall not be permitted.
- F. Material or equipment is not permitted to be stored on private property within approval from the property owner.
- G. No material or equipment to be stored within 25 feet of a street corner.

#### 1.7 MAINTENANCE OF STORAGE

- A. Stored products, materials and equipment shall be periodically inspected. The Contractor shall maintain a log of inspections and shall make the log available on request.
- B. The Contractor shall comply with manufacturer's product, material and equipment storage requirements and recommendations.
- C. The Contractor shall maintain manufacturer-required environmental conditions continually.
- D. The Contractor shall ensure that surfaces of products, materials and equipment exposed to the elements are not adversely affected and that weathering of finishes and coatings does not occur.
- E. Products, materials and equipment shall be serviced on a regularly scheduled basis, and a log of services shall be maintained and submitted as a record document prior to acceptance by the Owner in accordance with the Contract Documents.
- F. Contractor to keep materials free of debris, trash and water.

### PART 2 - PRODUCTS

#### 2.1 GENERAL

- A. Do not use materials and equipment removed from existing premises, except as specifically required by the Contract Documents.
- B. Where similar Products (such as grease fittings, flexible couplings, etc.) are used on different pieces of equipment or in different areas within the Work, standardize the Products by providing all Products from the same Supplier as specified by the Engineer.

#### 2.2 GENERAL MATERIAL AND EQUIPMENT REQUIREMENTS:

- A. The following requirements shall constitute the acceptable minimum standards for the equipment specified herein. Should these requirements

conflict with the Supplier's recommendations or in any way be less stringent than the Supplier's requirements, they shall be superseded by the Supplier's requirements.

B. Sleeves:

1. Provided sleeves shall be of ample diameter to pass the pipe and its insulation, if any, and to permit expansion.
2. Provide sleeves that are flush at the walls and at the bottom of slabs. Sleeves must project one inch above the finished floor surface. Threaded nipples shall not be used as sleeves.

C. Protection against Electrolysis:

1. Where dissimilar metals are used in conjunction with each other, provide insulation between adjoining surfaces to eliminate direct contact and any resultant electrolysis. Provide bituminous insulation, heavy bituminous coatings, nonmetallic separators or washers, impregnated felt, or similar arrangement.

## PART 3 - EXECUTION

### 3.1 GENERAL MATERIAL AND EQUIPMENT INSTALLATION REQUIREMENTS

A. The following requirements shall constitute the acceptable minimum standards for installing the equipment specified herein. Should these requirements conflict with the Supplier's recommendations or in any way be less stringent than the Supplier's requirements, they shall be superseded by the Supplier's requirements.

B. Sleeves and Openings

1. Provide all chases or openings for the installation of the Work, or cut the same in existing Work.
2. Provide all sleeves or forms at the Work, and set them as indicated and as specified, and in ample time to prevent delays.
3. Locate all chases, openings, and sleeves as specified and indicated. If the location is not specified or indicated, locate all openings to avoid interference with equipment and piping.
4. If openings and/or sleeves were not provided prior to concrete placements, the Contractor shall provide and set them afterwards at no additional cost to the Owner. Confine the cutting to the smallest extent possible. In no case shall piers or structural members be cut without the written consent of the Owner.

5. Fit around, close up, repair, patch, and point around the work specified herein to the requirements of the Owner.
6. Perform all of this work by workmen using small hand tools. Do not use power tools except where, in the opinion of the Owner, the type of tool proposed can be used without damage to any work or structures and without interference with the operation of any facilities. The Owner's concurrence with the type of tools shall not in any way relieve or diminish the responsibility of the Contractor for such damage, or interference resulting from the use of such tools.
7. Do not cut or alter the work of any subcontractor or any other contractor, nor permit any subcontractor to cut or alter the work of any other contractor or subcontractor, except with the written consent of the contractor or subcontractor whose work is to be cut or altered, and with the written consent of the Owner. All cutting and patching or repairing made necessary by the Contractor or any subcontractors shall be done at no additional cost to the Owner.

PART 4 – COMPENSATION (Not Used)

END OF SECTION 01600

[THIS PAGE INTENTIONALLY LEFT BLANK]

SECTION 01630

RESTORATION OF GROUNDS AND CLEANING UP

PART 1 - GENERAL

1.1 REQUIREMENTS

- A. The Contractor on or before the completion of the work, except as otherwise expressly required or permitted in writing by the Owner, shall tear down and remove and legally dispose of all temporary structures built or used by him; shall remove all rubbish and debris of all kinds from all Contract structures and from any grounds which he shall have occupied within the limits of the project site; shall leave the site of the work in a satisfactorily neat and clean condition; shall remove from the land all abandoned materials and plant; and shall leave the spoil areas and the property which may have been affected by his operations in a neat and satisfactory condition. Also included is the restoration of all private grounds, including lawns, landscaped areas, driveway aprons and walkways damaged or disturbed in connection with the new work not elsewhere specified. Unless otherwise specified, all materials salvaged and not required to be reused shall be the property of the Contractor, and shall be legally disposed of off the site of the work.
  
- B. Included in the work under this Section is the restoration, including replacement of damaged and disturbed shrubs and trees, retaining walls, of all grounds and grassed and landscaped areas removed or disturbed or damaged during the construction of the new work, including pipe laterals within private property areas, and storage and field office areas. For private property restoration, refer to Section 02950, Private Property Restoration.
  
- C. Also included in the work under this Section is the furnishing of all labor, materials, and equipment required to remove, store, and reset or replace bumper posts, stone walls of all types, flagstone, brick, concrete, asphalt walks, fences of all types, railings, signs and sign posts, signal posts, mailboxes and such other miscellaneous objects damaged or disturbed during construction.

PART 2 – PRODUCTS (Not Used)

PART 3 – EXECUTION (Not Used)

PART 4 – COMPENSATION (Not Used)

END OF SECTION 01630

[THIS PAGE INTENTIONALLY LEFT BLANK]

Bike Path Drainage Upgrades  
Willow Ave. to Grove St.  
Somerville, MA  
20163393.002A

RESTORATION OF GROUNDS  
AND CLEANING UP  
01630-2

SECTION 01701  
PROJECT CLOSEOUT

PART 1 - GENERAL

1.1 DESCRIPTION

- A. This section includes the requirements for project closeout including final clean up, closeout timetable, Owner's manual submittal, final submittals, maintenance and guarantee, and bonds.

1.2 FINAL CLEANUP

- A. The Contractor shall promptly remove from the vicinity of the completed work, all rubbish, unused materials, concrete forms, construction equipment, and temporary structures and facilities used during construction according to Specification Sections 01630 – Restoration of Grounds and Cleaning Up and 02950 – Private Property Restoration. Final acceptance of the Work by the Owner will be withheld until the Contractor has satisfactorily complied with the foregoing requirements for final cleanup of the project site.
- B. The Contractor shall cleanup and restore all areas affected by staging, trailer(s) placement and parking. Restoration includes regrading, re-establishing topsoil and reseeding, and Section 02950 - Private Property Restoration.

1.3 CLOSEOUT TIMETABLE

- A. The Contractor shall establish dates for equipment testing, acceptance periods, and on-site instructional periods (as required under the Contract). Such dates shall be established as specified elsewhere in the Contract Documents.

1.4 FINAL SUBMITTALS

- A. The Contractor, prior to requesting final payment, shall obtain and submit the following items to the Engineer for transmittal to the Owner:
  - 1. Written guarantees, where required.
  - 2. Maintenance stock items; spare parts; special tools.
  - 3. CCTV video and report of pre and post-installation CCTV inspection for new drains and, if needed, completed storm drain main lining.
  - 4. O&M manuals of equipment as specified in Contract Documents.

5. Completed as-built / record drawings as described in Section 01200 GENERAL REQUIREMENTS FOR UTILITY WORK.
6. Certificates of inspection and acceptance by local governing agencies having jurisdiction.
7. Releases from all parties who are entitled to claims against the subject project, property, or improvement pursuant to the provisions of law.

#### 1.5 MAINTENANCE AND GUARANTEE

- A. The Contractor shall comply with the guarantee and warranty requirements contained in the General Conditions.
- B. Replacement of earth fill or backfill, where it has settled below the required finish elevations, shall be considered as a part of such required repair work, and any repair or resurfacing constructed by the Contractor which becomes necessary by reason of such settlement shall likewise be considered as a part of such required repair work unless the Contractor shall have obtained a statement in writing from the affected private owner or public agency releasing the Owner from further responsibility in connection with such repair or resurfacing.
- C. The Contractor shall make all repairs and replacements promptly upon receipt of written order from the Owner. If the Contractor fails to make such repairs or replacements promptly, the Owner reserves the right to do the Work and the Contractor and his surety shall be liable to the Owner for the cost thereof.

#### 1.6 BOND

- A. The Contractor shall provide a bond to guarantee performance of the provisions contained in Paragraph "Maintenance and Guarantee" above, and of the General Conditions.

PART 2 – PRODUCTS (Not Used)

PART 3 – EXECUTION (Not Used)

PART 4 – COMPENSATION (Not Used)

END OF SECTION 01701



## SECTION 02010

### SUBSURFACE INVESTIGATIONS

#### PART 1 – GENERAL

##### 1.1 DESCRIPTION

- A. This section includes the basic requirements and expectations of the Contractor in all work pertaining to subsurface conditions.

##### 1.2 GENERAL REQUIREMENTS

- A. The Contractor acknowledges that he has satisfied himself as to the nature and location of the Work; the general and local conditions, particularly those bearing upon groundwater table or similar physical conditions at the site; the characterization and conformation of subsurface materials to be encountered; and all other matters that can in any way affect the work or the cost thereof under this Contract. Any failure by the Contractor to acquaint himself with all available information concerning these conditions will not relieve him from responsibility for estimating properly the difficulty or cost of successfully performing the Work.

##### 1.3 SUBSURFACE DATA

- A. The findings of recent subsurface investigations are provided in the boring log information (included in the Appendix to these Specifications and as shown on the Drawings) and the analytical results of samples collected for waste characterization analyses are provided in the Appendices
- B. Such data is offered in good faith solely for the purpose of placing the Contractor in receipt of information available. The Contractor shall interpret such data according to his own judgment, and acknowledges that he is not relying upon the same as accurately describing the actual subsurface conditions or quantities of materials that may be encountered. The Contractor further acknowledges that he assumes all risk contingent upon the nature of the subsurface conditions to be actually encountered in performing the work covered by the Contract, even though such actual conditions may result in the Contractor performing more or less work than originally anticipated. In the event that quantities of waste soil/fill and related work as established in this Contract vary significantly from estimates provided, the unit bid prices will be the basis for compensation.
- C. Re-use of excavated soils on- or off-site is subject to local, state and federal regulations and as specified in Section 02080 – SOIL AND WASTE MANAGEMENT and 02095 – TRANSPORTATION AND DISPOSAL OF SOIL AND FILL.

- D. Additional subsurface investigation as may be warranted to satisfy a disposal facility's data requirements shall be the responsibility of the Contractor. Subsurface investigation activities shall not commence until a written work plan detailing the Contractor's approach for obtaining the data is approved by the Owner's Licensed Site Professional. The work plan must indicate the location and frequency of sampling; sampling parameters and sampling methodology. The Contractor shall allow a minimum of 14 days for review and comment.

PART 2 – PRODUCTS (Not Used)

PART 3 – EXECUTION

3.1 Test Pit Excavations

- A. Excavate test pits adjacent to 32 Clifton Street. at the approximate locations are indicated on the contract documents. Test pits shall be excavated in sufficient time to provide information for the contractor's design of the temporary excavation support system.
- B. Test pits shall expose the bottom of the building foundation and explore for the presence and condition of supporting piles.
- C. Test pit excavations shall be observed and documented by a representative of the Engineer.
- D. Contractor shall provide temporary dewatering to provide dry conditions within the test pits.
- E. Test pits shall be backfilled with excavated material placed in 12-inch-thick loose lifts compacted with the excavator bucket.

PART 4 – COMPENSATION (Not Used)

Refer to Section 02210, Part 4, Item 1 for measurement and payment of test pit excavations.

END OF SECTION 02010

SECTION 02015

GEOTECHNICAL MONITORING AND INSTRUMENTATION

<b>2015.1</b>	<b>VIBRATION MONITORING</b>	<b>LUMP SUM</b>
<b>2015.2</b>	<b>VIBRATION MONITORING – NEWBERNE ST.</b>	<b>LUMP SUM</b>
<b>2015.3</b>	<b>BUILDING MONITORING POINTS</b>	<b>EACH</b>

PART 1 – GENERAL

1.1 SUMMARY

- A. Work in this Section shall include, but not be limited to, all materials, equipment, labor, and services required to install, protect, replace, monitor and report on geotechnical instrumentation specified herein and shown on the drawings.
- B. The work included in this section includes the following:
  - 1. Vibration monitoring shall be performed continuously during excavation, installation and removal of temporary earth support, and backfill and compaction for installation of the drain pipe and structures between about Sta. 5+00 and 6+80 and at the two properties at the southern end of Newberne St. identified on the drawings for Newberne St. One seismograph shall monitor vibrations adjacent to the nearest private property. Vibration levels shall not exceed the criteria indicated herein. Newberne St. vibration monitoring and (2) building monitoring points at Newberne St. will
  - 2. Furnish, install, protect, replace, monitor and report on deformation monitoring points which shall include building monitoring points (BMPs).
    - a. BMPs shall be installed at the approximate location shown on the drawings.
  - 3. At locations where structure monitoring points are required on private property, the Contractor shall obtain a right of entry to obtain access.
  - 4. Monitoring of groundwater levels in the existing monitoring well on Clifton Street.
  - 5. The Contractor shall retain the services of Geotechnical Monitoring Consultant and Surveyor to install, monitor, maintain and report on

geotechnical instrumentation described herein and show on the Contract Drawings.

6. Replace instrumentation damaged or made inaccessible by the construction operations at no additional cost to the Owner.
- C. Contractor shall provide vibration monitoring and (2) building monitoring points for Newberne St. The Contractor shall not proceed with installation of building monitoring points and obtaining a base line for vibration monitoring along Newberne St. until heavy cleaning and internal inspection of the exist. 8" VC drain is complete, and CCTV inspection is submitted to the Engineer for review and approval of the Work within Newberne St. The Owner/Engineer reserves the right to remove (2) building monitoring points and vibration monitoring at Newberne St. after review of the post-heavy cleaning CCTV inspection.

## 1.2 SUBMITTALS

- A. Submit the following in accordance with Section 01300 – SUBMITTALS.
1. Qualifications of Surveyor and Geotechnical Monitoring Consultant. The Surveyor and Geotechnical Monitoring Consultant shall be approved by the Engineer and must be approved two weeks prior to mobilization for construction.
  2. Shop drawings that indicate the instrumentation locations, sizes, material types, manufacturers' data and specifications, installation procedures, and other data. Provide description of work and materials. Provide description of methods to be used to monitor movement and/or settlement of exposed utilities.
  3. Contractor submittals shall be acceptable to the Engineer at least two weeks prior to undertaking the work. The Contractor shall forward submittals in advance considering that re-submittals may be required.
- B. A mitigation plan shall be submitted to the Engineer by the Contractor a minimum of one week prior to any excavation and installation of the excavation support system. The mitigation plan shall detail the Contractor's course of action in the event threshold or limiting response values are met or exceeded. Such mitigation plan shall be revised as appropriate for each instance threshold and/or limiting values are reached.
- C. The Contractor shall submit initial baseline survey data on a plan indicating locations and elevations of all instrumentation monitoring points to the Engineer at least three days prior to beginning of the installation of the excavation support and excavation operations.

- D. The Surveyor shall submit subsequent survey data on all instrumentation monitoring points to the Engineer prior to the beginning of work the following day. A faster turnaround of data reporting may be required by the Engineer if threshold or limiting response values, as specified in this Section, are approached or exceeded. Data shall be tabulated and depicted graphically on plots and show incremental and cumulative movement since the start of excavation.

### 1.3 QUALITY CONTROL

- A. The Contractor shall provide sufficient notice to the Engineer to allow the Engineer to be present to observe the Work. Cooperate with the Engineer in all respects to facilitate any testing or observations.
- B. The Contractor may conduct additional testing or monitoring for its own information, at no additional cost to the Owner.
- C. The presence of the Engineer (including observations and review of test results) shall not relieve the Contractor of its sole responsibility to perform the work in accordance with the Contract Documents, nor shall they be construed to relieve the Contractor from full responsibility for the means and methods of construction and for safety on the construction site.
- D. Work not in conformance with the specified requirements shall be improved, or removed and replaced, at no additional cost to the Owner. All costs related to testing of nonconforming Work or materials shall be paid for by the Contractor, at no additional cost to the Owner.
- E. Measure and report all data on movements of all deformation monitoring points to the nearest 0.01 ft.
- F. Retain the services of Geotechnical Monitoring Consultant to monitor the geotechnical instrumentation, which includes and is not limited to deformation monitoring points and vibration monitors. The consultant shall be a Geotechnical Engineer registered in the Commonwealth of Massachusetts and shall have demonstrated at least five years' experience and at least three projects of similar type, size, and complexity including installation and monitoring of surface settlement and vibrations with seismographs. The Geotechnical Monitoring Consultant shall adhere to all methods and standards described in this Specification.
- G. Retain the services of a Surveyor to monitor the deformation monitoring points, which includes and is not limited to ground surface, utility, and excavation support system monitoring points. The Contractor's Surveyor shall be registered in the Commonwealth of Massachusetts and shall have demonstrated at least 5 years' experience and at least three (3) projects of similar type, size, and complexity including installation and monitoring of

surface vertical and horizontal displacement points. The Contractor's Surveyor shall be approved by the Engineer and must be approved two weeks prior to construction. The Contractor's Surveyor shall adhere to all methods and standards described in this Specification.

## PART 2 – PRODUCTS

### 2.1 SHORING MONITORING POINTS

- A. Shoring monitoring points (SMPs) shall consist of an observable point punch marked on the top horizontal surface of the piles or sheeting. The surface within three inches of the point shall be cleaned by wire brush to permit easy identification of the exact point. The point shall be clearly identified using fluorescent spray paint adjacent to the point.

### 2.2 BUILDING MONITORING POINT

- A. Building monitoring points (BMPs) shall consist of
  - 1. Type 1: ¼-inch-diameter, stainless steel carriage bolts drilled 1.5 inches into the structure surface and extending approximately 1.5 inches from the structure face,
  - 2. Type 2: 2-inch (7.62cm) long surveyors' "PK" nails, securely nailed in place, or
  - 3. Type 3: an observable point punch marked on the top horizontal surface of the structure. The surface within 3 inches (7.6cm) of the point shall be cleaned by wire brush to permit easy identification of the exact point. The points shall be clearly identified using fluorescent spray paint adjacent to the point.

### 2.3 VIBRATION MONITORING

- A. Provide portable seismographs for monitoring the velocities of ground vibrations resulting from construction activities.
- B. The seismograph shall have the following minimum features:
  - 1. Seismic range: 0.01 to 10 inches per second with an accuracy of 5 percent and no more than a 3 db roll off at the low frequency end.
  - 1. Flat frequency response: 2 to 200 Hertz.

2. Three component sensor.
  3. Fourth channel for air blast monitoring
  4. Two power sources: Internal rechargeable battery and charter and 115 volts AC. Battery must be capable of supplying power to monitor vibrations continuously for up to 24 hours.
  5. Capable of internal dynamic calibration.
  6. Direct writing to printer and to electronic memory that can be downloaded or saved to an external memory device. Instruments provided shall be capable of producing strip chart recordings of readings on site within one hour of obtaining the readings. Provide computer software to perform frequency analyses of data obtained on magnetic disks.
  7. Continuous monitoring mode must be capable of recording peak velocities.
- C. A factory calibration shall be conducted on all seismographs at the manufacturer's facility prior to shipment. Each factory calibration shall include a calibration curve with data points clearly indicated, and a tabulation of the data. Each instrument shall be marked with a unique identification number.

## PART 3 – EXECUTION

### 3.1 GENERAL REQUIREMENTS

- A. Do not install any instruments until the Owner and the Engineer have been notified.
- B. Construction activity shall not commence until instrumentation installed within the vicinity of the work are set up.

### 3.2 INSTALLATION

- A. Building Monitoring Points (BMPs)
  1. BMPs shall be installed at the locations shown on the plans.
  2. After completion of installation, the as-built location in horizontal position shall be determined to an accuracy of 0.01-foot and in elevation to an accuracy of 0.01-feet.

B. Shoring Monitoring Points (SMPs)

1. SMPs shall be spaced at a minimum of one every 20 feet distributed uniformly around the perimeter of the temporary excavation support wall at locations proposed by the Contractor and accepted by the Engineer.
2. After completion of installation, the as-built location in horizontal position shall be determined to an accuracy of 0.01-foot and in elevation to an accuracy of 0.01-feet.

C. Seismographs

1. A seismograph shall be installed each day for each crew performing earthwork operations. The seismographs shall be installed adjacent to the nearest private property within 25 feet of the work. If there are no private properties within 25 feet, the seismograph shall be installed on a firm surface 25 feet from the work zone.
2. Vibration sensors shall be firmly mounted on the surface of concrete or asphalt, or firmly set in undisturbed soil.
3. The daily reports shall clearly describe the location of the seismograph relative to the work zone and the work performed in the vicinity on that date.

D. Formal Initial Readings

1. Obtain formal initial readings (FIRs) on all installed instruments for use as the baseline reference for the instrument. Before establishing the FIR for each instrument, a minimum of three readings shall be performed that demonstrate that changes resulting from the installation process have ceased. The three readings demonstrating that the installation has stabilized shall be performed on different days and may be used to establish the FIR.
2. Obtain the first initial baseline readings on BMPs no later than seven days prior to the start of installation of the temporary excavation support or excavation operations.
3. The FIR for a BMP or UMP will consist of the average of two survey measurements of elevation or horizontal offset with two independent set-ups. Where applicable, the initial readings shall be taken after allowing sufficient time for the grout or epoxy to set. Each reading other than the FIR shall consist of a single set of survey measurements. Reference all elevation readings to a deep benchmark.



Reading accuracy shall be +/-0.01 foot. Report elevations to the nearest 0.01 foot.

4. The FIR (background reading) for a seismograph shall be performed prior to any vibration-producing construction activities to document background vibrations, and also at the start of vibration-producing construction activities to establish the maximum energy which can be used without surpassing acceptable vibration and overpressure levels at nearby facilities. The Contractor shall notify the Authority at least 24 hours prior to starting a new vibration-producing construction task. Monitoring during installation of temporary excavation support systems, pavement breaking, demolition, excavation, and other vibration-producing construction activity shall consist of recording single-component peak particle velocities, which shall be printed on a strip chart. Continuous monitoring and full waveform data shall be recorded and submitted. During all monitoring of vibration-producing construction activities the Contractor shall document all events that are responsible for the measured vibration levels, and submit the documentation to the Authority with the data.
5. The FIR for an observation well shall consist of the average of three independent readings of groundwater level measurements taken within one hour.

### 3.3 MONITORING

- A. Obtain the FIRs on building deformation monitoring points and observation well least four (4) days prior to the start installation of the temporary excavation support system
- B. Monitoring Frequency
  1. Vibration Monitoring
    - a. Vibration monitoring shall be performed continuously during excavation, installation and removal of temporary earth support, and backfill and compaction for installation of the drain pipe and structures within Thorndike Street
  2. Building Monitoring Points
    - a. Monitoring frequency shall be daily during installation of the temporary support of excavation.
    - b. Thereafter, during all excavation, backfill and compaction activities, monitoring frequency shall be at a minimum daily for monitoring points located within 25 feet of the work and

two times per week for monitoring points located within 100 feet of the work, unless otherwise directed by the Engineer or specified.

3. Shoring Monitoring Points

- a. Monitoring frequency shall be at a minimum daily during excavation; twice a week for the duration that the excavation remains open; and daily during backfill, and compaction activities unless otherwise directed by the Engineer or specified.
- b. Monitoring frequency shall be at a minimum two times per week thereafter until the support of excavation system is removed.
- c. Immediately following installation of each element of the lateral support system, the Surveyor shall establish a baseline parallel to each side of the excavation from which offset (horizontal displacement) measurements shall be made to the pile.
- d. Offset (horizontal position) monitoring of the temporary lateral earth support systems shall be made at least twice per week until the excavation is backfilled to within 2-ft of final grade, or as directed by the Engineer. A minimum accuracy of 0.01 ft. shall be maintained.

4. Observation well shall be monitored twice a week during excavation, dewatering, and backfilling activities within 25 feet of the well.

5. Monitoring frequency may be increased as required by the Engineer for some or all of the monitoring points if the threshold or limiting response values are approached or exceeded during the Work, at no additional cost to the Owner.

C. After each set of readings is obtained, the data shall be sent to the Engineer within 24 hours, where the data will be reviewed and interpreted. The Contractor shall make its own interpretations for the data. The Contractor shall monitor and interpret data from additional instrumentation that it deems necessary to ensure the safety of its work. The Engineer is not responsible for the safety of the work based on its review of the instrumentation data.

D. Reporting Data:

1. A plan showing location and numbering system for monitoring points shall be submitted to the Engineer prior to start of temporary

excavation support installation and excavation operations, along with results of two initial baseline surveys.

2. Tables of results of surveys and water levels shall be submitted prior to the beginning of work the following day. The tables shall include the initial measurement, the current measurement, and the amount of change since start of excavation.
3. Survey data shall be depicted graphically on plots and submitted with the tabular results to show incremental and cumulative movement since the start of excavation.

E. Criteria for “threshold” and “limiting” response values have been established as provided in the following table:

<b>Instrument</b>	<b>Monitoring</b>	<b>“Threshold” Value</b>	<b>“Limiting” value</b>
BMP	Vertical or horizontal movement	0.25 inches	0.5 inches
Observation wells	Change in groundwater level	3 inches	6 inches
Seismograph	Vibrations in peak particle velocity	<ul style="list-style-type: none"> <li>• 0.3 inches per second at frequencies of 60 Hz or less</li> <li>• 0.75 inches per second at frequencies greater than 60 Hz</li> </ul>	<ul style="list-style-type: none"> <li>• 0.5 inches per second at frequencies of 60 Hz or less</li> <li>• 1 .25 inches per second at frequencies greater than 60 Hz</li> </ul>

F. The Contractor shall immediately notify the Engineer and shall take immediate steps to control further movement by revising construction procedures, providing supplemental bracing or other measures (working extended hours as approved or temporarily terminating work in the area of movement if necessary) as required if any of the following occur:

1. Field measurements indicate that any of the "threshold" movement criteria are reached or exceeded.
2. Field measurements or observations indicate that significant or sustained wall movements, beyond those reasonably expected, are occurring (total movement may be less than the "Limiting" movement criteria).

3. Movements of adjacent structures, utilities or other facilities are detected.
- G. If "Limiting" movements are being approached or reached, the Owner may require the Contractor to temporarily suspend the work in the area where such movement is occurring and implement all necessary mitigation measures which are satisfactory to the Engineer, to arrest the movements, at no cost to the Owner.
  - H. Installation of Work in the area where the Limiting Values had been reached shall not be permitted until the results of optical surveys indicate no increase in lateral movement of the earth support system and adjacent surface and building settlement for the one-week period immediately prior to resuming construction.
  - I. These criteria are intended to establish a minimum basis for the Contractor's design and procedures and do not relieve the Contractor of its responsibility for preventing detrimental movements and damage to adjacent structures, utilities or other work.
  - J. The Contractor shall pay a penalty \$1,000 for each day the Contractor works in violation of any threshold or limiting values being reached or exceeded as determined by the Engineer.
  - K. In the event the Contractor does not comply with the approved mitigation plan, or continues to work in violation of threshold or limiting values being reached or exceeded, the Contractor shall not be allowed to continue work until proper mitigation procedures and corrections have been made as required by the Owner and Engineer.
  - L. The Contractor shall be responsible for repairing all property damage caused by construction activities.

#### 3.4 PROTECTION OF INSTRUMENTATION

- A. Protect all instruments during the course of the Work. Any damage or loss of function caused by the Contractors operations, or by any other cause, to new or existing instrumentation devices, shall be immediately repaired or the equipment replaced at no additional cost to the Owner.

#### PART 4 – COMPENSATION

#### **Items 2015.1 - Vibration Monitoring and 2015.2 Vibration Monitoring – Newberne St.**

#### METHOD OF MEASUREMENT:

Measurement for payment for Vibration Monitoring will be on a percent of the Lump Sum bid calculated by dividing the elapsed time to date by the contractual construction time limit as approved by the Engineer.

**BASIS OF PAYMENT/ INCLUSIONS:**

Under the Unit Price for Vibration Monitoring, the Contractor shall furnish all labor, materials, instrumentation, tools, equipment, and incidentals required to perform all vibration monitoring as specified in the Contract Specifications and also as required by the Engineer. Payment under this Item includes, but is not limited to; furnishing, installation and maintenance of seismographs; monitoring seismograph data and submission of all data to the Engineer; submission of shop drawings and submittals as required.

**Item 2015.3 – Building Monitoring Points**

**METHOD OF MEASUREMENT:**

Measurement for payment for Building Monitoring Points will be based on the per each completed monitoring point as approved by the Engineer.

**BASIS OF PAYMENT/ INCLUSIONS:**

Under the Unit Price for Building Monitoring Points, the Contractor shall furnish all labor, materials, instrumentation, tools, equipment, and incidentals required to furnish, install, replace, monitor, and report on all utility monitoring points as specified in the Contract Specifications and also as required by the Engineer. Payment under this Item includes, but is not limited to; furnishing, installation, and maintenance of all crack gauges; monitoring of all crack gauges and submission of all data to the Engineer; furnishing, installation, maintenance, and monitoring for building monitoring points; monitoring and recording groundwater levels through existing monitoring well, MW-1, conduct site visits with the Geotechnical Engineer to locate building monitoring points; submission of all data to the Engineer; submission of shop drawings and submittals as required.

END OF SECTION 02015

[THIS PAGE INTENTIONALLY LEFT BLANK]

SECTION 02051

DEMOLITION, MODIFICATION, AND ABANDONMENT

<b>2051.1</b>	<b>DISPOSAL OF CONSTRUCTION DEBRIS AS SOLID WASTE</b>	<b>TON</b>
---------------	---	------------

<b>2051.2</b>	<b>DISPOSAL OF BITUMINOUS CONCRETE</b>	<b>TON</b>
---------------	--	------------

PART 1 – GENERAL

1.1 SUMMARY

- A. The Contractor shall furnish all plant, labor, tools, equipment, materials, and supplies as required for utility and structure removal, demolition, modification, and/or abandonment as specified.
- B. The Work of this Section shall include the following significant items; all other activity shown on the Drawings; and work necessary and defined herein pertaining to the project area: removal of pavement; removal of existing manholes; removal of existing pipe; and selective demolition.

1.2 RELATED DOCUMENTS

- A. Section 02080 – SOIL AND WASTE MANAGEMENT
- B. Section 02095 – TRANSPORTATION AND DISPOSAL OF SOIL AND FILL
- C. Section 02210 – EARTH EXCAVATION, BACKFILL, FILL AND GRADING
- D. Section 02590 – BRICK MASONRY
- E. Section 02160 – TEMPORARY EXCAVATION SUPPORT SYSTEMS

1.3 SUBMITTALS

- A. Submit the following in accordance with Section 01300 – SUBMITTALS:
  - 1. Removal and abandonment procedures that shall provide for safe conduct of the Work, careful removal and disposition of materials

and equipment, protection of utilities, structures, property, or other features which are to remain undisturbed and coordination with existing utilities or owners responsible for those nearby elements to remain in service.

2. A detailed work plan to include a list of items to be removed and/or abandoned, a sequence and schedule, and a list of salvageable materials and equipment.
3. Proposed Dust-Control and Noise-Control Measures: Submit statement or drawing that indicates the measures proposed for use, proposed locations, and proposed time frame for their operation. Identify options if proposed measures are later determined to be inadequate.
4. Schedule of Selective Demolition, Modification and Abandonment Activities subject to approval by the Owner and Engineer. Indicate the following:
  - a. Detailed sequence of selective demolition, modification and abandonment work, with starting and ending dates for each activity. Ensure the Owner's operations are uninterrupted.
  - b. Interruption of utility services.
  - c. Coordination for shutoff, capping, bulkheading and continuation of utility services.
  - d. Proposed materials, construction details, locations of temporary utilities, abandonment materials, and means of access.
  - e. Coordination of Owner's continuing use of portions of utilities, structures, property or other features and of Owner's partial occupancy of completed Work.
5. Additional Submittals for Selective Demolition, Modification, and Abandonment Activities
  - a. Inventory: After selective demolition or modifications are complete, submit a list of items that have been removed and salvaged.



- b. Pre-demolition Photographs or Videotape: Show existing conditions of adjoining utility construction and site improvements that might be misconstrued as damage caused by selective demolition or modification operations. Submit before Work begins.
  - c. Landfill Records: Indicate receipt and acceptance of all wastes by disposal facility licensed to accept the wastes to be disposed.
6. Plugs and Bulkheads
- a. If temporary pneumatic or hydro plugs are proposed the Contractor shall submit the method and procedure of maintaining bladder pressure.

#### 1.4 REPAIR OF DAMAGE

- A. Any damage to existing facilities to remain, as caused by the Contractor's operations shall be repaired at no additional cost to the Owner.
- B. Damaged items shall be repaired or replaced with new materials as required to restore damaged items or surfaces to a condition equal to and matching that existing prior to damage or start of work of this Contract.

#### 1.5 PROTECTION OF EXISTING WORK

- A. Before beginning any cutting, trenching or demolition work, the Contractor shall carefully review the work sequence and examine the Drawings and Specifications to determine the extent of the Work. The Contractor shall take all necessary precautions to prevent damage to existing facilities, which are to remain in place, and be responsible for any damages to existing facilities, which are caused by the operations. Damages to such work shall be repaired or replaced to its existing condition at no additional cost to the Owner. The Contractor shall carefully coordinate the work of this Section with all other work and shall provide shoring, bracing, and supports, as required. The Contractor shall insure that structural elements are not overloaded or compromised and shall be responsible for increasing structural supports or adding new supports as may be required as a result of any cutting, removal, or demolition work performed under any part of this Contract. The Contractor shall remove all temporary protection when the work is complete.
- B. The Contractor shall carefully consider all bearing loads and capacities for placement of equipment and material on site. In the event of any questions

as to whether an area to be loaded has adequate bearing capacity, the Contractor shall consult with the Owner prior to the placement of such equipment or material.

## 1.6 JOB CONDITIONS

- A. The Owner assumes no responsibility for actual condition of the facilities to be removed, abandoned or modified. The Contractor shall visit the site; inspect all facilities to get familiarized with all existing conditions and utilities.
- B. The Owner may occupy portions of the utilities, structures, properties or other facilities immediately adjacent to selective demolition area. Conduct selective demolition, modification and abandonment so Owner's operations will not be disrupted. Provide not less than 24 hours notice to Owner of activities that will affect Owner's operations.
- C. Owner assumes no responsibility for condition of the utilities, structures, properties or other facilities to be selectively demolished.
- D. If materials suspected of containing hazardous or asbestos materials are encountered, do not disturb; immediately notify Engineer.
- E. Storage or sale of removed items or materials on-site will not be permitted.
- F. Utility Service: Maintain existing utilities indicated to remain in service and protect them against damage during selective demolition, modification and abandonment operations.

## 1.7 QUALITY ASSURANCE

- A. Comply with Section 01400 - QUALITY CONTROL
- B. Regulatory Requirements: Comply with hauling and disposal regulations of authorities having jurisdiction.
- C. Pre-Demolition, Modification, and Abandonment Conference: Conduct conference at Project site, which includes Owner and Engineer. Review methods and procedures related to selective demolition.
- D. Review and finalize selective demolition, modification and abandonment schedule and verify availability of materials, labor, equipment, and facilities needed to make progress and avoid delays.

## 1.8 WARRANTY

- A. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during selective demolition, by methods and with materials so as not to void existing warranties.

## PART 2 – PRODUCTS

### 2.1 MATERIALS

- A. Comply with material and installation requirements specified in individual Specification Sections.

### 2.2 MATERIALS OWNERSHIP

- A. Coordinate with Engineer and Owner, who will make final determination as to whether an item is to be salvaged or removed. Except for items or materials indicated to be reused, salvaged, reinstalled, or otherwise indicated to remain Owner's property, demolished materials shall become Contractor's property and shall be removed from Project site.

### 2.3 REPAIR MATERIALS

- A. Use repair materials identical to existing materials. If identical materials are unavailable or cannot be used for exposed surfaces, use materials that visually match existing adjacent surfaces to the fullest extent possible. Use repair materials whose installed performance equals or surpasses that of existing materials.

## PART 3 – EXECUTION

### 3.1 DEFINITIONS

- A. Remove: Detach items from existing construction and legally dispose of them off-site, unless indicated to be removed and salvaged or removed and reinstalled.
- B. Remove and Salvage: Detach items from existing construction and deliver them to Owner ready for reuse.
- C. Remove and Reinstall: Detach items from existing construction, prepare them for reuse, and reinstall them where indicated.

- D. Existing to Remain: Existing items of construction that are not to be removed and that are not otherwise indicated to be removed, removed and salvaged, or removed and reinstalled.

### 3.2 PREPARATION FOR WORK

- A. Verify that utilities have been disconnected and capped, shut-off, or bulk headed. Survey existing conditions and correlate with requirements indicated to determine extent of selective demolition, modification and abandonment required. Inventory and record the condition of items to be removed and reinstalled and items to be removed and salvaged.
- B. When unanticipated mechanical, electrical, or structural elements that conflict with intended function or design are encountered, investigate and measure the nature and extent of conflict. Promptly submit a written report to Engineer.
- C. Engage a professional engineer to survey condition of structures to determine whether removing any element might result in structural deficiency or unplanned collapse of any portion of structure or adjacent structures during selective demolition operations.
- D. Perform surveys as the Work progresses to detect hazards resulting from selective demolition activities.
- E. Dangerous Materials: Drain, purge, or otherwise remove, collect, and dispose of chemicals, gases, explosives, acids, flammables, or other dangerous materials before proceeding with selective demolition, modification, and abandonment operations.

### 3.3 SITE ACCESS, TEMPORARY FACILITIES AND PROTECTION

- A. Conduct selective demolition and debris-removal operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used utilities, structures, properties or facilities.
- B. Do not close or obstruct streets, walks, walkways, or other adjacent occupied or used facilities without permission from Owner. Provide alternate routes around closed or obstructed traffic ways if required by governing regulations.
- C. Erect temporary protection, such as walks, fences, railings, canopies, and covered passageways, where required by authorities having jurisdiction.

- D. Protect existing site improvements, appurtenances, and landscaping to remain.
- E. Erect a plainly visible fence around drip line of individual trees or around perimeter drip line of groups of trees to remain.
- F. Temporary Facilities: Provide temporary barricades and other protection required for demolition security and to prevent injury to people and damage to adjacent utilities, structures, properties and facilities to remain.
- G. Provide protection to ensure safe passage of people around the area.
- H. Temporary Shoring: Provide and maintain in accordance with Section 02160 - TEMPORARY EXCAVATION SUPPORT SYSTEMS.
- I. Strengthen or add new supports when required during progress of selective demolition.
- J. Existing landscaping materials, structures, pipes and appurtenances, which are not to be removed/abandoned shall be protected and maintained as required by the Engineer and as specified.

### 3.4 POLLUTION CONTROL

- A. Water sprinkling, temporary enclosures, and other suitable methods shall be used to limit dust and dirt rising and scattering in the area. Comply with government regulations pertaining to environmental protection. Water shall not be used when it creates hazardous or objectionable conditions such as ice, flooding, or pollution.
- B. Disposal: Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.

### 3.5 CLEANING

- A. During and upon completion of work, the Contractor shall promptly remove unused tools and equipment, surplus materials, rubbish, debris, and dust and shall leave areas affected by work in a clean, approved condition.
- B. All areas shall be cleaned of dust, dirt, and debris caused by demolition, modification, or abandonment and adjacent areas returned to conditions existing prior to start of work.

### 3.6 UTILITY SERVICES

Bike Path Drainage Upgrades    DEMOLITION, MODIFICATION, AND  
 Willow Ave. to Grove St.            ABANDONMENT  
 Somerville, MA                            02051-7  
 20163393.002A

- A. Existing Utilities: Maintain services indicated to remain and protect them against damage during selective demolition, modification and abandonment operations.
- B. Do not interrupt existing utilities serving occupied or operating facilities unless authorized in writing by Owner and authorities having jurisdiction. Provide temporary services during interruptions to existing utilities, as acceptable to Owner and to authorities having jurisdiction.
- C. Provide at least 72 hours notice to Owner if shutdown of service is required during changeover.
- D. Utility Requirements: Locate, identify, disconnect, and seal or cap off indicated utilities serving areas to be selectively demolished or abandoned.
- E. If utility services are required to be removed, relocated, or abandoned, before proceeding with selective demolition provide temporary utilities that bypass area of selective demolition, relocation or abandonment, and that maintain continuity of service to other parts of building.

### 3.7 DEMOLITION AND ABANDONMENT PROCEDURES

- A. Disposal of all materials shall be performed in compliance with applicable local, state, and federal codes and requirements. Provide labor, equipment, and materials to perform work as specified and indicated.
- B. The Contractor shall flush all pipe and structures to be removed or abandoned to remove solids and objectionable material prior to commencing demolition, modification, or abandonment.
- C. When existing pipe is removed, the Contractor shall plug all resulting abandoned connections whether or not shown. Where removed piping is exposed, the remaining piping shall be fitted with a removable cap or plug, or bulk headed. Where existing piping, to include catch basin laterals, is to be abandoned, the Contractor shall cut back the abandoned pipe for a distance of 5 feet from any connecting structures to remain. Pipes to be abandoned in structures to be abandoned may be capped, plugged or bulk headed from inside the structure. All holes at the existing structures shall be repaired. Abandoned pipe smaller than 15 inches diameter shall be capped or plugged at both ends, where accessible, prior to backfill. Abandoned pipe 15 inches diameter and larger shall be filled with Controlled Density Fill (CDF) prior to being capped, plugged, or bulk headed and backfilling unless otherwise noted. Each pipe reach to be abandoned with CDF shall be filled with CDF from the up gradient end of

the pipe reach wherever possible. The CDF shall completely fill each pipe reach and flow out the other end. The Contractor can aid the flow of the CDF in the pipe by providing a temporary structure at the access point to build up head or by pumping the CDF or by providing vibration in the pipe reach or access point. Requirements for Controlled Density Fill are described in Section 02210 – EARTH EXCAVATION, BACKFILL, FILL AND GRADING.

- D. Where existing drainage structures such as catch basins, drain manholes, sewer manholes, and combined sewer manholes are to be abandoned in place, the Contractor shall remove the frames, grates, and covers and cut the structures down a minimum of 2 feet below final grade. The Contractor shall put a minimum of four, 2-inch diameter drainage holes in the invert of each structure and then backfill the structure with control density fill or compacted sand as specified and as approved by the Engineer. Backfill around the structure shall be in accordance with Section 02210 – EARTH EXCAVATION, BACKFILL, FILL AND GRADING.
- E. Permanent plugs shall be constructed of Class B concrete, brick or other material approved by the engineer.
- F. Fill excavations with solid fill resulting from earth removal operations and/or with select borrow material in accordance with Section 02210 – EARTH EXCAVATION, BACKFILL, FILL AND GRADING. Final grade to be restored in kind unless otherwise noted.
- G. Exercise precautions for fire prevention. Make fire extinguishers approved for Class A, B and C fires available at all times in areas where performing demolition or abandonment work with burning torches. Do not burn demolition debris on site.

### 3.8 SELECTIVE DEMOLITION

- A. General: Demolish and remove existing construction only to the extent required by new construction and as indicated. Use methods required to complete the Work within limitations of governing regulations and as follows:
  - 1. Neatly cut openings, joints and holes plumb, square, and true to dimensions required. Use cutting methods least likely to damage construction to remain or adjoining construction. Use hand tools or small power tools designed for sawing or grinding, not hammering and chopping, to minimize disturbance of adjacent surfaces. Temporarily cover openings to remain.

2. Do not use cutting torches until work area is cleared of flammable materials. At concealed spaces, such as pipe interiors, verify condition and contents of hidden space before starting flame-cutting operations. Maintain portable fire-suppression devices during flame-cutting operations.
3. Maintain adequate ventilation when using cutting torches.
4. Remove decayed, vermin-infested, or otherwise dangerous or unsuitable materials and promptly dispose of off-site.
5. Dispose of demolished items and materials promptly.
6. Return elements of construction and surfaces that are to remain to condition existing before selective demolition operations began.
7. Existing Facilities: Comply with Owner's requirements for using and protecting utilities, structures, properties and other facilities.

B. Removed and Salvaged Items: Comply with the following:

1. Clean salvaged items.
2. Pack or crate items after cleaning. Identify contents of containers.
3. Store items in a secure area until delivery to Owner.
4. Transport items to Owner's storage area designated by Owner.
5. Protect items from damage during transport and storage.

C. Removed and Reinstalled Items: Comply with the following:

1. Clean and repair items to functional condition adequate for intended reuse. Paint equipment to match new equipment.
2. Pack or crate items after cleaning and repairing. Identify contents of containers.
3. Protect items from damage during transport and storage.
4. Reinstall items in locations indicated. Comply with installation requirements for new materials and equipment. Provide







submitted will not be paid for.

**BASIS OF PAYMENT / INCLUSIONS:**

Payment for Disposal of Construction Debris as Solid Waste shall be based on the per ton price bid for this item in the proposal. Under the per ton price for this item, the Contractor shall furnish all labor, materials, tools, equipment, and incidentals required to Dispose of Construction Debris as Solid Waste. The work includes, but is not limited to; handle, load, transport, stockpile, weigh and dispose at an appropriately permitted facility; all cobbles, rail, timber, brick, cement concrete, stone and concrete retaining wall, metals, granite curb, edging, inlets and corners, plastic, or other construction debris; and all fees, permits, taxes, sampling, testing and analysis required by the facility.

**SPECIAL NOTES ON EXCLUSIONS:**

The excavation and removal of the items listed above for disposal are not included herein but are included for payment elsewhere. This is a disposal item only. Soils are not included for payment herein but are included for payment in the appropriate soil disposal item. Soil weight excavated and disposed with Construction Debris due to poor segregation techniques shall be estimated by the Engineer and deducted from the total weight disposed. Disposal of bituminous concrete is not paid for herein but is included for payment elsewhere. Bituminous Concrete weight excavated and disposed with Construction Debris due to poor segregation techniques shall be estimated by the Engineer and deducted from the total weight disposed. Payment for the disposal of abandoned or relocated existing gas, telephone, electric, cable TV, telecommunications, fire alarm and traffic signal utilities shall NOT be paid herein or separately elsewhere and are considered “incidental” to the Contract, with costs to be carried in the Contractor’s base bid. Disposal of concrete and brick sidewalks, driveways, and handicap ramps removed and disposed of is not included herein but is carried under the unit price for the construction of the new sidewalks, driveways and handicap ramps.

**Item 2051.2 - Disposal of Bituminous Concrete**

**METHOD OF MEASUREMENT:**

Measurement for payment for Disposal of Bituminous Concrete shall be on the basis of Tons of bituminous concrete actually disposed, as measured at the disposal facility by certified scale, and documented on the return manifest or certified weight slip. Bituminous Concrete disposed of for which return manifests or certified weight slips have not been submitted will not be paid for.

**BASIS OF PAYMENT / INCLUSIONS:**

Payment for Disposal of Bituminous Concrete shall be based on the per ton price bid for this item in the proposal. Under the per ton price for this item, the Contractor shall furnish all labor, materials, tools, equipment, and incidentals required to Dispose of Bituminous Concrete. The work includes, but is not limited to; handle, load, transport, stockpile, weigh and dispose at an appropriately permitted facility all bituminous concrete; and all fees, permits, taxes, sampling, testing and analysis required by the

Bike Path Drainage Upgrades DEMOLITION, MODIFICATION, AND  
Willow Ave. to Grove St. ABANDONMENT  
Somerville, MA 02051-13  
20163393.002A

facility.

**SPECIAL NOTES ON EXCLUSIONS:**

The excavation and removal of bituminous concrete is not included herein. The excavation of bituminous concrete is considered incidental to the contract and is not included for separate payment unless otherwise specified. This is a disposal item only. Soils are not included for payment herein but are included for payment in the appropriate soil disposal item. Soil weight excavated and disposed with Bituminous Concrete Pavement due to poor segregation techniques shall be estimated by the Engineer and deducted from the total weight disposed. Disposal of construction debris as solid waste is not included for payment herein but is included for payment elsewhere.

END OF SECTION 02051

SECTION 02080

SOIL AND WASTE MANAGEMENT

**2080.1**                      **OHM - SOIL AND WASTE MANAGEMENT**                      **LUMP SUM**

PART 1 – GENERAL

1.1      QUALIFICATIONS

- A.      The Contractor shall be experienced and knowledgeable and have the trained and qualified personnel needed to conduct the work as specified herein

1.2      RELATED DOCUMENTS

- A.      Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification sections, apply to work of this section.
- B.      The following documents are available for review at the office of the Owner, 1 Franey Road, Somerville, MA 02145, and appended to the technical specifications in Appendices.
  - 1.      “Somerville Bike Path Drainage Improvements: Environmental Conditions (Clifton Street)”, dated May 25, 2017.

1.3      OBJECTIVE and OVERVIEW

- A.      This Section includes furnishing all plant, labor, equipment, appliances, and materials, and performing all operations associated with the handling, treating, stockpiling, transporting, and disposal and/or reuse of soil and associated fill and waste material resulting from the construction operations as specified.
- B.      This Section also includes requirements for handling spills of contaminated and/or hazardous materials.
- C.      The objective of soil management practices is to handle all soil and fill excavated during this contract in accordance with applicable state, federal and local regulations and bylaws and to implement off-site soil management in a cost-effective manner. The Contractor shall reuse excavated soils on-site and in the general area of excavation to the maximum extent possible and minimize the volume of material to be disposed off-site. Soils excavated from the MBTA parcel or the private property parcel, respectively, shall be reused in the origin parcel and shall be not be combined or otherwise intermixed, except at the direction of Engineer.

- D. This Section includes protocol for handling and management of waste materials, including, but not limited to, construction debris, municipal waste, boulders, soil, fill, ash, rubble, and empty or crushed drums and/or drum parts. The Contractor shall provide the services of an Environmental Professional qualified to coordinate all soil/fill-handling activities with the Owner or Engineer and/or their representative.
- E. In the course of the work, it may be necessary to excavate and handle potentially contaminated soil/fill. The soil/fill management practices specified herein apply to all soil/fill excavated during the course of this contract. To the extent possible, the Contractor shall reuse geotechnically suitable excavated material prior to using imported backfill to reduce the volume of material to be disposed off-site. Imported backfill shall be used only as accepted by the Engineer.
- F. Excavation and management of project soils and groundwater shall be conducted in accordance with:
  - 1. The Memorandum “Somerville Bike Path Drainage Improvements: Environmental Conditions (Clifton Street)”, dated May 25, 2017, and attached to these specifications; and,
  - 2. In the event that an unanticipated release or other condition requiring notification to MassDEP, an Utility-related Release Abatement Measure (URAM) Plan to be prepared by the Owner’s Licensed Site Professional (LSP) and submitted to MassDEP by the City of Somerville DPW.
- G. All work shall be conducted in compliance with the following Contractor-prepared plans, which may be combined as appropriate so long as all requirements of each Plan are incorporated and distinct:
  - 1. Site-Specific Health and Safety Plan;
  - 2. Soil Management Plan;
  - 3. Equipment and Personnel Decontamination Plan;
  - 4. Dust, Vapor and Odor Control Plan;
  - 5. Air Monitoring and Quality Control Plan; and
  - 6. Spill and Discharge Control Plan.

#### 1.4 DEFINITIONS

- A. Area of Contamination: For the purpose of managing soil that is classified as a RCRA hazardous waste, the Area of Contamination is the contiguous area within which the waste has been identified.

- B. Area of Excavation: For the purposes of reusing soil/fill on-site, the *area of excavation* is considered to be the approximate area in which the soil/fill was removed provided that area is consistent in soil strata, color, texture, geotechnical properties and has substantially similar visual and olfactory characteristics as accepted by the Engineer. Soil/fill returned to the *area of excavation* shall be placed in the same parcel and at the approximate horizontal and vertical location from which it originated.
- C. Excavation: The removal of materials encountered to the elevation and width limits indicated in the Contract Drawings, Specifications, or as directed by the Engineer.
- D. Fill (Historic Fill): Fill, also known as historic fill or miscellaneous fill, is defined as a mixture of soil and other materials which have been located in the area through man-made processes primarily for the purpose of grading, backfilling or filling in low areas. Materials commonly associated with historic fill include, but are not limited to; coal, glass, brick, ash, wood fragments and other similar granular materials. Historic fill shall not include boulders, ledge, consolidated rock, asphalt pieces, concrete, railroad timbers, rail, cobblestones or other abandoned building materials that would preclude the disposal of the urban fill as daily cover at a landfill.
- E. Hazardous Waste:
  - 1. Defined in 310 CMR 40.0006; or
  - 2. Defined in 40 CFR 261.3.
  - 3. A waste, or combination of wastes, that, because of its quantity, concentration, or physical, chemical, or infectious characteristics may:
    - a. Cause or significantly contribute to an increase in mortality or cause or significantly contribute to an increase in a serious irreversible or incapacitating reversible illness; or
    - b. Pose a substantial present or potential hazard to human health or the environment when improperly treated, stored, transported, disposed of, or otherwise managed.
- F. Peat: A substance of vegetable origin, consisting of roots and fibers, moss, etc., in various stages of decomposition, and found as a kind of turf or bog. Peat shall be considered natural soil when it is encountered in small amounts (layers 1-foot (304.8 mm) or less in thickness) and when it is impractical to separate the peat from the natural soil or urban fill strata. Otherwise, peat shall be considered a distinctive stratum.
- G. Sediment: All detrital and inorganic or organic matter situated on the bottom of lakes, ponds, streams, rivers, the ocean, or other surface water bodies.

H. Soil Classification Categories: Unless specifically stated otherwise terms used in this specification are as defined in the MCP, 310 CMR 40.0006. The following definitions and soil classifications apply to these specifications:

1. (Class A) Any soil or fill material which has concentrations of chemicals < RCS-1 Reportable Concentrations, established by 310 CMR 40.0300 and 40.1600.

Class A soils may be reused at the following types of facilities: Managed Fill Site (operating under an Administrative Consent Order (ACO) issued by MassDEP, unless otherwise approved by the owner); or a permitted landfill, provided that in all cases, the excavated soil analyte concentrations meet the acceptance criteria established by the facility and that disposal of soil at the receiving facility will not result in an exceedance of an RC applicable at the point of disposal and which would require notification of a release pursuant to 310 CMR 40.0300. Soils not exhibiting evidence of contamination or soils determined through laboratory chemical analysis to be Class A soils may also be reused in the area of excavation.

Soil/fill with oil or hazardous material (OHM) concentrations  $\geq$  RCS-1, but which have been confirmed by the Owner's LSP to contain asphalt as a result of historic road construction or filling operations, and therefore exempt from notification requirements, may be categorized as Class A at the discretion of the Owner's LSP.

Class A soil may be reused as common fill/ordinary borrow provided it also meets the physical requirements as specified herein and as specified in Section 02210 - Earth Excavation, Backfill, Fill and Grading. Class A soil may be used in gravel processing facilities provided the soil analytical data is comparable to materials being used by the facility and such use is approved by the Engineer.

Class A soil /fill which is reused or disposed of off-site shall be transported under a Material Shipping Record (MSR). Management of Class A soils shall be conducted in conformance with the MassDEP Similar Soils Provision Guidance – WSC#-13-500 (2014).

2. (Class B) Contaminated: Any soil or fill material which contains oil or hazardous materials at concentrations equal to or greater than ( $\geq$ ) a release notification threshold established by 310 CMR 40.0300 and 40.1600, regardless of whether it is exempt from notification.

Any soils exhibiting either petroleum or chemical odor or visual indications of oil or hazardous materials as accepted by the Engineer shall be handled as potentially contaminated soils. Potentially



contaminated soils can be reused within the area of excavation without first performing laboratory analyses, with the approval of the Owner's LSP. Any excavated soil/fill material which is not reused within the area of excavation, must be characterized prior to reuse. After analytical results are available, soil/fill shall be handled in accordance with the type and degree of contamination (if any) present in the soil/fill. Surplus soil/fill which may be contaminated shall be segregated by the Contractor. Potentially contaminated soils shall not be mixed with soils not exhibiting either petroleum or chemical odor or visual indications of oil or hazardous materials. Soil/fill which has been staged and characterized can be reused within the area of excavation or elsewhere on site provided the material has been characterized by laboratory analysis and has equal or less contamination than the point where it is to be reused.

3. Class B soil which cannot be reused on site shall be reused off-site, recycled, or disposed of at a permitted facility. Subcategories of Class B, which establish off-site management requirements, are defined as follows:
  - a. Class B-1: Soil and Fill that meet all applicable criteria (i.e., Massachusetts Department of Environmental Protection (MassDEP) Policy # COMM 97-001 - Reuse and Disposal of Contaminated Soil at Massachusetts Landfills Policy, and/or facility-specific permit requirements) for reuse as daily cover, intermediate cover, or pre-cap contouring material at in-state unlined landfills. Note: per COMM 97-001, sediments may not be re-used as Class B-1.
  - b. Class B-2: Soil and Fill that meet all applicable criteria (i.e., COMM 97-001 and/or facility-specific permit requirements) for reuse as daily cover, intermediate cover, or pre-cap contouring material at in-state lined landfills.
  - c. Class B-3: Soil and Fill that meet all applicable criteria for recycling at an asphalt batching plant and/or the specific licensing requirements for the proposed recycling facility.
  - d. Class B-4: Soil and Fill that contain concentrations of contaminants that exceed in-state, lined, and unlined landfill reuse criteria as well as asphalt batching acceptance criteria, but meet the criteria for regional thermal treatment facilities, and are not classified as a RCRA Hazardous Waste.
  - e. Class B-5: Soil and Fill that contain concentrations of contaminants that exceed in-state, lined and unlined landfill reuse criteria or which require removal to regional disposal facilities and which is not classified as RCRA Hazardous Waste.

- f. Class B-6: Soil and fill which does not meet one of the designations above due to excessive foreign materials and/or debris and which is not classified as a hazardous waste.
4. (Class C) Hazardous Waste: A waste, or combination of wastes, that, because of its quantity, concentration, or physical, chemical, or infectious characteristics may cause or significantly contribute to an increase in mortality or cause or significantly contribute to an increase in a serious irreversible or incapacitating reversible illness; or pose a substantial present or potential hazard to human health or the environment when improperly treated, stored, transported, disposed of, or otherwise managed. Also included within the definition of hazardous waste is hazardous waste as defined 310 CMR 40.0006 and 40.CFR 261.3. Hazardous waste, as defined in 40 CFR 261.3, is a solid waste that exhibits any of the characteristics of hazardous waste in excess of regulation levels presented in 40 CFR 261, subpart C and/or that is listed in 40 CFR 261, subpart D; that is a mixture of solid and hazardous waste; or that is derived from a listed waste.

Soil having or suspected of having the characteristics of a hazardous waste or of containing a listed hazardous waste shall not be removed from the excavation or staged at another location except at the direction of the Engineer. Subcategories of Class C shall be as follows:

- a. Class C-1: Soils classified as hazardous waste that can be treated on-site to eliminate the toxicity characteristic (e.g., for lead).
  - b. Class C-2: Material determined to contain "listed" or "characteristic" hazardous waste constituents which cannot be treated on-site. Land disposal of hazardous soil is prohibited until the soil has been treated to meet Land Disposal Restrictions (LDR) standards pursuant to 40 CFR 268.48. This material must be transported to an out-of-state approved RCRA permitted disposal or treatment facility under a Uniform Hazardous Waste Manifest. Land disposal following achievement of the Uniform Treatment Standards (UTS) shall be at a RCRA landfill.
- I. Special Waste: means any solid waste that is determined not to be a hazardous waste pursuant to 310 CMR 30.000 and that exists in such quantity or in such chemical or physical state, or any combination thereof, so that particular management controls are required to prevent an adverse impact from the collection, transport, transfer, storage, processing, treatment or disposal of the solid waste. Asbestos and PCB-contaminated soils/fill (at regulated concentrations) are examples of special waste categories.

- J. Soil (Natural Soils): Soil, otherwise known as natural soil, is defined as unconsolidated sand, gravel, silt and clay, and the organic material which has become part of the unconsolidated soil matrix.
- K. Over Excavation: Consists of removal of materials beyond indicated elevations and width limits indicated in the Contract Documents without direction of the Engineer. Over-excavation material handling, transportation and disposal, backfilling and compaction shall be at the Contractor's expense. Over-excavations shall be backfilled and compacted as specified for excavations of the same class, unless otherwise directed by the Engineer.
- L. Unknown Materials: Any material, that is not readily identifiable as non-hazardous waste, and which has not been previously characterized or encountered during site investigation activities. The Unknown Material classification is to be used in the event that an unexpected, unusual material is encountered for which special handling procedures shall be required in order to handle the material safely. Such wastes include but are not limited to:
  - 1. Unlabeled drums or containers containing material which is not readily identifiable as a non-hazardous substance.
  - 2. Any material which varies significantly from material previously observed on site and which cannot be readily identified as a non-hazardous.
  - 3. Waste material of unusual color or odor or material with indications of hazardous levels (e.g. exceeding OSHA permissible exposure limits) of contaminants as evidenced on an organic vapor monitor or other similar instrument.

The Owner reserves the right to apply generator knowledge to classify and profile the material as a previously encountered waste or as a known waste. In the event that a material is encountered which the Contractor is uncertain as to its nature, the Owner or their representative shall assess the material with the Contractor and direct the Contractor as to the nature of the material being known or unknown.

## 1.5 WORK INCLUDED

- A. Managing excavated soil and fill material, including disposal and/or reuse of excavated soil and fill material.
- B. The Contractor's Environmental Professional shall characterize all excavated soil and fill material prior to off-site reuse or disposal. Characterization requirements may vary depending on the site selected to receive soil suitable for reuse or the disposal facility permits and policies. The Contractor is responsible

for final waste characterization and shall determine waste characterization required. The Owner shall not be responsible for soil characterization.

- C. Characterization of soil, fill, and unknown material for disposal/reuse purposes, including; field screening and soil management/segregation; temporary storage/staging; and laboratory analysis (as may be necessary for unknown materials and/or for compliance with receiving facility requirements). All laboratory chemical analyses conducted shall utilize currently accepted U.S. EPA and applicable state agency analytical protocols and procedures. Laboratory chemical analysis reports shall meet MassDEP Compendium of Analytical Methods (CAM) requirements for analysis which have published CAM requirements. The MassDEP MCP Analytical Method Protocol Certification Form shall be provided by the Laboratory with all sample results. At a minimum, surplus soil shall be characterized by the following methods for off-site disposal: MCP 14 total metals; Volatile organic compounds (EPA Method 8260B); Semi-volatile organic compounds (EPA Method 8270); Total petroleum hydrocarbons (EPA Method 8100M or equivalent); Polychlorinated biphenyls (PCBs) (EPA Method 8082); reactivity, conductivity, pH and flash point. TCLP analysis shall be conducted for any analyte for which the RCRA “rule of twenty” is exceeded.
  
- D. Management of contaminated groundwater: If groundwater potentially impacted by OHM, based on visual or olfactory evidence, is encountered in the course of the work and dewatering is required, discharge permits, modification of discharge permits, and/or groundwater treatment may be necessary depending upon the discharge method(s) and/or location(s) utilized by the Contractor. The Owner and Engineer shall be notified by the Contractor if groundwater potentially impacted by OHM is identified.
  
- E. All work at the site must be performed in accordance with all applicable federal, state, and local regulations, permits and licenses, including, but not limited to:
  - 1. The applicable parts of the Code of Federal Regulation (CFR) Title 40: Protection of Environment, pertaining to the Comprehensive Environmental Response and Liability Act (CERCLA) and the Superfund Amendments and Reauthorization Act (SARA), RCRA, Toxic Substances Control Act (TSCA), and the National Emission Standards for Hazardous Air Pollutants (NESHAPS) as regulated by the U.S. Environmental Protection Agency (U.S. EPA);
  
  - 2. State regulations specified in the Massachusetts Contingency Plan (MCP) (310 CMR 40.0000), and Massachusetts General Law 21E - Massachusetts Oil and Hazardous Materials Release Prevention and Response Act, and applicable Massachusetts Department of Environmental Protection (MassDEP) guidelines and policies;
  
  - 3. MassDEP Technical Update. Background Levels of Polycyclic

Aromatic Hydrocarbons and Metals in Soil (2002)

4. Department of Transportation (DOT) regulations 49 CFR, and state transportation licenses and permits;
5. OSHA regulations (including, but not limited to, 29 CFR 1910.1000, 29 CFR 1926, and CFR 1910.120), 40-hour Occupational Safety and Health Administration (OSHA) training (plus 8-hour refresher training) and all other applicable state and federal regulations regarding health and safety requirements;
6. NIOSH/OSHA/USCG/EPA: "Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities" October 1985, DHHS (NIOSH). Publ. No. 85-115;
7. Department of Transportation training;
8. U.S. Army Corps of Engineers Section 404 Programmatic General Permit, Commonwealth of Massachusetts;
9. General Contractor's license;
10. National Pollutant Discharge Elimination System (NPDES) Notice of Intent (NOI) to discharge and associated Construction General Permits and Remediation General permits;
11. Regional and local Publicly Owned Treatment Works (POTW) pre-treatment and construction dewatering requirements and permits;
12. Excavation and/or grading permits;
13. Special use permits;
14. Special waste haulers certificate;
15. Massachusetts Wetlands Protection Act and associated Order of Conditions;
16. The Contractor's Soil Management Plan (SMP) and Health and Safety Plan to protect the workers and the public.
17. Massachusetts Division of Occupational Safety (DOS): The Removal, Containment or Encapsulation of Asbestos (453 CMR 6), including all clarifications, policy statements, etc.
18. Massachusetts Department of Environmental Protection: 310 CMR 7.00, 7.09, 7.15 and all related amendments and policy statements,

and

19. MassDEP: Asbestos Cement Pipe Guidance Document (2011)
  20. Massachusetts Division of Occupational Safety (DOS): The Removal, Containment or Encapsulation of Asbestos (453 CMR 6), including all clarifications, policy statements, etc.
  21. Massachusetts Department of Environmental Protection: 310 CMR 7.00, 7.09, 7.15 and all related amendments and policy statements.
  22. MassDEP Technical Update: Considerations for Managing Contaminated Soil: RCRA Land Disposal Restrictions and Contained-In Determinations, August 2010;
  23. MassDEP Similar Soils Provision Guidance (2014); and
  24. MassDEP - Best Management Practices for Controlling Exposure to Soil during the Development of Rail Trails (Undated).
- E. Implementation of the submitted HASP and other applicable monitoring and control plans including establishing work zones (e.g., support zone, contamination reduction zone, exclusion zone), preparing a decontamination pad(s) and staging area(s), performing the appropriate environmental monitoring, training and medical monitoring of personnel, coordinating waste disposal and waste characterization as needed.
- F. The Contractor shall develop, implement, maintain, supervise, and be responsible for all soil management practices during the course of this contract. The Contractor's Environmental Professional shall be present during all field screening, segregating, handling, and characterization of all soils excavated in the course of completing this contract to ensure that soil is managed in accordance with applicable laws, regulations, and this Section.

Soil management activities shall include and be conducted as specified herein:

1. Providing and constructing a secure soil staging area sized to adequately segregate soils in accordance with the conditions specified without impeding construction-related activities. The Contractor is to use existing information and obtain additional information as may be needed at no additional cost to the Owner to minimize the need for a staging area. If a staging area is required to characterize unknown or excess material for any reason, the Contractor is responsible for locating, selecting, preparing and securing the area. Contractor shall provide means of separating potentially contaminated material from the staging area ground surface to prevent the potential of cross-

contamination. Separation method to be provided in accordance with 3.4(C).

2. Excavated soil that cannot be re-used on site shall be staged at a location determined and secured by the Contractor pending sampling and analytical characterization by the Contractor's Environmental Professional for off-site reuse or disposal. Soil suspected of having the characteristics of a hazardous waste or of containing a listed hazardous waste shall not be removed from the excavation or staged at another location except at the direction of the Engineer. Since individual disposal facilities have different permit conditions and specific pre-characterization data requirements, the Contractor is responsible for final soil characterization prior to transport and disposal. The Contractor is hereby made aware that for the purposes of disposal, final soil characterization is the responsibility of the Contractor and costs for securing a staging area and conducting waste characterization shall be incorporated into the Contractor's bid price for construction.
3. The Contractor shall control and contain runoff of free liquids drained from stockpiled soil/fill. Free liquids shall be managed in accordance with applicable regulations.
4. Soil that has been chemically stabilized shall be confirmed through laboratory chemical analysis to be characteristically non-hazardous pursuant to RCRA prior to off-site shipment and disposal.
5. Soil/fill shall not be staged within 100 feet (30.5 meters) of a Reservoir, or Area of Critical Environmental Concern. Soil/fill shall not be staged in the work area over night.
6. Excavating unknown, previously uncharacterized material which may be classified as RCRA hazardous waste and disposing of it at an approved facility and/or on-site treatment of these materials to render it non-hazardous prior to and disposing of it at an approved facility.
7. Removing characterized on-site materials for off-site re-use or disposal.
8. Demobilizing the site, including, but not limited to, removing and disposing of construction-related equipment and materials used for personnel and equipment decontamination and related waste such as personal protective equipment (PPE), decontamination water/solids, temporary covers, and washwater storage tanks; disconnection of temporary utilities; and final clean-up to pre-construction conditions.
9. The Contractor shall manage unknown material separately and temporarily stage the material pending characterization.

- G. All incidental, Contractor-generated waste (such as Personal Protective Equipment, decontamination wash water, etc.) resulting from the services hereunder are the property and responsibility of the Contractor and are to be disposed of by the Contractor under a Uniform Hazardous Waste Manifest and/or by a Massachusetts Bureau of Waste Site Cleanup Bill of Lading, as appropriate.
- H. The Contractor is responsible for identifying potential hazards at the site and reviewing existing information.

#### 1.6 RELATED WORK

- A. Section 01025 – MEASUREMENT AND PAYMENT
- B. Section 01108 – HEALTH AND SAFETY PROCURES
- C. Section 01500 - TEMPORARY FACILITIES AND CONTROLS
- D. Section 02010 - SUBSURFACE INVESTIGATION
- E. Section 02095 - TRANSPORTATION AND DISPOSAL OF SOIL AND FILL
- F. Section 02210 – EARTH EXCAVATION, BACKFILL, FILL AND GRADING
- G. Section 02140 – DEWATERING

#### 1.7 EXISTING CONDITIONS.

- A. Limited chemical characterization of soil adjacent to the work area has been conducted, the results of which are presented in the report referenced in Paragraph 1.2 of this section. The Contractor is obligated to review existing environmental assessment reports and manage the soil and groundwater in accordance with applicable state and federal regulations.
- B. Reports and files regarding the project area indicate the following:
  - 1. A release of miscellaneous oil or hazardous materials occurred at the former Beacon Printing Ink Company on Winslow Street. A Release Action Outcome Statement (RAO) was submitted for this release in 1999. No impact to the Project area from this release is anticipated based on its status and location.
  - 2. The Project is located within an area historically utilized for railroad operations. The potential exists for OHM, including but not limited to polycyclic aromatic hydrocarbons (PAHs), petroleum hydrocarbons, lead



and/or arsenic (from pesticides/herbicides), and other contaminants to remain within area soils.

- C. Site investigation results indicate the following:
1. No soil sampling was conducted within the limits of the Somerville Community Path.
  2. One soil boring (B-1), finished as a monitoring well, was advanced proximate to the Project Area on Clifton Street. Two representative samples were collected (fill and natural soil) and analyzed for disposal parameters. Approximately four feet (4') of historic fill was encountered beneath the road pavement. Pieces of brick, bituminous pavement and coal were encountered throughout. Lead and one PAH (benzo(a)pyrene) were detected in fill soils above RCS-1 Reportable Concentrations.
  3. No analytes were detected above MCP RCS-1 Reportable Concentrations in natural soils.

## 1.8 SUBMITTALS

- A. The Contractor shall prepare a Work Plan that generally describes the work to be performed under Section 02080 Part 3 (Execution). The work plan shall include, but not be limited to detailing the submittal and implementation of the following:
1. Site-Specific Health and Safety;
  2. Soil Management;
  3. Dust, Vapor, and Odor Control;
  4. Air Monitoring and Quality Control; and
  5. Spill and Discharge Control.

The Work Plan shall be submitted to the Owner and Engineer for review and acceptance at least two weeks prior to beginning any intrusive work at the site.

- B. The Contractor shall provide the qualifications of the Environmental Professional(s) to be assigned to this project. The Environmental Professional(s) shall be at a minimum certified, registered or licensed as an Environmental Professional or equivalent and hold a Bachelor of Science Degree in Environmental Science, Environmental Engineering, or Public Health or related degree and have sufficient experience in similar work to perform the responsibilities detailed herein. The Environmental Professional(s) shall have demonstrated experience in management of RCRA

hazardous waste soils and groundwater.

- C. Soil Management: The Contractor shall prepare a Soil Management plan that outlines measures for soil and fill sampling, field screening, laboratory chemical analysis, treatment, and disposal/reuse. At a minimum, this plan shall address the following:
1. Methods, procedures, and equipment used for treating, excavating, dewatering, characterizing, segregating, reusing/backfilling, loading, and transportation of contaminated soil/fill materials encountered during excavation operations, including Class A, B, and C soils;
  2. A list of all transporters and waste facilities, complete with license numbers, permit or ACO numbers (as applicable), contact person, and address and telephone number that the Contractor utilizes for waste disposal. The Contractor shall provide copies of the permits/ACOs held by each disposal facility which the Contractor plans to use to dispose of non-hazardous solid waste; and if necessary, to dispose of hazardous waste (due to lead toxicity), PCB-impacted waste and/or asbestos-containing waste;
  3. A summary of the history of compliance actions for each disposal/recycling facility proposed to be used by the Contractor. The compliance history shall include a comprehensive list of any state or federal citations, notices of non-compliance, consent decrees or violations relative to the management of waste (including remediation waste) at the facility. The Owner reserves the right to reject any facility on the basis of poor compliance history;
  4. Procedures for securing the staging area, controlling dust and soil/fill migration, prevention of contamination of excavated soil by trucks used for asphalt, separation of stockpiled materials from staging area ground surface, preventing damage to uncontaminated areas via contaminant migration and for decontaminating vehicles and personnel exiting the staging area;
  5. The means and methods for decontaminating all equipment and personnel, including provisions for installing an equipment decontamination pad if required or specified;
  6. Methods and procedures for identifying stockpiled material (e.g., labeling, marking containers) and procedures for identification and tracking;
  7. Methods, procedures, and equipment used for obtaining the necessary information needed to satisfy the off-site reuse/disposal facility requirements specified herein and/or by the facility;

8. Methods, procedures, and equipment proposed for assessing and handling Unknown Materials. The SMP shall indicate which laboratory(ies) the Contractor shall utilize for chemical analysis of soil, groundwater and unknown materials:
  - a. An Unknown Materials information sheet shall be developed as part of the Contractor's SMP, upon which the Contractor shall record information such as container type, size, and condition; and, any identifying characteristics of the unknown material. The format of the information sheet shall be as accepted by the Owner and/or its representatives;
  - b. The Contractor's plan for notifying the Owner and Engineer in the event that an unknown material as defined in this specification is encountered. The plan shall include the phone numbers and names of the Owner's representative(s) that the Contractor will contact in such an event.
9. Provisions for separation of incompatible materials;
10. Protocol for over-packing drums (if encountered);
11. Procedures for consolidating (i.e., bulking) compatible materials for disposal; and
12. Procedures for dewatering; testing, handling, treatment, and disposal/discharge of groundwater.

D. Soil Management/Tracking Documentation:

Prior to off-site disposal or reuse, the Contractor shall provide to the Engineer a letter from the disposal facility indicating that the facility has reviewed the available data relative to the soil/fill to be delivered and agrees that the soil/fill meets their acceptance criteria. The letter shall be signed by a duly authorized representative of the receiving facility.

Within the time constraints established in state and/or Federal laws and regulations, the Contractor shall submit to appropriate authority(ies), as applicable, Uniform Hazardous Waste Manifests and/or Bills of Lading for all soils and associated fill disposed or reused off-site utilizing such documents. Copies of all manifests, Bills of Lading, and all other documents used to track and/or permit off-site transportation of soils shall be submitted to the Engineer within ten (10) days of shipment. The Contractor is responsible for preparation of all manifests, Bills of Lading, Material Shipping Records, and all other related documents completely, legibly, and accurately prior to submitting them to the Owner and/or its representative for

generator and LSP signatures. (Bills of Lading shall be prepared electronically by the Owner's LSP; the Contractor shall be responsible for providing information necessary for completion of the BOL). The Contractor shall be responsible for paying for any and all fines associated with inaccurate, incorrect, or improperly completed manifests, Bills of Lading and all other related documents, including fines resulting from late or untimely submittals.

- E. Spill and Discharge Control (SDC): The SDC program shall provide contingency measures and reporting responsibilities for potential uncontrolled spills and discharges of contaminated and/or hazardous materials, including, but not limited to, leachate, decontamination water, sewage, and other on-site waste materials. In addition to the above listed items, the SDC program shall specifically contain: procedures for containing dry and liquid spills; absorbent material available on site; storage of spilled materials; governmental reporting (i.e., notification) procedures; decontamination procedures; discharges of sanitary or combined sewers into storm drains either by flow handling/bypassing or accidental or unintentional discharge; and procedures for protecting wetlands and surrounding public and private property.

The Spill and Discharge Plan shall indicate the location and quantity of the materials to be staged on site and the basis for the quantities (i.e. indicate the vessel which will be on site containing the greatest volume of oil or hazardous materials). No fuel or oil tanks or drums may be temporarily staged on site unless they are stored within a secondary containment system. Fuel deliveries shall be performed in a designated area which has either secondary spill containment or an impervious surface with absorbent berms located around the point of fuel delivery. The Spill and Discharge Plan shall indicate the location of the fueling area and the nature of secondary containment which the Contractor intends on utilizing.

1. Notification Procedures: The Contractor shall prepare in advance of work activities a notification list, complete with phone numbers, addresses, and contact names for all parties to be notified in the event of a spill. This list shall include:
  - a. Owner's designated representatives;
  - b. Owner;
  - c. Fire Department;
  - d. Engineer; and
  - e. Massachusetts Department of Environmental Protection (as required per 310 CMR 40.0000).

The Owner shall be notified immediately of an uncontrolled spill or discharge. If human health or the environment are potentially threatened, the Contractor shall take immediate action to abate the conditions and notify emergency personnel.

2. Spill Incident Report(s): In the event of an uncontrolled spill or discharge, a written report detailing each uncontrolled spill or discharge shall include, at a minimum, the cause and resolution of incident, outside agencies involved, and date of occurrence. The report shall be submitted to the Owner within 48 hours of the incident. The Contractor shall document all spills on the as-built Drawings and submit the Drawings to the Owner at project completion. The Contractor shall be responsible for remediating any spills or releases of oil or hazardous materials as a result of the Contractor's activities. The site shall be remediated to pre-release conditions at no additional cost to the Owner.
- F. Dust, Vapor and Odor Control (DVOC): The DVOC program shall include measures to control objectionable dust, vapors, and chemical or natural odors originating from the work area or soil/fill staging area. The DVOC Plan shall describe procedures to minimize the creation of dust, and the control of objectionable vapors and odors originating from the site. At a minimum, the DVOC program shall include air monitoring as specified in paragraph 3.6. The Contractor shall have materials on hand to implement control measures.

## PART 2 – PRODUCTS

### 2.1 DUST AND VAPOR CONTROL

- A. Air monitoring shall include total dust testing using MIE, Inc. Miniram PDM-3 Dust Monitors, or like instruments. Air monitoring shall include monitoring total volatile organic vapors using a MiniRAE Photoionization Detector or like instrument.

### 2.2 SPILL CONTROL

- A. At a minimum, the Contractor shall maintain on-site absorbent pads, booms and absorbent materials in sufficient quantity to address a release of fuel oil, hydraulic oil or other OHM that the Contractor intends to use or store on site, including fuel oil and hydraulic oil that is used within earth moving equipment. The quantity of spill containment materials maintained on site shall be sufficient to respond to a catastrophic release from the vessel containing the greatest quantity of oil or hazardous material on-site.

### 2.3 EQUIPMENT DECONTAMINATION PAD

- A. The Contractor shall provide all materials and labor to complete an equipment decontamination pad if required or specified. Liner materials and collection system shall be selected by the Contractor to perform as specified.

## PART 3 – EXECUTION

### 3.1 GENERAL

- A. All work in this section will be performed in accordance with the Contractor's Work Plan, SMP and Site-Specific HASP.
- B. The primary concern of the Contractor in the excavating, handling, sampling, bulking, and on-site storage of soil/fill and/or drummed material (if encountered) will be to protect the health and safety of the site workers, the public, and the environment.
- C. The Contractor shall keep a copy of the Health and Safety Plan (HASP) on site during all operations and shall conduct daily health and safety meetings. Failure to keep a copy of the HASP on-site, or any other breach of the Contractor's Plan, may be cause for stopping work at the cost of the Contractor. Delays caused by the Contractor's failure to comply with the health and safety regulations or any health and safety plan shall not entitle the Contractor to recover any additional costs or time lost. The Contractor shall not be allowed to resume activities until corrective measures are accepted by the Engineer and/or their representative and implemented.
- D. Medical surveillance records, OSHA 40-hour training forms, accident forms, and all other documentation requirements of the Contractor's safety and health program for personnel working on the site (who are subject to exposure to potentially contaminated soil) shall be up-to-date and kept on file at the site. The Contractor shall provide documentation of employee status upon request of the Engineer and/or their representative.

### 3.2 SOIL/FILL MANAGEMENT

- A. Soil and fill material that is managed under a Utility-related Abatement Measure (URAM) Plan pursuant to the MCP, which is staged off-site, and which is not characteristically hazardous, may be re-used within fourteen (14) calendar days of excavation. Any material which is suitable for re-use as ordinary borrow, based on analytical results and could have been placed on site, but was not, due to Contractor delay (i.e. analytical results were not available within 10 days following excavation) will be disposed in accordance with the applicable regulations by the Contractor at no cost to the Owner.
- B. Soil and fill material that is managed under a Utility-related Abatement Measure (URAM) Plan pursuant to the MCP, which is staged off-site and which is determined at the staging area to be characteristically hazardous for lead may be treated (stabilized) within the "Area of Contamination" (AOC) only and must be reused or disposed of within ninety (90) calendar days of excavation. No treatment may occur at the staging area if located outside the "Area of Contamination".

- C. Class B and C excavated soils shall be completely covered with a minimum 10-mil thick layer of plastic tarp. Soils exhibiting evidence of potential contamination including but not limited to odors and/or staining shall be covered prior to characterization and off-site reuse or disposal. Stockpiled soils determined to be Class B or C, as described herein, shall be securely covered at the close of each day and continuously when not being added to or otherwise being handled by the Contractor. Stockpiles, including those of Class A soils, shall also be covered at times as directed by the Engineer.
- D. Excavated soil shall be managed such that it is not exposed to contamination following excavation. Equipment and supplies in contact with excavated soil shall be free of asphalt, petroleum products or other hazardous materials that could be transferred to soil. Vehicles used to transport asphalt shall not be used to transport soil except by permission of and following inspection by of the truck, by the Engineer.

### 3.3 SOIL/FILL CHARACTERIZATION

- A. Soil and fill material shall be classified based on the criteria established in the accepted SMP and these Specifications.
- B. Initial Characterization of Soil/Fill Material: A summary of existing conditions and investigation findings performed by the Engineer during design, including a summary of analytical results, is appended to this section.
- C. It is the Contractor's responsibility to determine if the data appended to this section is sufficient to pre-characterize soil/fill for disposal. If additional data is required, the Contractor may either perform independent sampling and pre-characterization of soil/fill strata to be encountered during construction in advance of excavation such that excavated soil can be directly transported to an appropriate facility; or the Contractor shall make the necessary arrangements to secure a staging area(s) suitable for storing soil stockpiles pending analyses.
- D. Soil shall be preliminarily segregated based on the Soil Classification Categories detailed in Sub-section 1.4, except as indicated below.
  - 1. Potential Asbestos Containing Material (PACM): If soil/fill suspected of including asbestos-containing debris is encountered during excavation, the Contractor or the Contractor-hired Environmental Professional shall immediately contact the Engineer to discuss the nature and extent of the PACM and to assess potential hazards and appropriate handling procedures. Prior to handling and removing the PACM, MassDEP shall be notified and approval for handling and disposal obtained. Discovery and management of PACM shall be documented as required in the SMP. Evidence of PACM includes but is not limited to the presence of suspect asbestos-containing building

debris such as broken or crushed asbestos-cement (transite) piping, vinyl floor tiling, tar-based pipe wrap, roofing paper or paper-like insulation materials. Following MassDEP approval, such soil/fill shall be managed in accordance with applicable regulations. Soils shall be analyzed for OHM to determine appropriate disposal requirements, as required by the proposed disposal facility.

2. Unknown Material. If unknown material is encountered during excavation, the Contractor or the Contractor-hired Environmental Professional shall immediately contact the Engineer to discuss the nature and extent of the unknown material and to assess potential hazards and appropriate handling procedures. Prior to handling and removing the unknown material from the excavation area, the Contractor and Owner and/or its representatives, shall visually assess the material and its potential hazards. Drums shall be assessed to determine whether they are leaking, bulging (evidence of reactive waste), crushed, or empty. Crushed, empty, and/or skeletal parts of drums shall be handled as solid waste, as specified. The Contractor shall record any identification or markings on the drummed material(s). Discovery and management of unknown materials shall be documented as required in the SMP.

- E. Disposal Characterization: Waste characterization shall be the responsibility of the Contractor. The Contractor shall be responsible for determining the characterization requirements of each disposal facility in advance to facilitate timely disposal and to adequately estimate the disposal costs. The Contractor shall perform additional segregation based on disposal requirements. Disposal or reuse of the material shall depend on sampling and characterization analytical results. The Contractor shall, at the direction of the Engineer, provide a split sample to the Engineer. The Contractor shall provide notice to the Engineer of when sampling will occur so that the Engineer may observe the sampling procedure.

Stockpiles within the staging area shall be sampled and characterized within a timely manner so as not to impede construction activities or preclude the reuse of soil/fill on site. If soil/fill cannot be reused on site due to the Contractor's delay in sampling material, the Contractor shall dispose of the soil/fill at no additional cost to the Owner including the cost of imported fill material used in its place.

### 3.4 STAGING AREAS

- A. Unless the staging area is comprised of an impervious surface material such as asphalt or concrete, the Contractor shall pre-characterize the surface soils (0-6") at the staging area(s) prior to staging any soils to document the existing conditions relative to contamination which may result from using the area to stage excess or unknown materials. A minimum of one composite surface soil



sample, consisting of at least five grab samples, for every 2,500 square feet of staging area shall be collected by the Contractor prior to staging materials at the location. The samples will be submitted to a certified laboratory for analysis for:

1. MCP 14 total metals;
  2. Volatile organic compounds (EPA Method 8260B);
  3. Semi-volatile organic compounds (EPA Method 8270);
  4. Total petroleum hydrocarbons (EPA Method 8100M or equivalent); and
  5. Polychlorinated biphenyls (PCBs) (EPA Method 8082).
- B. At the completion of the work, the Contractor shall replicate the pre-staging sampling and analysis protocol to assess impacts to the area from use as a staging area.
- C. Stockpiles located within the soil staging areas shall be placed on asphalt or concrete, or on a 20-mil HDPE liner and bermed to minimize the effects of contamination release. Each soil category shall be staged in separate areas with berms constructed a minimum of 2 feet above the existing grade with common fill, hay bales, concrete barriers, or functionally equivalent berm material. Waste characterized as RCRA hazardous waste shall not be stored on site for a period greater than sixty (60) days. All other waste must be disposed off-site within ninety (90) days of excavation.
- D. As described above and herein, excavated materials shall be completely covered with a minimum 10-mil thickness polyethylene tarp and secured with tires, ropes, anchors or equivalent material. The covered system shall be capable of resisting actual wind gusts at the site, with a minimum wind capacity of 40 miles per hour. The stockpile covers shall be installed and secured at the end of each working day and at all times when earthwork is not taking place on site. Stockpile covers shall be immediately recovered should wind forces expose any of the excavated materials. Stockpiles shall also be covered at times as directed by the Engineer.
- E. Stockpiles are to be segregated based on a review of pre-characterization data and visual and olfactory conditions and field screening results obtained during excavation. Stockpiles shall be segregated by source location as approved by Engineer. Each stockpile must be clearly separated from adjacent stockpiles.
- F. Stockpiles shall be limited in size to approximately 500 cubic yards, unless approved by the Engineer. If, as a result of combining soil piles into larger volumes than 500 cubic yards, soil must be disposed of as a higher cost bid item than would otherwise be required, the Contractor shall be responsible for the additional cost.

- G. Stockpiles shall be clearly designated by a sign post or marker which can be cross-referenced with the source location and with samples collected from the pile for characterization purposes. The signs/markers are not to be moved, except by authorized personnel and not until the soil is ready to be either reused on site or loaded for off-site disposal.
- H. Excavated soil shall not be added to a stockpile after it has been sampled for characterization.
- I. Unknown, potentially hazardous soils/debris and drummed materials encountered during the project shall be located in a separate bermed location. The Contractor's Soil Management Plan shall provide construction details of the dimensions and protective measures proposed for the staging area(s). The construction details and protective measures are subject to the acceptance of the Owner and/or its representatives. The Contractor shall select the area to facilitate handling of the material and to minimize interference with other ongoing construction activities. The Owner or Engineer must agree with the location prior to construction.

### 3.5 EQUIPMENT AND PERSONNEL DECONTAMINATION

- A. Equipment and personnel decontamination area(s), conforming with the Contractor's HASP and these Specifications, shall be constructed in such a manner to protect existing site surfaces, materials, and structures from contamination. Equipment decontamination areas shall be sized adequately to provide for the decontamination of the largest piece of equipment to be decontaminated. Filter fabric shall be placed over an impermeable liner to protect the liner from rips, punctures, or tears from traffic and heavy equipment.
- B. The Contractor shall establish a site-specific decontamination protocol and decontamination areas for personnel and equipment utilized at the subject site. Personnel and equipment decontamination shall be conducted in compliance with the HASP.
- C. The decontamination protocol shall include (i) the means, methods, and materials for the proposed decontamination procedures; (ii) the procedures employed to contain and store the wash or rinse liquids/sludges; (iii) procedures used to sample, analyze, and characterize the contaminated wash or rinse liquids/sludges; (iv) procedures to contain or clean contaminated equipment and PPE; and (v) the procedures for handling and disposing of solid wastes generated from site decontamination activities. All sample analysis or sample compositing shall be completed by a certified laboratory. The Contractor shall be responsible for the cost of this analytical work. The Contractor shall submit a copy of the analytical results and laboratory certifications to the Owner for review prior to proceeding with disposal. The Contractor shall be responsible to properly manifest and dispose of all

residual wastes generated from on-site activities in conformance with federal, state, and local environmental and transportation regulations. The Contractor shall be responsible for the manifests and procedures to be used to package and dispose of contaminated solid wastes, wash, or rinse liquids at an EPA or state-approved treatment or disposal facility. The Contractor shall be responsible for any releases from site or decontamination activities due to its work, and will remediate any release for which the Contractor is responsible to pre-existing conditions at the Contractor's expense.

- D. Provisions for collecting decontamination water will be incorporated into the maintenance of the decontamination pad and will include placing an impermeable liner over a sloped surface such that water is directed, if necessary, into an area for subsequent pumping to 55-gallon drums or other appropriate tankage. Following completion of the work, the wash water shall be characterized by the Contractor and disposed off-site, in accordance with federal, state, and local regulations.

### 3.6 ENVIRONMENTAL FIELD MONITORING/DUST CONTROL

- A. The Contractor's Site Health and Safety Officer shall keep accurate documentation of all air monitoring in accordance with the Contractor's Health and Safety Plan. Air monitoring data shall be made available to the Engineer or Owner upon request. At the direction of the Engineer, air monitoring may be limited to visual assessment for dust and odor monitoring; instrument monitoring may be required at any time by the Engineer, based on the results of visual and odor monitoring.
- B. During excavation and construction, the Contractor shall monitor the air quality at and surrounding the areas where construction activities involve soil handling such as excavation, re-location, staging, loading or grading of soil/waste materials. Air monitoring shall involve appropriate techniques, capable of providing real-time indications of air contaminants to protect on-site personnel and the local population. If there are indications of contamination, the frequency of air monitoring shall be determined by the Contractor's Industrial Hygienist or competent environmental health professional. The Contractor's Site Health and Safety Officer and Superintendent shall be responsible for assuring that monitoring is conducted in an appropriate manner by personnel trained to operate the air monitoring equipment, record measurements, and compare to action limits established by the Contractor's Health and Safety Plan, and that work practices, engineering controls and/or Personal Protective Equipment are proper for the conditions.
- C. The air monitoring program is to be designed to protect public health and the environment from the potential generation of dust and odors and contaminant release during work. At a minimum, the air monitoring shall include daily monitoring and documentation of one upwind, and two downwind conditions during periods of activity on the site and when there is a potential for dust being

generated on the site. The air monitoring information including air monitoring in the vicinity of all site activities shall also be utilized for establishing levels of personal protection measures in the Contractor's Site-Specific Health and Safety Plan. The Contractor shall submit his/her air quality monitoring program for review prior to commencement of site activities.

- D. Air monitoring shall be performed by the Contractor during all soil handling operations. In contaminated areas, detectors for organic contaminants and dust should be utilized to monitor on-site and off-site breathing zones and possible sources of potentially hazardous material (e.g. excavations, regrading, etc.). All personnel shall be made aware of the potential hazards and be informed of air monitoring information by the Contractor. Particular attention to air quality shall be made in the work area during earthwork activities to ensure that contaminants do not escape to the atmosphere and affect off-site population, on-site control, working conditions and personnel protection measures.
- E. Dust shall be controlled during excavation of soil/fill material to limit potential spread of contaminants and potential exposure of contaminants to workers and the public.
- F. Ambient dust levels at the site shall be monitored by the Contractor prior to construction. During construction, real-time dust monitoring shall be conducted during any soil/fill handling activities. The monitoring shall consist of total dust testing using MIE, Inc. Miniram PDM-3 Dust Monitors, or like instruments. The total dust criteria at the site shall conform to the requirements of the HASP. Should fugitive dust quantities exceed 20 percent of the ambient level, the Contractor shall perform additional measures to reduce the total dust concentrations.
- G. Nuisance dust levels shall be reduced by pre-wetting the surface soils and by establishing and maintaining clean access roads. The Contractor's Dust, Vapor, and Odor Control Plan shall describe the procedures and materials to minimize dust. At a minimum, the Contractor shall provide clean water, free from salt, oil, and other deleterious materials.

Areas of exposed earth to be excavated shall be lightly sprayed with water before excavation if there is potential for nuisance dust generation. Additional water spray may be utilized only when any indication of excessive dust is observed. To the extent feasible, the Contractor shall minimize the use of water within the limits of excavation.

Access roads shall be sprayed with water on a regular basis to minimize the generation of dust.

- H. All containers temporarily storing waste material shall be covered at all times except as necessary to place waste material into the container. The Contractor

shall monitor the covers daily to ensure the covers are in place and effectively eliminating the generation of dust and make appropriate notes in the site log.

- I. In the event that asbestos containing materials are encountered, dust control measures, which may include negative air containment, shall be instituted in accordance with all applicable local, state and federal laws and regulations.
- J. Air monitoring shall include screening for methane, %Lower Explosive Limit, hydrogen sulfide, oxygen and total volatile organic compounds.

### 3.7 VAPOR AND ODOR CONTROL

- A. The Contractor shall provide the materials and labor to control objectionable vapors and odor in accordance with the Contractor's Vapor and Odor Control Plan. The Contractor shall limit the exposure area and shall cover the exposure area with synthetic reusable covers, lime, foam suppressants, or other methods to reduce off-site odors to acceptable levels. The Contractor shall not use soil suitable for on-site reuse as cover to control vapor and odors.

### 3.8 BULKING

- A. Following characterization and compatibility testing of waste material, the Contractor shall place compatible materials into common containers to reduce transport and disposal costs. In addition, materials that are improperly contained shall be transferred into the appropriate containers. Drums and containers used during this project shall meet the appropriate DOT, OSHA, and U.S. EPA regulations for the materials contained. The Contractor shall describe the bulking procedures in the Soil and Fill Management Plan.

### 3.9 BACKFILLING AND COMPACTION

- A. Excavated areas shall be backfilled with appropriate backfill material (including excavated material suitable for reuse and, when necessary, imported off-site material). Imported backfill used in excavated areas shall have been analyzed and certified as free of contaminants and as specified in Section 02210 – EARTH EXCAVATION, BACKFILL, FILL, AND GRADING.

## PART 4 – COMPENSATION

### **Item 2080.1 – OHM - Soil and Waste Management**

#### METHOD OF MEASUREMENT:

Measurement for Payment shall be based on the following breakdown; a maximum of 3 percent of the lump sum will be paid upon the finished construction of the completed soil/fill staging area as specified and accepted by the Engineer. A maximum of 4 percent of the lump

sum will be paid upon the submittal and acceptance of all related submittals, plans and shop drawings. A minimum of 3 percent of the lump sum will be paid at the complete removal and restoration of the staging area, as approved by the Engineer. The balance of the Lump Sum measurement for payment for will be on a percent of the Lump Sum bid remaining, calculated by dividing the elapsed time to date by the contractual construction time limit as approved by the Engineer. Deducts for work not performed as specified shall be applied.

#### BASIS OF PAYMENT / INCLUSIONS:

Payment for Soil and Waste Management shall be based on the lump sum price complete for this item in the proposal. The Contractor shall furnish all labor, materials, tools, equipment, and incidentals required for Soil and Waste Management. The work includes, but is not limited to; Environmental Professional; dewatering Professional; soil/fill sampling; analytical services; development and implementation of all submittals and plans specified including, but not limited to: Health and Safety Plan; Equipment and Personnel Decontamination Plan; Soil and Waste Management Plan; Dust, Vapor, and Odor Plan; Air Quality Control Plan; and a Spill and Discharge Control Plan; submittal of all required certifications; coordination with all parties affected and maintaining proper documentation necessary; disposal of wastes, such as construction-related waste and by-products, and Contractor-generated waste material, such as personal protective equipment, excess materials, debris, wash water, and any other waste materials not specifically addressed in other payment items; waste characterization sampling and analysis costs for the waste referenced above; construct and maintain a secure (enclosed with 8 foot high fencing and gate) soil/fill staging area for soil/fill stockpiling pending analytical testing, reuse, or disposal; all permits and administration fees; collecting and testing surface soil samples pre- and post- use of staging area; placement of polyethylene liner under piles; additional placement of bituminous or cement concrete as may be needed at the staging area; construction of segregated soil/fill bays; signage and lighting at the staging area; installation of sedimentation and erosion control at the staging area; construction of a truck wash down area; construction of a decontamination area with wheel wash; maintenance including placement of daily polyethylene covers over existing stockpiles; performing dust control; street sweeping; vehicle wheel-washing in the staging areas as needed to control airborne dust and sediment from spreading beyond the staging area or presenting a health risk to the workers or public; day to day security measures; maintenance of the soil/fill stockpiles to avoid migration; and maintenance of the sedimentation and erosion control measures; and removal, hauling, and disposal of all items of which the staging area was constructed as well as the restoration of the site to pre-construction conditions.

#### EXCLUSIONS:

The following items are not included for payment under this item; transportation and disposal of soil and fill material; re-use of soil and fill material on site as backfill; handling unknown materials; sedimentation and erosion control for other uses besides soil management (at the staging area); and all work associated with a staging area for other uses beyond soil and waste management.

END OF SECTION 02080

SECTION 02095

TRANSPORTATION AND DISPOSAL OF SOIL AND FILL

<b>2095.1</b>	<b>OHM - DISPOSAL OF SOIL- LESS THAN RCS-1 (CLASS A)</b>	<b>TON</b>
<b>2095.2</b>	<b>OHM - DISPOSAL OF SOIL – DAILY COVER UNLINED LANDFILL (CLASS B-1)</b>	<b>TON</b>
<b>2095.3</b>	<b>OHM - DISPOSAL OF SOIL – DAILY COVER LINED LANDFILL (CLASS B-2)</b>	<b>TON</b>
<b>2095.4</b>	<b>OHM - DISPOSAL OF SOIL – NON-HAZARDOUS SOLID WASTE ASPHALT BATCHING (CLASS B-3)</b>	<b>TON</b>

PART 1 – GENERAL

1.1 DESCRIPTION

- A. Furnish all labor, materials, equipment, and incidentals required to transport off site, and dispose, reuse or recycle excess soil (defined herein as including sediments and fill) at a licensed facility approved by the Owner.
- B. All personnel involved in the transportation of waste from the site shall have the required Department of Transportation (DOT) and Occupational Safety and Health Administration (OSHA) training.

1.2 RELATED WORK

- A. Section 01108 – HEALTH AND SAFETY PROCEDURES
- B. Section 01500 – TEMPORARY FACILITIES AND CONTROLS
- C. Section 02010 – SUBSURFACE INVESTIGATION
- D. Section 02051 – DEMOLITION, MODIFICATION, AND ABANDONMENT
- E. Section 02080 – SOIL AND WASTE MANAGEMENT
- F. Section 02210 – EARTH EXCAVATION, BACKFILL, FILL AND GRADING

1.3 SUBMITTALS

Bike Path Drainage Upgrades  
Willow Ave. to Grove St.  
Somerville, MA  
20163393.002A

TRANSPORTATION AND  
DISPOSAL OF SOIL AND FILL  
02095-1

- A. Submit the following in accordance with Section 01300 – SUBMITTALS:
1. A list of all transporters, destination/receiving sites and waste facilities, complete with license numbers and permit numbers (as appropriate), contact person, and address and telephone number that the Contractor utilizes for soil management and waste disposal.
  2. Where appropriate the Contractor shall submit waste manifests for all waste disposed off-site to the appropriate authority, agency, facility, or person within the time constraints specified by state and federal regulations. Copies of all waste manifests and Bill of Lading documentation including weight slips and BOL summary sheets shall be provided to the Owner within 10 days. It is the responsibility of the Contractor to complete all waste manifests and bills of lading completely and accurately prior to submitting them to the Owner. For MassDEP Bills of Lading the Contractor shall provide the Owner's Licensed Site Professional (LSP) all information required for preparation of electronic Bills of Lading. The Contractor shall be responsible for preparation of Material Shipping Records. The Contractor shall be responsible for submitting to the Owner's LSP all information necessary for preparation of LSP opinion letters to disposal facilities and coordinating disposal documentation with all parties. The Owner's LSP and the Owner shall sign any MassDEP Bill of Lading forms where required only after the Contractor has provided the information required for preparation of electronic MassDEP forms. The Contractor shall reimburse the Owner for any and all fines associated with inaccurate, incorrect, or improperly completed waste manifests, including fines resulting from late or untimely submittals.
  3. Disclose a summary of the history of compliance for each disposal/recycling facility proposed to be used by the Contractor. The compliance history shall include a comprehensive list of any state or federal citations, notices of non-compliance, consent decrees or violations relative to the management of waste (including remediation waste) at the facility. The Owner reserves the right to reject any facility on the basis of poor compliance history.
  4. Prior to transporting any soils or fill material to a disposal facility the Contractor shall submit a letter from the disposal facility indicating that the facility has reviewed the available data and the generator's profile of the material and the facility agrees that it meets the facility's acceptance criteria.



5. Following off-site disposal of soil or fill materials at a disposal facility the Contractor shall submit Material Shipping Record or MCP Bill of Lading load log sheets signed by the facility.
6. Following disposal of all the soil represented by a Material Shipping Record or Bill of Lading, the Contractor shall submit that Material Shipping Record "Acknowledgment of Receipt by Receiving Facility" or Contractor shall arrange for receiving facility to electronically sign that Bill of Lading "Attestation of Disposal", as applicable, within 60 days of shipment.

## PART 2 – PRODUCTS

### 2.1 GENERAL

- A. Provide completed Bills of Lading, Material Shipping Records, manifests, certificates of disposal, weight slips and all other documentation relative to disposal, reuse, treatment or recycling of soil material.

## PART 3 – EXECUTION

### 3.1 GENERAL

- A. The Contractor shall reuse, recycle or dispose of all excess soil resulting from excavation activities in accordance with federal, state and local regulations and these specifications. Transport shall be by a permitted and licensed waste transporter. The Contractor shall be responsible for supplying the proper manifests to be approved and signed by a representative of the Owner.
- B. Prior to disposal, it shall be the responsibility of the Contractor to maintain segregated waste stockpiles in conformance with all applicable federal, state, and local waste disposal regulations and as specified in Section 02080 - SOIL AND WASTE MANAGEMENT.
- C. The Contractor shall be responsible for preparing and keeping in proper order all waste manifests, BOLs, MSRs, and shall designate one person who shall be made available to sign all transportation documentation. The Engineer shall be responsible for obtaining the Owner's and receiving facilities' signature and all other signatures required for the proper completion of the manifests. The Contractor shall allow a minimum of five working days from the date of the submittal for any documents requiring the signature of the Owner and/or the LSP. The manifests shall document the handling of the waste from the time it is generated until the time it is properly disposed.

- D. The Contractor shall be responsible for obtaining all federal, state, and local permits and variances to allow transport of materials on public roadways.
- E. The Contractor shall be responsible to inform the Owner if hazardous waste disposal will not be performed within 60 days of hazardous waste characterization. This notification shall take place a minimum of 30 days prior to the 60-day deadline. No hazardous waste stockpiled at the site shall remain on site more than 60 days after it is characterized.
- F. The Contractor shall obtain certificates of disposal for all disposed waste.
- G. Transportation of solid wastes shall comply with all relevant federal, state and local special waste requirements, and such as to assure that waste material is not released during transit.

### 3.2 SOLID WASTES

- A. Transporters of solid wastes that include, but are not limited to, contaminated soil/fill (including oil-contaminated soil/fill), construction and demolition debris, non-hazardous laboratory wastes, bottles, tires, metal parts, tree stumps, brush, and grass cuttings will utilize truck or dumpsters specifically designed to ensure that material, dust, or liquid is not released in transit. No truck shall be allowed to exit the site until all free liquids are drained from soil/fill or other solid waste being transported off-site. Material shall be covered at all times. The vehicle in which the waste is transported shall be driven directly to the intended destination without any stops or detours in between, except those necessary in response to road conditions, vehicle service needs, or emergencies. Discharge or release of material during transport shall be immediately reported to the Owner. Transporters shall clean up any discharge that occurs in transit, at the Contractor's expense.
- B. The disposal site shall be permitted by the state in which the facility is located to receive and dispose of solid waste, and shall be approved for use by the Owner. The Contractor shall provide copies of the disposal facility's operating permit.
- C. Manifesting of solid waste shall be required and shall include vehicle identification; date of loading and disposal; tonnage, as measured at the disposal site; and signature of the Owner and/or its representative, transporter, and disposal facility's representative. Transportation of the wastes shall be accompanied by the appropriate manifests as required in the Code of Massachusetts Regulations (CMR) 310 CMR 40.0030, such as a Material Shipping Record or by a Uniform Hazardous Waste Manifest. The original shall be returned to the Owner, and/or their representative, within ten (10) working days of disposal.

- D. All solid waste shall be disposed in accordance with all applicable federal, state and local laws and regulations, as well as all other state laws through which the waste material is being transported.
- E. Transport of soils in which asbestos containing materials have come to be located shall be transported and disposed of in accordance with Section 02080 – SOIL AND WASTE MANAGEMENT and all applicable local, state and federal laws and regulations.

### 3.3 HAZARDOUS WASTES

- A. Transporters of hazardous wastes shall be in conformance with Code of Federal Regulations (CFR) 40 CFR, Part 171, all other federal laws and regulations, 310 CMR 30.400, and all other state laws through whose boundaries the waste material is being transported. The transporter shall provide copies of its EPA identification number, Massachusetts transporter's license, and proof of driver training in transporting hazardous waste.
- B. The disposal site shall be in conformance with 40 CFR, Part 264 and relevant laws of the state in which the facility is located. The Contractor shall provide copies of the disposal facility's EPA and state treatment and disposal permit.
- C. Manifesting of hazardous wastes shall be in conformance with 40 CFR, Part 264, Subpart E, 310 CMR 30.310 and 310 CMR 30.405.

### 3.4 DUST CONTROL

- A. Dust control measures shall be implemented during loading and transport of waste material from the site in accordance with the contractor's Dust Control Plan, as specified in Section 02080 – SOIL AND WASTE MANAGEMENT.

## PART 4 – COMPENSATION

### 4.1 GENERAL

- A. Measurement and Payment for Transportation and Disposal of Soil and Fill items shall be as listed below. Payment for lump sum items and unit price items shall constitute full payment for all fees, labor, materials and equipment required to perform the work; all supervision; all overhead items including but not limited to bonds, insurance, labor burden, profit, protections and cautions are also included. Payment for unit price items shall be as detailed below and as measured by the Engineer. The Contractor shall be made aware that for Transportation and Disposal of Soil and Fill unit price items, the actual quantities encountered may vary significantly from the estimated quantities presented in the Bid Schedule. The estimated quantities presented have been established for bid comparison purposes only and do not represent

a warranty of work. In the event of quantity changes, the unit bid price shall be the basis for compensation or credit.

- B. The following unit price payment items are for transporting and disposing excess soils and fill material encountered during the course of this contract. Management of soil/fill shall be in accordance with applicable regulations and technical specifications. The costs associated with disposing excess soil and fill other than allowed for in the following payment items shall be incorporated into the contractor's Base Bid Item 2080.1- Soil Management. A minimum unit bid cost has been established for each unit price bid item. The Contractor is required to review the minimum unit bid price and increase it within the bid table as the Contractor sees fit. The Contractor is not obligated to accept the minimum unit price indicated but shall not be able to reduce it. The minimum unit price established may be below actual market cost and is provided to avoid unbalanced bidding. The Contractor is required to review the minimum unit price presented and develop a competitive unit price for inclusion in the bid table. Any bids received which do not present a unit price entered by the Contractor within the bid table or present a unit price below the minimum unit price established, shall be rejected as non-responsive.
  
- C. The quantity of any pay item expressed as tons shall be subject to verification by the Engineer by calculation of the in-place weight using the horizontal and vertical trench pay limits defined in the Contract Drawings, a bulking factor applicable to the soil type, and in place density tests supplied from a certified soil testing lab, hired by the Contractor. Should the quantity presented by the Contractor on the certified weight slips, be significantly more (i.e. greater than 10%) than that as determined through the Engineer's calculations, the Contractor shall be compensated for the lesser tonnage. The Contractor shall receive no additional compensation for material removed outside of the approved pay limits. The Owner, and/or their representative, shall have the right to perform independent weighing of trucks. No payments will be made in cases of incomplete documentation of disposal. Payment will be at the unit price established set in the FORMS FOR GENERAL BID.
  
- D. The quantity of any pay item expressed as cubic yards shall be as measured by the Engineer, per the horizontal and vertical trench pay widths established in the Drawings, and confirmed through field engineering surveys performed by the Contractor. The Contractor shall receive no additional compensation for material removed outside of the approved pay limits. Payment will be at the unit price established set in the FORMS FOR GENERAL BID.
  
- E. Preference is to be given to the most cost effective option of either reusing excavated material on-site as fill or disposal off-site.

**02095.1 OHM Disposal of Soil- Less than RCS-1 (Class A):**

Measurement for Payment for Disposal of Soil – <RCS-1 (Class A) shall be on the basis of tons of waste actually disposed, as measured at the disposal facility by certified scale, and documented on the return manifest or certified weight slip and accompanied by the appropriate Lading or Material Shipping Record form. Measurement shall be verified as described above and the lesser tonnage, as further described above, paid for. Material excavated outside of the pay limits indicated elsewhere in the Contract Documents or as directed by the Engineer shall be done at the Contractor’s expense, at no additional cost to the Owner.

It is the intent that payment under this item shall be limited to soil/fill excavated on site, which is non-remediation waste as defined in the Massachusetts Contingency Plan and has been determined through testing to be suitable for general reuse as fill. This pay item shall apply to material which is suitable for re-use off-site as fill and shall include the costs associated with characterizing the destination site as necessary to assess background conditions.

It is the intent that, if the analytical characteristics of the material meet the criteria for this classification, that the disposal be paid for at the unit price bid for this item. The Contractor shall use due diligence to identify a reuse location that meets the criteria identified in Section 02080 (Item 1.4 Definitions). Payment for disposal of the material at a higher unit price item shall be made only if the Contractor provides written certification that a reuse location that meets the criteria is not available; and only if approved in writing by the Engineer.

**BASIS OF PAYMENT / INCLUSIONS:**

Payment for OHM - Disposal of Soil – Less than RCS-1 (Class A) shall be based on the per ton price complete for this item in the proposal. Under the per ton price for this item, the Contractor shall furnish all labor, materials, tools, equipment, and incidentals required for OHM - Disposal of Soil – Less than RCS-1 (Class A). The work includes, but is not limited to; handle, load, transport, and dispose at a facility in accordance with the facilities acceptance criteria, all soil/fill which is unsuitable for on-site reuse and is defined as less than RCS-1; placing, grading and compacting the material at the disposal site as specified; and all fees, permits, and taxes.

**EXCLUSIONS:**

The following items are not included for payment under this item; reuse of soil and fill material on site as backfill; furnishing and installing replacement imported backfill; staging; disposal of bituminous concrete; and disposal of construction debris.

**2095.2 – OHM - Disposal of Soil – Daily Cover Unlined Landfill (Class B-1)**

**METHOD OF MEASUREMENT:**

Measurement for Payment for OHM - Disposal of Soil – Daily Cover Unlined Landfill (Class B-1) shall be on the basis of tons of waste actually disposed, as measured at the disposal facility by certified scale, and documented on the return manifest or certified weight slip and accompanied by the appropriate MassDEP Bill of Lading form. Measurement shall be

Bike Path Drainage Upgrades  
Willow Ave. to Grove St.  
Somerville, MA  
20163393.002A

TRANSPORTATION AND  
DISPOSAL OF SOIL AND FILL  
02095-7

verified as described above and the lesser tonnage, as further described above, paid for. Material excavated outside of the pay limits indicated elsewhere in the Contract Documents or as required by the Engineer shall be done at the Contractor's expense, at no additional cost to the Owner.

It is the intent, that if the analytical characteristics of the material meet the criteria for this classification, but not that of lower levels of contamination, that the disposal be paid for at the unit price bid for this item. The Contractor shall use due diligence to identify a disposal facility that meets the criteria identified in Section 02080 (Item 1.4 Definitions). Payment for disposal of the material at a higher unit price item shall be made only if the Contractor provides written certification that a reuse location that meets the criteria is not available; and only if approved in writing by the Engineer.

**BASIS OF PAYMENT / INCLUSIONS:**

Payment for OHM - Disposal of Soil – Daily Cover Unlined Landfill (Class B-1) shall be based on the per ton price complete for this item in the proposal. Under the per ton price for this item, the Contractor shall furnish all labor, materials, tools, equipment, and incidentals required for OHM - Disposal of Soil – Daily Cover Unlined Landfill (Class B-1). The work includes, but is not limited to; handle, load, transport, and dispose at an appropriately permitted, solid waste facility, all soil/fill which is unsuitable for on-site reuse and is defined as a non-hazardous solid waste suitable for reuse as daily cover at an unlined Massachusetts Landfill (as defined in MassDEP Policy #COMM-97-001); placing, grading and compacting the material at the disposal site as specified; and all fees, permits, and taxes.

**EXCLUSIONS:**

The following items are not included for payment under this item; transportation and disposal of soil and fill material which can be disposed of at the A level; reuse of soil and fill material on site as backfill; furnishing and installing replacement imported backfill; staging; disposal of bituminous concrete; and disposal of construction debris.

**2095.3 – OHM - Disposal of Soil – Daily Cover Lined Landfill (Class B-2)**

**METHOD OF MEASUREMENT:**

Measurement for Payment for OHM - Disposal of Soil – Daily Cover Lined Landfill (Class B-2) shall be on the basis of tons of waste actually disposed, as measured at the disposal facility by certified scale, and documented on the return manifest or certified weight slip and accompanied by the appropriate MassDEP Bill of Lading form. Measurement shall be verified as described above and the lesser tonnage, as further described above, paid for. Material excavated outside of the pay limits indicated elsewhere in the Contract Documents or as required by the Engineer shall be done at the Contractor's expense, at no additional cost to the Owner.

It is the intent, that if the analytical characteristics of the material meet the criteria for this classification, but not that of lower levels of contamination, that the disposal be paid for at the unit price bid for this item. The Contractor shall use due diligence to identify a disposal facility that meets the criteria identified in Section 02080 (Item 1.4 Definitions). Payment for disposal of the material at a higher unit price item shall be made only if the Contractor

provides written certification that a reuse location that meets the criteria is not available; and only if approved in writing by the Engineer.

**BASIS OF PAYMENT / INCLUSIONS:**

Payment for OHM - Disposal of Soil – Daily Cover Lined Landfill (Class B-2) shall be based on the per ton price complete for this item in the proposal. Under the per ton price for this item, the Contractor shall furnish all labor, materials, tools, equipment, and incidentals required for OHM - Disposal of Soil – Daily Cover Lined Landfill (Class B-2). The work includes, but is not limited to; handle, load, transport, and dispose at an appropriately permitted, solid waste facility, all soil/fill which is unsuitable for on-site reuse or disposal at one of the lesser unit price options and is defined as a non-hazardous solid waste suitable for reuse as daily cover at a lined Massachusetts Landfill (as defined in MassDEP Policy #COMM-97-001); placing, grading and compacting the material at the disposal facility as specified; and all fees, permits, and taxes.

**EXCLUSIONS:**

The following items are not included for payment under this item; transportation and disposal of soil and fill material which can be disposed of at the A or B-1 levels; reuse of soil and fill material on site as backfill; furnishing and installing replacement imported backfill; staging; disposal of bituminous concrete; and disposal of construction debris.

**2095.4 – OHM - Disposal of Soil – Non-Hazardous Solid Waste Asphalt Batching (Class B-3)**

**METHOD OF MEASUREMENT:**

Measurement for Payment for OHM - Disposal of Soil – Non-Hazardous Solid Waste Asphalt Batching (Class B-3) shall be on the basis of tons of waste actually disposed, as measured at the disposal facility by certified scale, and documented on the return manifest or certified weight slip and accompanied by the appropriate MassDEP Bill of Lading form. Measurement shall be verified as described above and the lesser tonnage, as further described above, paid for. Material excavated outside of the pay limits indicated elsewhere in the Contract Documents or as required by the Engineer shall be done at the Contractor’s expense, at no additional cost to the Owner.

It is the intent, that if the analytical characteristics of the material meet the criteria for this classification, but not that of lower levels of contamination, that the disposal be paid for at the unit price bid for this item. The Contractor shall use due diligence to identify a disposal facility that meets the criteria identified in Section 02080 (Item 1.4 Definitions). Payment for disposal of the material at a higher unit price item shall be made only if the Contractor provides written certification that a reuse location that meets the criteria is not available; and only if approved in writing by the Engineer.

**BASIS OF PAYMENT / INCLUSIONS:**

Payment for OHM - Disposal of Soil – Non-Hazardous Solid Waste Asphalt Batching (Class B-3) shall be based on the per ton price complete for this item in the proposal. Under the per ton price for this item, the Contractor shall furnish all labor, materials, tools, equipment, and

Bike Path Drainage Upgrades  
Willow Ave. to Grove St.  
Somerville, MA  
20163393.002A

TRANSPORTATION AND  
DISPOSAL OF SOIL AND FILL  
02095-9

incidentals required for OHM - Disposal of Soil – Non-Hazardous Solid Waste Asphalt Batching (Class B-3). The work includes, but is not limited to; handle, load, transport, and dispose at an appropriately permitted, asphalt batching plant, all soil/fill which is suitable for recycling at an asphalt batching plant (as defined in MassDEP Policy WSC-94-400) and which is unsuitable for on-site reuse or off-site reuse or as daily cover at a Massachusetts Landfill; and all fees, permits, and taxes.

**EXCLUSIONS:**

The following items are not included for payment under this item; transportation and disposal of soil and fill material which can be disposed of at the A, B-1, or B-2 levels; reuse of soil and fill material on site as backfill; furnishing and installing replacement imported backfill; staging; disposal of bituminous concrete; and disposal of construction debris.

END OF SECTION 02095



## SECTION 02140

### DEWATERING

#### 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. Design, furnish, operate, maintain, and remove temporary dewatering systems to control groundwater and surface water to maintain stable, undisturbed subgrades, and allow work to be performed under dry and stable conditions and comply with permit and other regulatory requirements. Work to be done as part of dewatering includes, but is not limited to:
    - a. Lower the groundwater level within excavations to at least 2 feet below the bottom of the excavation.
    - b. Lower hydrostatic pressure.
    - c. Prevent surface water from entering the excavation during construction.
    - d. Limit settlement of utilities and adjacent structures.
    - e. Implement erosion and sedimentation control measures for disposing of discharge water.
    - f. Provide treatment system to treat all water removed from excavations, except water that is re-infiltrated to the ground on site in a manner that does not result in negative on- or off-site impacts.
    - g. Provide observation wells and geotechnical instrumentation as specified and indicated or as otherwise required by the Engineer.
    - h. Common dewatering methods include, but are not limited to, sump pumping.

2. The Contractor shall be aware of groundwater under drains that may exist under all existing sanitary, storm, or combined piping. The Contractor shall identify such drains, bypass pump and dewater in accordance with the dewatering permits, and relocate and reconnect under drains upon completion of the work in the area.
- B. Water removed from excavations shall be re-infiltrated to the ground if feasible. If re-infiltration is not feasible, water shall be directly or indirectly discharged to a surface water in accordance with a Dewatering Discharge permit issued by the Massachusetts Water Resource Authority (MWRA). The Contractor shall be responsible for obtaining, paying for, and complying with the MWRA Dewatering Discharge Permit.
- C. The Contractor shall be responsible for scheduling and coordinating inspections and receipt of local, state, or federal permits/approvals/certifications for all Work as part of this Contract.

### 1.3 SUBMITTALS

- A. Shop Drawing: Submit the following in accordance with Section 01330 – SUBMITTALS:
  1. Submit a dewatering plan including design calculations at least four (4) weeks prior to start of any dewatering operation. The review will be only for the information of the Owner and third parties for an overall understanding of the project relating to access, maintenance of existing facilities and proper utilization of the site. The Contractor shall remain responsible for the adequacy and safety of the means, methods and sequencing of construction. The plan shall include the following items as a minimum:
    - a. Dewatering plan and details that conform to the requirements of the dewatering permit(s), and all other applicable regulations and permits including, but not limited to, requirements for equipment, monitoring, sampling and reporting.
    - b. A generalized plan of actions to be implemented in the event that the Threshold and Limiting values for groundwater lowering have been reached.
    - c. Certificate of Design.
    - d. A list of equipment including, but not limited to, pumps, prime movers, and standby equipment.

- e. A description of the proposed method of dewatering; water re-infiltration; containment; treatment and discharge; and installation, monitoring, maintenance, and system removal procedures.
  - f. The monitoring plan shall address groundwater control within the excavations and address settlements of utilities and adjacent structures.
  - g. A description of the monitoring program for water levels outside the excavation.
  - h. A description of erosion/sedimentation control measures, and methods of disposal of pumped water.
  - i. List of all applicable laws, regulations, rules, and codes to which dewatering design conforms.
2. A modified dewatering plan within 24 hours, if open pumping from sumps and ditches results in boils, loss of fines or softening of the ground.

#### 1.4 QUALITY ASSURANCE

- A. Provide in accordance with Section 01400 – QUALITY CONTROL and as specified.
- B. If subgrade soils are disturbed or become unstable due to dewatering operation or an inadequate dewatering system, notify the Engineer, stabilize the subgrade, and modify system to perform as specified at no additional cost to the Owner.
- C. Notify the Engineer immediately if any settlement or movement is detected on any adjacent structures. If the settlement or movement is deemed by the Engineer to be related to the dewatering, take actions to protect the adjacent structures and submit a modified dewatering plan to the Engineer within 24 hours. Implement the modified plan and repair any damage incurred to the adjacent structures at no additional cost to the Owner.
- D. If oil and/or other hazardous materials are encountered after dewatering begins, immediately notify the Engineer.

### PART 2 – PRODUCTS

#### 2.1 MATERIALS

- A. Provide groundwater monitoring wells in accordance with the submitted

dewatering plan or as specified.

- B. Provide casings, well screens, piping, fittings, pumps, power and other items required for dewatering system.
- C. Provide sand and gravel filter around the well screen. Wrapping geotextile fabric directly around the well screen shall not be allowed.
- D. When deep wells, well points, or vacuum well points are used, provide pumping units capable of maintaining high vacuum and handling large volumes of air and water at the same time.
- E. Provide and store auxiliary dewatering equipment, consisting of pumps and hoses on the site in the event of breakdown, at least one (1) pump for every five (5) used.
- F. Provide dewatering equipment, including an appropriately sized settling tank, and maintain erosion/sedimentation control devices as indicated or specified and in accordance with the dewatering plan.
- G. Provide temporary pipes, hoses, flumes, or channels for the transport of discharge water to the discharge location.
- H. Provide cement grout having a water cement ratio of 1 to 1 by volume.

## PART 3 – EXECUTION

### 3.1 GENERAL

- A. Execution of any earth excavation, installing temporary excavation support systems, and dewatering shall not commence until the related submittals have been reviewed by the Engineer with all Engineer's comments satisfactorily addressed, the geotechnical instrumentation has been installed and baselines established and submitted to the Engineer.
- B. Furnish, install, operate, and maintain dewatering, re-infiltration, treatment and discharge systems as indicated or specified and in accordance with the dewatering plan. It is anticipated that all dewatering flows will be re-infiltrated to the ground, as such, at a minimum the Contractor shall provide pumps, piping, erosion controls, and tankage necessary to allow dewatering flows to be appropriately discharged to grade or to a settling tank and overflow to grade. Delays due to insufficient storage capacity will be at no additional cost to the Owner. The Contractor is responsible to evaluate available data and determine the necessary storage capacity so as to not impede construction activities.

- C. Do not excavate until the dewatering system is operational and the required drawdowns have been achieved.
- E. Unless otherwise specified, continue dewatering uninterrupted until all structures, pipes, and appurtenances below groundwater level have been completed such that they will not be floated or otherwise damaged by an increase in groundwater elevation.
- F. Discontinue open pumping from sumps and ditches, if such pumping is resulting in boils, loss of fines, softening of the ground, or instability of the slopes. Modify dewatering plan and submit to the Engineer at no additional cost to the Owner.
- G. Where subgrade materials are disturbed or become unstable due to dewatering operations, remove and replace the materials in accordance with Section 02210 – EARTH EXCAVATION, BACKFILL, FILL, AND GRADING at no additional cost to the Owner.

### 3.2 DEWATERING DISCHARGE

- A. Water to be infiltrated need not be treated. Contractor shall provide infiltration that complies with relevant local, state and federal regulations.
- B. Transport pumped or drained water to discharge location in compliance with applicable permits and without interference to other work; damage to or contamination of pavement, other surfaces, or property; erosion; or siltation.
- C. Provide separately controlled pumping lines.
- D. Immediately notify the Engineer if groundwater is encountered that is suspected to be contaminated with substances other than those for which the treatment system has been designed. Do not pump water found to be contaminated with oil or other hazardous material to the discharge locations.

### 3.3 COMPLIANCE WITH DEWATERING AND RELATED PERMITS AND REGULATIONS

- A. Discharging groundwater and allowing for natural infiltration may not be a viable option for controlling groundwater in the project area. Should dewatering activities be required where the Contractor needs to discharge groundwater to a location other than the point of origin, then the Contractor shall be prepared to store, treat and discharge the water in accordance with applicable permits and regulations. Periodic sampling, as may be required to demonstrate treatment effectiveness and compliance with pretreatment standards specified in any local, state, or federal discharge permit required shall be the responsibility of the Contractor. The Dewatering Plan shall include a description of procedures and information related to the collection

of readings, maintenance of logs and other required documents. At a minimum, the dewatering plan shall describe compliance with relevant provisions of the MWRA dewatering discharge permit obtained by the Contractor.

B. The Contractor:

1. Shall furnish all labor, equipment and materials necessary to obtain accurate representative samples of the groundwater and for analysis for the set of analytical parameters specified above and as required by local, state and federal permits and regulations.
2. Shall coordinate sampling activities with the Engineer. The engineer reserves the right to sample treated and untreated dewatering flows at any time.
3. Shall take readings from the treatment system in accordance with the dewatering plan.
4. Shall collect an initial sample of untreated and treated groundwater at the beginning of dewatering activities within the construction area.
5. Shall prepare and keep in proper order all records required by regulatory authorities and permits.
6. Shall maintain logs and other records in accordance with the Specifications, regulatory agency and permit requirements, and the Dewatering Plan.
7. Shall coordinate analysis of samples by an appropriately certified analytical laboratory in accordance with the Specifications, regulatory agency and permit requirements, and the Dewatering Plan, and ensure that laboratory detection limits meet permit requirements.
8. Shall comply with reporting requirements in a timely manner and in the format required by the relevant permit. Reporting in compliance with permit requirements includes, but is not limited to, notification to the appropriate regulators and the Owner and Engineer prior to discharge; submittal of laboratory analytical reports for each sampling event; submittal of reports for each reporting period during which no discharge occurs; notification of non-compliant discharges; notification of termination of discharge; and response to permit-related questions posed by regulators or the Owner and Engineer.
  - a. If re-infiltration is not feasible, water will be discharged under a MWRA dewatering discharge permit as applicable. The Contractor shall submit notifications and reports to the entities

identified in the permit. Comply with pre-discharge notification, discharge reporting, notification of no discharge, and termination of discharge notification requirements; and respond to inquiries or correspondence from agencies regarding permit issues.

- b. If water will be discharged under a local permit, submit notifications and reports as required in the permit.
  - c. For monthly or less frequent reporting deadlines, provide the Engineer with copies of all reports fourteen (14) days prior to the reporting deadline, and submit reports to the appropriate agency(ies) at the same. Provide copies of other dewatering documents to the Engineer immediately.
- 9. Install and maintain erosion/sedimentation control devices at the point of discharge as indicated or specified and in accordance with the dewatering plan.
  - 10. The Contractor shall obtain all federal, state, county, and local permits and variances to allow transport of materials on public roadways, should such transport be necessary.
  - 11. The Contractor shall dispose of all wastes resulting from construction dewatering activities in accordance with local, federal and state regulations.
  - 12. The Contractor is solely responsible for the implementation of the permit requirements, and is solely responsible for any punitive action resulting from any violation of the permit. The actual permit issued by the MWRA shall become part of this Contract by either addendum or by change order. If the actual permit is included by change order, no additional costs for implementing the permit will be considered by the Owner, when the actual permit is issued.

### 3.4 REMOVAL

- A. Do not remove dewatering system without written approval from the Engineer.
- B. Backfill and compact sumps or ditches with crushed stone wrapped with geotextile fabric in accordance with Section 02210 – EARTH EXCAVATION, BACKFILL, FILL AND GRADING.
- C. All dewatering wells shall be abandoned upon completion of the work, and completely backfilled with cement grout.

PART 4 – COMPENSATION (Not Used)

END OF SECTION 02140

Bike Path Drainage Upgrades  
Willow Ave. to Grove St.  
Somerville, MA  
20163393.002A

DEWATERING  
02140-8



## SECTION 02160

### TEMPORARY EXCAVATION SUPPORT SYSTEMS

#### PART 1 – GENERAL

##### 1.1 SUMMARY

A. This section includes the following:

1. Design, furnish, and install temporary excavation support systems as required to maintain lateral support, prevent loss of ground, limit soil movements to the allowable limits indicated, and protect from damage existing and proposed improvements including, but not limited to, pipelines, utilities, structures, roadways, and other facilities.
2. The location, configuration, design, construction, and maintenance of the excavation support walls and internal bracing shall be the sole responsibility of the Contractor.
3. The temporary excavation support systems to be used on this project may include singular or multiple stages comprised of internally braced timber or steel sheeting, soldier piles and timber lagging, or trench boxes except as excluded below.
  - a. Trench boxes shall not be used adjacent to 91, 93, 95, and 97 Winslow Street, and #32 Clifton Ave.
  - b. Soldier piles and timber or steel sheeting shall be drilled or hydraulically pushed in place. Vibratory or impact hammers shall not be used to install the excavation support system.
4. Temporary excavation support system is, at a minimum, required at excavation locations within 25 feet of building walls, and where buried utilities are located within the soil wedge extending from the base of the excavation, upward to the ground surface at a slope of 2 horizontal to 1 vertical.
5. Wherever the word "sheeting" is used in this section or on the Contract Drawings, it shall be in reference to steel soldier piles and timber lagging or steel and timber sheeting support systems.
6. Construction of the temporary excavation support system shall not disturb the existing structures or the completed proposed structures. The Contractor, at no additional cost to the Owner, shall repair damage to such structures.

7. The Contractor shall bear the entire cost and responsibility of correcting any failure, damages, subsidence, upheaval or cave-ins as a result of improper installation, maintenance or design of the temporary excavation support systems. The Contractor shall pay for all claims, costs and damages that arise as a result of the work performed at no additional cost to the Owner.
8. Monitoring movement of the excavation support systems by optical survey techniques is required by an independent geotechnical monitoring consultant per Specification 02015 until installation and backfilling is complete. Additional survey monitoring may be required if movement (lateral or vertical) is measured following backfilling to the existing grade.
  - a. In addition to monitoring the movement of the excavation support systems, where existing utilities are exposed within the trench, they shall be monitored for movement and/or settlement for the entire time they are exposed.
9. If, in the Engineers judgment, the performance of the excavation support system is unacceptable, the Owner may instruct the Contractor to stop work and implement remedial measures to arrest further movements or restore groundwater levels to pre-construction levels. The Contractor shall take immediate steps to implement the remedial measures designed by the Contractor and reviewed by the Engineer. The costs for these measures shall be at no additional cost to the Owner.
10. Temporary excavation support systems shall be designed and installed in accordance with OSHA excavation safety standards.

## 1.2 SUBMITTALS

- A. Shop Drawings: Submit the following in accordance with Section 01300 – SUBMITTALS.
  1. Submit the following qualifications at least three weeks prior to the start of construction:
    - a. Qualifications of Contractor’s temporary excavation support system designer as specified below.
    - b. Qualifications of Contractor’s temporary excavation support system installer as specified below.
  2. Submit a temporary excavation support plan stamped and signed by a Professional Civil Engineer registered in the Commonwealth of Massachusetts at least two weeks prior to start of the

construction. Submit design calculations for review that will be only for the information of the Owner and third parties for an overall understanding of the project relating to access, maintenance of existing facilities and proper utilization of the site. The Contractor shall remain responsible for the adequacy and safety of the means, methods and sequencing of construction. The plan shall include the following items as a minimum:

- a. Drilled or hydraulically pushed in place excavation support system details, location, layout, depths, extent of different types of support relative to existing features and the permanent structures to be constructed, and methods and sequence of installation and removal.
  - b. Certificate of Design
  - c. Requirements of dewatering during the construction.
  - d. Minimum lateral distance from the edge of the excavation support system for use for vehicles, construction equipment, and stockpiled construction and excavated materials.
  - e. List of equipment used for installing the excavation support systems.
  - f. Estimates of the lateral and vertical displacements of the excavation lateral support systems under applied loads at critical stages.
3. Plans for preventing movement of the existing utilities adjacent to, or exposed within the trench. In addition, in accordance with Specification Section 02015, the Contractor shall propose and submit for the Engineer's approval no less than 30 days prior to the start of excavation, the methods to be used to monitor movement and/or settlement of exposed utilities.
  4. Submit a Construction Contingency Plan specifying the methods and procedures to maintain excavation support system stability if the allowable movement of the adjacent ground and adjacent structures is exceeded.
  5. For excavation support systems left in place, submit the following as-built information prior to backfilling and covering the excavation support systems:
    - a. Survey locations of the temporary excavation support systems, including coordinates of the ends and points of change in direction.

- b. Type of the temporary excavation support system.
- c. Elevations of top and bottom of the excavation support systems left in place.

### 1.3 QUALITY ASSURANCE

- A. Provide in accordance with Section 01400 – QUALITY CONTROL and as specified.
- B. Conform to the requirements of the OSHA Standards and Interpretations: "Part 1926 Subpart P - Excavation, Trenching, and Shoring", and all other applicable laws, regulations, rules, and codes.
- C. All welding shall be performed in accordance with AWS D1.1.
- D. Prepare design, including calculations and drawings, under a Professional Civil Engineer registered in the Commonwealth of Massachusetts and having the following qualifications:
  - 1. Not less than five years experience in the design of soldier pile and lagging and steel or timber sheeting temporary excavation support systems of at least 15 feet deep in urban areas of comparable type, size, and complexity as this project.
  - 2. Completed not less than five successful soldier pile and lagging and steel or timber sheeting temporary excavation support system projects of comparable type, size, and complexity as this project within the last five years.
- E. Temporary Excavation Support System Installer's Qualifications:
  - 1. Not less than five years' experience in the installation of soldier pile and lagging and steel or timber sheeting temporary excavation support systems of at least 15 feet deep in urban areas of comparable type, size, and complexity as this project.
  - 2. Completed not less than five successful soldier pile and lagging and steel or timber sheeting temporary excavation support system projects of comparable type, size, and complexity as this project within the last five years.
- F. Install all temporary excavation support system under the supervision of a supervisor having the following qualifications:
  - 1. Not less than five years' experience in installation of soldier pile and lagging and steel or timber sheeting temporary excavation support systems of at least 15 feet deep in urban areas of comparable type, size, and complexity as this project.

2. Completed not less than five successful soldier pile and lagging and steel or timber sheeting temporary excavation support system projects of comparable type, size, and complexity as this project within the last five years.
- G. Notify the Engineer immediately if any settlement or movement is detected on any adjacent structures. If the settlement or movement is deemed by the Engineer to be related to the temporary excavation support system, take actions to protect the adjacent structures and submit a modified temporary excavation support plan to the Engineer within 24 hours. Implement the modified plan and repair any damage incurred to the adjacent structures at no additional cost to the Owner.

#### 1.4 DESIGN CRITERIA

- A. Design of temporary excavation support systems shall meet the following minimum requirements:
1. Support systems shall be designed for foundation, earth pressures, hydrostatic pressure, equipment, traffic, temporary stockpiles, construction loads, and other surcharge loads in accordance with the current AASHTO (American Association of State Highway and Transportation Officials) Design Criteria.
  2. Design internal bracing as needed to provide sufficient reaction to maintain stability.
  3. Limit movement of buildings, ground, and buried utilities adjacent to the excavation support system to be within the allowable ground deformation as specified in Section 02015 – GEOTECHNICAL MONITORING AND INSTRUMENTATION.
  4. Design the embedment depth below bottom of excavation to minimize lateral and vertical earth movements and provide bottom stability. Toe of unbraced temporary excavation support systems shall not be less than 5 feet below the bottom of the excavation.
  5. Design temporary excavation support system shall withstand an additional 3 feet of excavation below proposed bottom of excavation without redesign except for the addition of lagging and/or bracing.
  6. Maximum width of pipe trench excavation shall be as indicated on the Drawings.
  7. Permanent structure walls shall not be directly cast against excavation support walls.

#### 1.5 DELIVERY, STORAGE AND HANDLING

- A. Provide support of excavation in accordance with Section 01600 – PRODUCTS, MATERIALS AND EQUIPMENT and as specified.
- B. Store sheeting and bracing materials to prevent sagging, which would produce permanent deformation. Keep concentrated loads, which occur, during stacking or lifting below the level which would produce permanent deformation of the material.

## 1.6 PROJECT/SITE CONDITIONS

- A. Subsurface investigation data are provided in the Contract Documents. The geotechnical data is made available to the Contractor for informational purposes only and shall not be interpreted as a warranty of subsurface conditions whether interpreted from written text, boring logs, or other data.
- B. Test pits shall be excavated in accordance with Section 02010 - SUBSURFACE INVESTIGATIONS.
- C. Prior to submitting a bid, the Contractor shall review and understand the information contained in the geotechnical data and all Contract Documents.
- D. The Contractor shall draw their own conclusions regarding site conditions based upon site visit(s) and from available sources, for which the Owner and its Consultants assume no responsibility. The Contractor shall assume that subsurface conditions outside of subsurface exploration locations could differ from conditions shown in the records of the explorations.
- E. The Contractor shall notify the Engineer immediately if obstructions are determined to conflict with the location of the excavation support system. Cobbles and boulders within dense well-bonded soils or other competent naturally deposited soils will not be considered obstructions.
- F. The Contractor shall protect adjacent structures above ground and buried from damage associated with lateral support of excavation operations and other operations. Damage due to lateral excavation support operations or other Contractor activities shall be repaired immediately by the Contractor at his own expense.

## PART 2 – PRODUCTS

### 2.1 MATERIALS

- A. Structural Steel: All soldier piles, wales, rakers, struts, wedges, plates, waterstop and accessory steel shapes shall conform to ASTM A36.
- B. Timber Lagging: Structural grade having a nominal thickness of 3 inches and a minimum allowable working stress of 1100 psi.
- C. Timber Sheeting: Structural grade having a nominal thickness of 4 inches

and a minimum allowable working stress of 1100 psi.

D. Other Materials

1. Tamping tools adapted for backfilling voids after removal of the excavation support system.
2. Hydraulic, pneumatic or screw-jack shoring systems (Speed Shores) used to support excavations shall be in good working order and shall conform to all of the manufacturer's requirements for new equipment; bent or otherwise damaged supports, leaking hydraulic cylinders, or damaged sheeting shall not be used, and the Contractor shall immediately remove such damaged materials/equipment from the work site.

### PART 3 – EXECUTION

#### 3.1 GENERAL

- A. Installation of the temporary excavation support systems shall not commence until the Engineer has reviewed the related earth excavation and dewatering submittals with all Engineers' comments satisfactorily addressed.
- B. Install excavation support system in accordance with the Contractor's temporary excavation support plan.
- C. Carry out program of temporary excavation support in such a manner as to prevent undermining or disturbing foundations of existing structures and utilities, and of work ongoing or previously completed.
- D. Perform preparatory work to discover, protect, maintain and restore, or remove utilities, foundations or other facilities located in close proximity of the proposed temporary excavation support system.
- E. Conduct pre-excavation as necessary to remove obstructions and identify exiting utilities along the alignment of the temporary excavation support system which will interfere with installation in accordance with Specification Section 02210. Pre-excavation shall not extend greater than 4 feet in depth, and shall not extend within a 2 horizontal to 1 vertical (2H:1V) envelope below existing utilities or structures to remain
- F. The Contractor shall provide fully equipped rig(s) and appropriate tools in full-time operation at the site during the work, and shall mobilize additional equipment, if necessary, to complete the work on schedule.
- G. Excavation shall not proceed more than 2 ft below the bracing level, anywhere within the excavation support limits, until the entire level of

bracing is completely installed, including prestressing.

- H. Notify utility owners if existing utilities interfere with the temporary excavation support system. Modify the existing utility with the utility owner's permission or have the utility owner make the modifications at no additional cost to Owner.
- I. All trench support shall be installed and maintained so it is in continuous contact with the earthen trench walls being supported.
- J. Installation, maintenance and removal of the temporary excavation support shall be coordinated with the exposure and support of existing utilities.
- K. Contractor shall control the rate of the trench excavation and removal of the support system to minimize the movement of permanent structures and the adjacent ground surface.

### 3.2 SOLDIER PILES AND TIMBER LAGGING

- A. Install steel soldier piles before starting excavation. Install soldier piles by drilling or hydraulically pushing to the design tip elevation. Driving by impact or vibratory hammers shall not be allowed. If used, drilled methods shall prevent loss of ground around the hole. Each soldier pile shall be installed in its drilled hole within 2 hours after drilling is completed to the required depth.
- B. The Contractor shall have equipment on-site able to advance the drilled hole for installation of the soldier piles through sand below the water table, through concrete, and through large boulders and other obstructions which may be encountered.
- C. Space soldier piles at intervals indicated on the Shop Drawings. Accurately align exposed faces of flanges to vary not more than 2 inches from a horizontal line and not more than 1:120 out of vertical alignment.
- D. Within the same day of seating the soldier piles in the drilled holes, encase the piles with MHD (1995) M4.08.0 – Controlled Density Fill, Type 1E from the tip elevations to the currently existing ground surface. Crushed stone or other granular materials are not acceptable.
- E. Where the excavation support is to be left in place, soldier piles shall be cut off 5 feet below the final ground surface prior to completion of the final backfilling operations.
- F. Install wood lagging within flanges of soldier piles as excavation proceeds. Trim excavation as required to install lagging. As installation progresses, backpack the voids between the excavation face with sand and on-site soils to establish a tight contact. Pack louver openings between lagging with hay or other porous material to allow free drainage of groundwater without loss of



retained soil or backpacking. In no case shall the louvered openings be allowed to exceed 1-inch.

- G. Beginning at the top of the soldier piles, the maximum permissible height of unlagged face of excavation shall not exceed 1-foot in all soil types encountered at the site. If water is flowing from the face of the excavation, or if soil to be retained moves toward the excavation, the maximum height of unlagged face shall not exceed 8-inches.
- H. If unstable ground is encountered, take suitable measures (grouting behind the lagging or other approved method) to retain the material in place and prevent loss of ground or movements, which may cause damage to adjacent structures or utilities.

### 3.3 STEEL OR TIMBER SHEETING

- A. Length Markings: Before installation is started each steel or timber section shall be marked so that the depth of the tip can be readily determined. This shall be accomplished by a method that is approved by the Engineer.
- B. Sheeting shall be installed by means of hydraulically pushing each sheet piling to the required design depth. Driving by impact or vibratory hammers shall not be allowed. The Contractor shall take all precautions against excessive vibrations in all areas. The Contractor shall be solely responsible for any damages caused directly or indirectly to structures, utilities, and shall repair any such damage occurring due to his operations to the requirements of the Owner.
- C. All sheeting shall be protected from damage during installation.
- D. All sheeting shall be hydraulically pushed to its full depth ahead of the excavation so as to avoid the loss of material from behind the sheeting; where voids occur outside of the sheeting, they shall be filled immediately with structural fill and thoroughly compacted.
- E. The Contractor shall provide all inspection equipment to determine whether the sheeting has been started in their planned location, are vertical, and are within the allowable tolerance for position after installation.
- F. Requirements for the sheeting include the following:
  - 1. Install sheeting in the plumb position.
  - 2. Install sheeting such that the piling is in direct contact with the material to be retained.
  - 3. Install sheeting to the depths indicated on approved Shop Drawings.
  - 4. Methods and equipment used in pushing, setting, cutting and splicing

shall conform to approved Shop Drawings.

5. Use templates or other temporary alignment facilities to maintain piles plumb and on line.
6. Control vibrations and noise associated with installation.
7. Pre-excavate as necessary to remove existing structures along alignment of the sheeting.
8. Sheeting shall be positioned within 3 inches of the design plan location along its length from top down to bottom of excavation grade. Design plan locations are to be established by the Contractor's Professional Engineer and submitted to the Engineer for review.

#### 3.4 INTERNAL LATERAL WALL BRACING (WALES AND STRUTS)

- A. Use wales and struts as necessary to provide support of the temporary excavation support system as required. Include web stiffeners, plates, brackets, or angles as required to prevent rotation, crippling or buckling of connections and points of bearing between structural steel members. All for eccentricities due to fabrication and assembly. Consider effects of temperature changes.
- B. Install and maintain all support members in continuous tight contact with each other and with the earth wall being supported.
- C. Coordinate locations of all bracing and components thereof for temporary lateral excavation support with locations of permanent structures.
- D. Control rate of excavation and installation of support members to minimize movement of adjacent ground surface.
- E. Excavation shall proceed in accordance with the detailed sequence submitted by the Contractor and reviewed by the Engineer. It shall be the responsibility of the Contractor to schedule and sequence the work accordingly.

#### 3.5 MONITORING

- A. As proposed by the Contractor and approved by the Engineer.
- B. In the event the monitoring system proposed by the Contractor proves ineffective, the Contractor shall implement additional measures as required by the Engineer at no additional cost to the Owner.

#### 3.6 REMOVAL OF EXCAVATION SUPPORT SYSTEM

- A. Where sheeting cannot be removed without damage to existing utilities or work recently installed or other facilities it shall be left in place with the

exception of the top 5 feet of excavation support wall below final grades, which shall be removed, unless otherwise approved by the Engineer.

- B. Remove excavation support in a manner that will maintain support as excavation is backfilled and will not leave voids in the backfill.
- C. Do not begin the removal of the excavation support system until it can be safely removed damage to existing facilities, completed work or adjacent property.
- D. Fill any void left by the shoring system or voids created by the removal of the shoring system to provide soil support between the trench backfill and the native soil.
- E. Sheet piling removal must be performed in a manner that will avoid “vibro-consolidation” (densification) of sandy or granular material below or adjacent to the excavation that could lead to settlement and damage of the pipeline, existing utilities, other works of construction and adjacent property.

PART 4 – COMPENSATION (Not Used)

END OF SECTION 02160

[THIS PAGE INTENTIONALLY LEFT BLANK]

SECTION 02210

EARTH EXCAVATION, BACKFILL, FILL AND GRADING

<b>2210.1</b>	<b>TEST PITS</b>	<b>EACH</b>
<b>2210.2</b>	<b>CONTROL DENSITY FILL FOR BACKFILL</b>	<b>CUBIC YARD</b>
<b>2210.3</b>	<b>OVEREXCAVATION OF GEOTECHNICALLY UNSUITABLE MATERIAL</b>	<b>CUBIC YARD</b>
<b>2210.4</b>	<b>UNCLASSIFIED EXCAVATION</b>	<b>CUBIC YARD</b>

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.
- B. Examine all Drawings and all other Sections of the Specifications for requirements therein affecting the work of this Section.

1.2 SUMMARY

- A. This section includes the following:
  - 1. The Work shall consist of excavation of all materials within the limits of the Contract in accordance with the Specifications and in close conformity with the lines, grades, thickness and cross sections shown on the plans or established by the Engineer.
  - 2. The Contractor shall comply with all applicable laws, rules, ordinances, and general regulations of the Federal Government, the Commonwealth of Massachusetts, the City of Somerville, the Somerville Department of Public Works, DEP, EPA, OSHA, and other regulatory agencies having jurisdiction over the Work.
  - 3. Provide materials for backfilling excavations as indicated and specified.
  - 4. Grade surfaces to meet finished grades indicated. Grade roadway and site as to maintain them in a level unrutted condition and to eliminate

puddling of surface and subsurface water.

5. Excavate test pits on the southern side of 32 Clifton Street at the approximate locations shown on the Drawings. Intent of test pit is to confirm building foundation elevation and bearing conditions. Test pits shall be observed by the Engineer.
6. The Contractor shall monitor existing structures for movement during excavation and backfilling as indicated on the Contract Drawings.
7. The Contractor shall bear the entire cost and responsibility of correcting any failure, damages, subsidence, upheaval or cave-ins as a result of improper excavation, maintenance or backfill of excavation. The Contractor shall pay for all claims, costs and damages that arise as a result of the work performed at no additional cost to the Owner.

### 1.3 SUBMITTALS

- A. Shop Drawings: Submit the following in accordance with Section 01300 – SUBMITTALS:
  1. Submit an Excavation, Backfilling, Grading and Compaction plan at least two (2) weeks prior to start of any earth moving activities. The review will be only for the information of the Owner and third parties for an overall understanding of the project relating to access, maintenance of existing facilities and proper utilization of the site. The Contractor shall remain responsible for the adequacy and safety of the means, methods and sequencing of construction. The plan shall include, but not be limited to the following items:
    - a. Detailed sequence of work.
    - b. General description of construction methods.
    - c. Numbers, types, and sizes of equipment proposed to perform excavation, backfilling, grading and compaction.
    - d. Details of dust control measures.
    - e. Proposed locations of stockpiled excavation and/or backfill materials.
    - f. Proposed surplus excavated material off-site disposal areas and required permits.
    - g. Erosion and sedimentation control measures, which will prevent erosion and sedimentation during the earth moving and soil stockpile activities.

- B. Backfill Materials: Submit a grain size analysis and moisture density curve performed in accordance with AASHTO T311 and AASHTO T180, respectively, for each proposed source and type of backfill, imported material, and on-site material to be reused for review by the Engineer at least, one week prior to use of the material. The grain size analysis shall indicate that the backfill material conforms to the gradation requirements specified.
1. In addition, a certification statement and analytical results shall accompany each physical sample of earth materials to be imported onto the site, including but not limited to crushed stone, loam, bedding sand, gravel sub-base, common fill and structural backfill. At a minimum the certification shall state the point of origin and that the material is free of contaminants. The certification shall include representative sample analysis from each point of origin of backfill to be used on the site. The sample(s) shall be analyzed by a certified laboratory for RCRA 8 metals, volatile organic compounds (EPA Method 8260), semi-volatile organic compounds (EPA Method 8270), petroleum hydrocarbons (EPA Method 8100), and Total PCBs and pesticides (EPA Method 8081 and 8082). On-site soils defined as suitable for reuse in this Section and in Section 02080 – SOIL AND WASTE MANAGEMENT can be used as backfill without providing the certification required above.
  2. All sampling of soils for chemical testing shall be performed by a person experienced in sample collection and shall be a Licensed Site Professional registered in the Commonwealth of Massachusetts or their authorized representative. Samples of each material shall be submitted to a chemical analytical laboratory, certified by the Massachusetts Department of Environmental Protection.
  3. Submit additional geotechnical and analytical test data and certifications for every 1000 cubic yards (every 200 cubic yards for moisture density curves) of material imported or reused on-site or anytime consistency of material changes in the opinion of the Engineer. Submit associated chemical laboratory data on the imported materials throughout the course of the Work, if requested by the Engineer, to evaluate the consistency of the source or process, at no additional cost to the Owner.
- C. Controlled Density Fill Mix Design: Prior to beginning the work the Contractor shall submit for review, controlled density fill mix designs which shall show the proportions and gradations of all materials proposed for each class and type of controlled density fill specified herein.
- D. Filter Fabric: Submit shop drawings and product data sheets.
- E. During Construction, submit written confirmation of fill lift thickness, in-

place soil moisture content, and percentage of compaction to the Engineer before placing the next lift or constructing foundations.

- F. Submit Qualifications of the Contractor's Independent Testing Laboratory as specified in Paragraph 1.7.C, three weeks prior to the execution of any earth excavation, backfilling, filling, or compaction process.

#### 1.4 DEFINITIONS

- A. Suitable Material: Material which does not contain organic silt or organic clay; peat; vegetation; wood or roots; stones or rock fragments over 6-inch in diameter; porous biodegradable matter; loose or soft fill; excavated pavement; or refuse. Material for backfill shall conform to the gradation requirements specified herein.
- B. Unsuitable Materials: Materials that do not comply with the requirements for the acceptable material or which cannot be compacted to the specified or indicated density.
- C. Percentage of compaction is defined as the ratio of the field dry density, as determined by AASHTO T310 or AASHTO T191 to the maximum dry density determined by AASHTO T180, multiplied by 100.
- D. Proof Roll: Compaction to a firm and unyielding condition with a minimum of four passes of a vibratory steel drum roller. Vibratory plate compactors shall be used in small areas where a vibratory steel drum roller cannot be used.

#### 1.5 EXCAVATION CLASSIFICATIONS

- A. Earth Excavation or "Excavation" consists of removal of materials encountered to the subgrade elevations indicated and subsequent reuse or disposal of the materials removed. All excavation is classified as earth excavation unless it otherwise meets the classifications provided below for unauthorized excavation, additional excavation, or rock excavation.
- B. Unauthorized Excavation consists of removal of materials beyond indicated subgrade elevations or dimensions without specific direction of the Engineer. Unauthorized excavation, as well as remedial work directed by the Engineer, shall be at Contractor's expense.
  - 1. Under footings, foundations bases, concrete slabs, retaining walls or other structures, fill unauthorized excavations to the proper elevations with material as directed by Engineer. Elsewhere, backfill and compact unauthorized excavations as specified for excavations of the same class, unless otherwise directed by the Engineer.



C. Additional Excavation:

1. When excavation has reached required subgrade elevations, notify the Engineer who will review subgrade conditions.
2. If unsuitable bearing materials are encountered at required subgrade elevations, carry excavations deeper and replace excavated material as directed by the Engineer.
3. Removal of unsuitable material and its replacement as directed will be paid on the basis of contract conditions relative to changes in work or as provided for under the unit rates for this classification.

D. Rock Excavation:

1. Rock excavation in trenches and pits includes removal and disposal of materials and obstructions encountered which cannot be excavated with a 1.0 cubic yard (heaped) capacity, 42-inch wide bucket on track-mounted power excavator equivalent to Caterpillar Model 215, rated at not less than 90HP flywheel power and 30,000 lb. drawbar pull. Trenches in excess of 10 feet 0-inches in width and pits in excess of 30 feet 0-inches in either length or width are classified as open excavation.
2. Rock excavation in open excavations includes removal and disposal of materials and obstructions encountered which cannot be dislodged and excavated with modern track-mounted heavy-duty excavating equipment without drilling, blasting or ripping. Rock excavation equipment is defined as Caterpillar Model No. 973 or No. 977K, or equivalent track-mounted loader, rated at not less than 170HP flywheel power and developing 40,000 lb. break-out force (measured in accordance with SAE J732C).
3. Determination of rock excavation classification shall be made by the Engineer. Typical of materials classified as rock are boulders 1.0 cu. yd. or more in volume, solid rock, rock in ledges, and rock-hard cementitious aggregate deposits. Intermittent drilling, blasting or ripping performed to increase production and not necessary to permit excavation of material encountered will be classified as earth excavation. Do not perform rock excavation work until material to be excavated has been cross-sectioned and classified by Engineer. Visual observation of the completed excavation may be made by the Engineer to modify the excavation classifications. Removal of rock excavation prior to classification by the Engineer shall be considered as earth excavation unless accepted by the Engineer in writing. Such excavation will be paid on the basis of contract unit rates for

this classification.

## 1.6 REGULATIONS

- A. The Contractor shall be solely responsible for making all excavations in a safe manner. All excavation, trenching, and related sheeting, bracing, etc. 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. Comply with all applicable laws, rules, ordinances, and general regulations of the Federal Government, the Commonwealth of Massachusetts, the City of Somerville, the Somerville Department of Public Works, DEP, EPA, OSHA, and other regulatory agencies having jurisdiction over the Work.

## 1.7 QUALITY ASSURANCE

- A. Do not excavate or fill until the Engineer has reviewed all the required submittals.
- B. Dig test pits considered separate to the normal excavation as required to locate underground utilities, obstructions or water table.
- C. Employ an independent testing laboratory to perform particle size and gradation analyses, in accordance with AASHTO T311, as well as compaction testing. The independent testing laboratory shall have the following qualifications:
  - 1. Be accredited by the American Associates of State Highway and Transportation Officials (AASHTO) Accreditation Program;
  - 2. Have three years' experience in sampling, testing and analysis of soil and aggregates, and monitoring field compaction operations;
  - 3. Able to provide three references from previous work.

## 1.8 AVAILABLE INFORMATION

- A. Prior to submitting his bid, the Contractor shall review and understand all available information. Subsurface exploration data is made available to the Contractor for informational purposes only and shall not be interpreted as a warranty of subsurface conditions whether interpreted from written text, boring logs, or other data. The subsurface data represent conditions only at the sampling locations at the times the explorations were conducted.
- B. Neither the Owner nor Engineer shall be liable for any error or discrepancy in the subsurface information provided, nor for the Contractor's use or

interpretation of the information. Additional test borings, test pits or other exploratory operations may be made by the Contractor with the written approval of the Owner, at no additional cost to the Owner.

## 1.9 CONSTRUCTION TOLERANCES

- A. Construct finished surfaces to plus or minus 0.5 inches of the elevations indicated. Provide the Engineer with adequate survey information to verify compliance with above tolerances.

## 1.10 FIELD TESTING

- A. Field Testing and Inspections: By Contractor's independent testing laboratory, acceptable to the Engineer, at Contractor's expense as specified. Location of tests shall be mutually acceptable to testing laboratory and the Engineer or as required by the Engineer. In the event compacted material does not meet specified in-place density, recompact material and retest this area until specified results are obtained at no additional cost to the Owner.
- B. Methods of Field Testing: In-Place Density and Moisture Content shall be determined by AASHTO T310 or AASHTO T191.
- C. Testing Frequency: Crushed stone and Sand Borrow shall be compacted as specified and indicated. For other backfill and fill materials, minimum test frequency shall be as follows, and no less than two tests per lift:
  - 1. Trenches under structures, sidewalks, or roadways subbase: Every 30 lin. ft. per lift.
  - 2. Trenches in areas without structures or roadways: Every 50 lin. ft. per lift.
  - 3. Under Structure: Every 100 sq. ft. per lift.
  - 4. Around Structures: Every 100 sq. ft. per lift.

## PART 2 – PRODUCTS

### 2.1 SAND BORROW

- A. The Sand Borrow shall conform to Massachusetts Department of Transportation (MassDOT) 1988 Standard Specifications section, M1.04.1.

### 2.2 CRUSHED STONE

- A. Crushed stone shall conform to the requirements of MassDOT 1988 Standard Specifications section M2.01.4 for ¾-inch crushed stone.
- B. Crushed stone shall be wrapped in filter fabric, placed in maximum 6-inch

thick layers, loose measure, and compacted with a minimum of four passes of a vibratory plate or roller compactor. The crushed stone shall be uniformly blended.

2.3 ORDINARY BORROW:

- A. Ordinary Borrow shall consist of sand and gravel consisting of hard durable particles, and free from trash, ice and snow, tree stumps, roots and other organic matter, and shall conform to MassDOT 1988 Standard Specifications section M1.01.0, and the following gradation requirements:

Sieve Size	Percent Finer by Weight
6-inch (152.4mm)	100
No. 4	30-80
No. 40	30-50
No. 200	0-25

- B. On-site excavated material may be used as Ordinary Borrow, provided it meets the requirements specified herein and can be compacted to the required degree.

2.4 CONTROLLED DENSITY FILL (CDF)

- A. Controlled density fill shall consist of a cementitious excavatable mixture of aggregate, Portland Cement, and air entraining admixtures. The material shall be of the type specified in MassDOT 1995 Standard Specifications for Highway and Bridges, as amended, Type 2E.
- B. Controlled density fill placed in contact with ductile iron pipe shall utilize a non-fly ash mix design.

2.5 GRAVEL BORROW

- A. Gravel Borrow shall conform to the requirements of MassDOT 1988 Standard Specifications section M1.03.0 for Type b Gravel Borrow.

2.6 GRAVEL SUBBASE

- A. Gravel Subbase shall conform to the requirements of MassDOT 1988 Standard Specification section M1.03.1.

2.7 FILTER FABRIC

- A. Filter Fabric, shall consist of a nonwoven fabric made from polypropylene or

polyethylene filaments or yarns. The fabric shall be inert to organic chemicals commonly encountered in the soil. The fabric shall conform to the following recommended property tests:

Property	Unit	Test Method	Minimum Value
Weight	oz/sy	ASTM D-3776	4.5
Grab Strength	Lbs	ASTM D-4632	120
Grab Elongation	percent	ASTM D-4632	55
Trapezoid Tear Strength	Lbs	ASTM D-4533	50
Mullen Burst Strength	PSI	ASTM D-3786	210
Puncture Strength	Lbs	ASTM D-4833	70

B. Edges and ends of filter fabric shall overlap a minimum of two feet.

### PART 3 – EXECUTION

#### 3.1 GENERAL

- A. Execution of any earth excavation shall not commence until the related dewatering, soil and fill management, excavation support systems, and required backfill and fill materials submittals are reviewed by the Engineer and all Engineers' comments addressed.
- B. Cut pavement and all surface materials to the top of the existing fill material with a saw to prevent damage to remaining pavement without extra compensation. Surface materials may include concrete slabs, cobblestones, rails and other miscellaneous materials. Where pavement is removed in large pieces, dispose of pieces before proceeding with excavation.
- C. Formulate excavation, backfilling, and filling schedule and procedures to eliminate possibility of undermining or disturbing foundations of partially and completed structures, pipelines and embankments or existing structures and pipelines.
- D. During progress of work, conduct earth-moving operations and maintain work site so as to minimize the creation and dispersion of dust.
- E. Roadway and Site Leveling: Grade roadway and site as to maintain them in a level unrutted condition and to eliminate puddling of surface and subsurface water.

### 3.2 TRENCH EXCAVATION

- A. Excavate to widths that give adequate working space for constructing structures or laying and jointing piping, and to allow for safety of personnel.
- B. Excavate to lines and elevations indicated in an orderly and continuous program.
- C. Excavate trench by machinery to, or just below designated subgrade. Excavate deeper, as required by the Engineer, to remove unsuitable subgrade material.
- D. Exercise care to preserve material below and beyond the lines of excavations. If material remaining at the bottom of the trench is disturbed, proof compaction shall be required.
- E. Excavations shall be performed in the dry, and kept free from standing water, snow and ice during construction.
- F. Maintain groundwater levels a minimum of 2 feet below the bottom of the trench during excavation and subgrade preparation. Dewatering systems shall be provided and maintained as specified in Section 02140 - DEWATERING.
- G. Excavation Around Existing Structures or Utilities:
  - 1. Discontinue digging by machinery when excavation approaches pipes, conduits, or other underground structures. Excavate using only hand tools when within 3 feet horizontally of exposed structures or utilities, and within a soil wedge delineated by a downward line at 45 degree angle drawn from the springline of exposed utilities. Include such manual excavation in work to be done when incidental to normal excavation and under items involving normal excavation.
  - 2. Excavations to remove unsuitable material shall not extend within a 2 horizontal to 1 vertical (2H:1V) envelope below existing structures to remain, except when excavation is supported by an approved shoring system designed and installed in accordance with Specification Section 02160.
  - 3. Excavate test pits when determination of exact location of pipe utilities or other underground structures is necessary for doing work properly.

### 3.3 REUSE OF EXCAVATED MATERIAL

- A. Carefully remove material from excavated areas and store separately for further use as backfill material or for disposal or immediately reuse at the area of excavation as backfill.
- B. Reuse surplus suitable excavated materials for backfill as indicated and in accordance with Section 02080 – SOIL AND FILL MANAGEMENT;

deposit neatly and grade.

- C. In general, the material used for backfilling trench excavations within the zone above structures and above 6 inches above pipe crowns shall be material removed from the excavation, provided that the reuse of these materials result in the required trench compaction and the material meets the requirements specified herein for Ordinary Borrow.

### 3.4 SUBGRADE PREPARATION AND PROTECTION

- A. Proof compact the exposed subgrade with a vibratory plate compactor or double drum roller (4 passes) prior to backfilling and filling operation, or placing pipe or structure bedding. Proof rolling shall be performed in the presence of the Engineer.
- B. As required by the Engineer, over-excavate any unstable or unsuitable materials below the subgrade.
  - 1. Unsuitable materials may include but shall not be limited to organic materials.
  - 2. The overexcavation shall be backfilled with Crushed Stone wrapped in filter fabric and compacted as specified herein.
- C. Use excavating equipment equipped with a toothless or smooth edged, excavating bucket to expose the pipe trench subgrade to avoid disturbance of the bearing surface. Do not plow, scrape or dig by machinery near to finished subgrade in a manner that would result in disturbance of subgrade.
- D. In areas where the bottom of the excavation is in silt and clay, and is below the groundwater table, a working mat and drainage layer of 12 inches of compacted crushed stone wrapped in filter fabric may be placed.

### 3.5 BACKFILL PLACEMENT

- A. The trenches shall be backfilled as soon as practicable with the material specified herein. All trench backfilling shall be done with special care, in the following manner and as required by the Engineer.
- B. All fill shall be placed in horizontal layers. Fill shall not be placed following the natural contours of the ground. Fill shall be placed starting in the lowest areas working up to finish grades in horizontal layers in the manner specified herein.
- C. Place backfill to a maximum loose lift thickness of 9 inches except where used as pipe bedding, and compact to the degree specified herein.

- D. Backfill material for pipe bedding shall be deposited across the entire width of the trench, uniformly on both sides of the pipe simultaneously to ensure that all loads applied to the utility by the backfill are properly balanced and that they do not exceed the safe load carrying capacity of the utility at any time as indicated on the drawings.
1. Sand borrow bedding shall be placed by hand shovels, in layers not more than 4-inches thick in loose depth, and each layer shall be thoroughly and evenly compacted by tamping on each side of the pipe to provide uniform support around the pipe, free from voids.
  2. Crushed stone bedding material shall be placed in layers not more than 6-inches thick in loose measure, and compacted with at least 4 passes using a vibratory plate compactor.
- E. The trench shall be backfilled with quick-set CDF to 2 feet above the crown of any utility crossing the trench in areas where compaction cannot be achieved using mechanical compaction equipment.
- F. Backfill shall be placed in appropriately sized lifts and on both sides of the utility simultaneously to ensure that all loads applied to the utility by the backfill are properly balanced and that they do not exceed the safe load carrying capacity of the utility at any time.
- G. All trench backfilling shall be done with special care and must be carefully placed so as not to disturb the work at any time. If necessary, timber grillage or other suitable method shall be used to break the fall of material. The moisture content of the backfill material shall be such that proper compaction will be obtained. Backfill shall be made to grades required to establish the proper subgrade for the placement of topsoil or pavement base courses.
- H. In no case shall fill be placed in standing water, over unsuitable material, or material that is frozen. Water shall not be allowed to rise upon or flow over the bedding and backfill material.
- I. No fill material shall be placed, spread or rolled during unfavorable weather conditions. When work is interrupted by heavy rains, fill operations shall not be resumed until the moisture content and the density of the previously placed fill are as specified.
- J. Any trenches or excavations improperly backfilled or where settlement occurs, shall be reopened to the depth required for proper compaction, then refilled and compacted with the surface restored to the required grade and condition, at no additional expense to the Owner.
- K. During filling and backfilling operations, pipelines will be checked by the Engineer to determine whether any displacement of the pipe has occurred. Pipelines observed to display poor alignment, displacement, or other defects



shall be remedied to meet Engineer and Owner requirements at no additional cost to the Owner.

- L. After backfilling trenches and excavations, the Contractor shall maintain the surfaces of backfill area in good condition so as to present a smooth surface at all times level with adjacent surfaces. The Contractor shall repair any subsequent settling over backfilled area immediately, in a manner satisfactory to the Engineer, and such maintenance shall be provided by the Contractor for the life of this Contract, at no additional expense to the Owner.
- M. The finished subgrade of the fills and filled excavations upon which topsoil is to be placed or pavements are to be constructed, shall not be disturbed by traffic of other operations, and shall be maintained in a satisfactory condition until the finished courses are placed. The storage or stockpiling of materials on finished subgrade will not be permitted.
- N. Backfilling around structures should not commence until after the satisfactory completion of leakage tests and of any other required work in connection with the structures.
- O. Symmetrical backfill loading shall be maintained around structures. Special care shall be taken to prevent any wedging action or eccentric loading upon or against the structures.
- P. The Contractor shall conduct his compacting and other operations in a manner to prevent damage to structures due to passage of heavy equipment over or adjacent to structures, and any damage thereto shall be remedied by the Contractor at no additional expense to the Owner.

### 3.6 COMPACTION REQUIREMENTS

- A. Compaction equipment:
  - 1. The compaction equipment shall be selected by the Contractor, and shall be capable of consistently achieving the specified compaction requirements.
  - 2. Except where restricted per Section 3.7.A.2, the selected compaction equipment shall meet the following minimum requirements.
    - a. Manually operated vibratory plate compactors weighing no less than 200 pounds with vibration frequency no less than 1600 cycles per minute
    - b. Vibratory steel drum roller weighing at least 12,000 pounds.
    - c. Water jetting and puddling will not be allowed

3. Compaction equipment restrictions over MBTA Red Line Tunnel:
  - a. When within 2 to 5 feet above the top of the MBTA Red Line Tunnel roof, compaction equipment is restricted to manually operating vibratory plate compactors weighing no more than 150 pounds.
  - b. When within 2 feet above the top of the MBTA Red Line tunnel roof, mechanical compaction shall not be permitted, and compaction shall be done by hand-operated tampers.

B. The degree of compaction is expressed as a percentage of the maximum dry density at optimum moisture content as determined by AASHTO T180. The required degrees of compaction are as follows:

Area	ASTM Density Degree of Compaction
Natural subgrade	Proof roll
Crushed stone	As specified herein
Sand Borrow	As specified herein
Gravel subbase	95%
Trench backfill (on-site fill)	
- below pavements	95%
- below landscaped areas	90%
Other areas	90%

- C. Moisture Control: Maintain backfill material with a uniform moisture content, with no visible wet or dry streaking, between plus 2 percent or minus 3 percent of optimum moisture content.
  1. Fill that is too wet for proper compaction shall be desiccated, harrowed, or otherwise dried to a proper moisture content to allow compaction to the required density. If fill cannot be dried within 24 hours of placement, it shall be removed and replaced with drier fill at no additional cost to the Owner.
  2. Fill that is too dry for proper compaction shall receive water uniformly applied over the surface of the loose layer. Sufficient water shall be added to allow compaction to the required density
- D. Compaction Control: In-place density tests shall be made at the Contractor's expense in accordance with AASHTO T310 or AASHTO T191 as the work progresses, to determine the degree of compaction being attained by the Contractor. Any corrective work required as a result of such tests, such as additional compaction, or a decrease in the thickness of layers, shall be performed by the Contractor at no additional expense to the Owner.

- E. In freezing weather, a layer of fill shall not be left in an uncompacted state at the close of the day's operations. Prior to terminating work for the day, the final layer of compacted fill shall be rolled with a smooth wheeled roller to eliminate ridges of soil left by compaction equipment.
- F. The Engineer's duties do not include supervision or direction of the actual work by the Contractor, his employees or agents. Neither the presence of the Engineer nor any observation and testing performed by him shall excuse the Contractor from defects discovered in his work at that time or subsequent to the testing.

### 3.7 CDF QUALITY CONTROL TESTING DURING CONSTRUCTION

- A. Slump: ASTM C143; one test at point of discharge for each day's placement; additional tests when CDF consistency seems to have changed.
- B. Compression Test Specimen: ASTM C31; one set of four (4) standard cylinders for each compression strength test, plus additional sets for each 100 cu yds more than the first 50 cu yds placed in any one day unless otherwise required.
- C. Compressive Strength Tests: ASTM C39; one set for each day's pour plus additional sets for each 100 cu. yds more than the first 50 cu. yds placed in any one day; two specimens tested at 28 days, and two specimens tested at 90 days.
- D. Test results will be reported in writing to Engineer, Ready-Mix Producer, and Contractor within 24 hours after tests. Reports of compressive strength tests shall contain the project identification name and number, date of placement, name of testing service, fill type and class, location of fill batch along route, design compressive strength limits at 28 days and 90 days, fill mix proportions and materials, compressive breaking strength, and type of break for both 28 day tests and 90 day tests.

### 3.8 REMOVAL OF SUBSURFACE OBSTRUCTIONS

- A. Remove indicated or approved subsurface structures and related obstructions to complete the work.
- B. Promptly notify the Engineer when any unexpected subsurface facilities are encountered during excavation such as utility lines and appurtenances, walls and foundations.

### 3.9 UNAUTHORIZED EXCAVATION

- A. When the bottom of any excavation is excavated beyond limits indicated or specified, backfill with crushed stone wrapped with non-woven geotextile

fabric. No additional payment will be made for the excavation of backfill or unauthorized excavation.

### 3.10 CARE AND RESTORATION OF PROPERTY

- A. Restore all surfaces damaged by the Contractor's operations, including paved surfaces damaged by the treads of the Contractor's equipment, to a condition at least equal to that in which they were found immediately before work commenced. Use suitable materials and methods for such restoration.

### 3.11 POLLUTION CONTROL

- A. During progress of work, conduct earth-moving operations and maintain work site so as to minimize the creation and dispersion of dust.
- B. Separation of Excavated Material for Reuse: Remove only existing pavement and all other surface materials, which may include concrete slabs, cobblestones, rail ties, by saw cutting that is necessary for prosecution of work.

## PART 4 – COMPENSATION

### **Item 2210.1 - Test Pits**

#### METHOD OF MEASUREMENT:

Measurement for payment for Test Pits will be based on the actual amount of test pits excavated as required by the Engineer. Test Pits, completed for the Contractor's convenience, not approved by the Engineer, will be at the Contractor's expense and at no additional cost to the Owner.

#### BASIS OF PAYMENT / INCLUSIONS:

Payment for Test Pit shall be based on the actual amount of test pits excavated for this item in the proposal. Under the per each for this item, the Contractor shall furnish all labor, materials, tools, equipment, and incidentals required for Test Pits. The work includes, but is not limited to; saw cutting bituminous and cement concrete; excavate and backfill such materials as necessary to locate pipe, utilities and other possible obstructions as indicated on the Drawings, as required by the Owner or Engineer, or as approved by the Owner or Engineer prior to performing the test pit; temporary excavation support; furnishing and placing backfill per one of the approved methods; compaction and compaction testing; coordination with utility companies/owners; survey of existing conditions including horizontal and vertical utility alignments and reflecting the actual conditions on the Project's

As-built Drawings; and construction dewatering and all work incidental thereto and all work not specifically included for payment under other items.

**EXCLUSIONS:**

Test Pits completed for the purpose of soil characterization shall not be paid for under this item. Pre-trenching prior to the installation of temporary support of excavation or for any other purpose shall not be paid for herein unless approved by the Owner and Engineer prior to the pre-trenching or test pitting. Test pitting related to transferring existing water services to an existing water main are not paid for here and are paid for elsewhere.

**Item 2210.2 - Controlled Density Fill for Backfill**

**METHOD OF MEASUREMENT:**

Measurement for payment for Controlled Density Fill for Backfill shall be made on the basis of cubic yards placed within the trench width pay limits shown indicated elsewhere in the Construction Documents or as otherwise approved by the Engineer.

**BASIS OF PAYMENT / INCLUSIONS:**

Payment for Controlled Density Fill for Backfill shall be based on the cubic yards installed complete for this item in the proposal. Under the per cubic yard price for this item, the Contractor shall furnish all labor, materials, tools, equipment, and incidentals required for Controlled Density Fill for Backfill. The work includes, but is not limited to; furnish and install controlled density fill for backfill under existing utilities, encasement of shallow pipe and utilities, and in areas of difficult compaction, and where required by the Engineer; temporary bulkheads and forms; furnishing and installing filter fabric; and material testing.

**EXCLUSIONS:**

Controlled Density Fill used for the abandonment of pipes and structures will not be paid for under this item.

**Item 2210.3 – Overexcavation of Geotechnically Unsuitable Material**

**METHOD OF MEASUREMENT:**

Bike Path Drainage Upgrades  
Willow Ave. to Grove St.  
Somerville, MA  
20163393.002A

EARTH EXCAVATION,  
BACKFILL, FILL, AND GRADING  
02210-17

Measurement for payment for Overexcavation of Geotechnically Unsuitable Material shall be made on the basis of cubic yards of organic peat or silt, loose foundation soils, or other unsuitable material excavated as approved by the Engineer. The depth of unsuitable material in pipe trenches shall be measured from 6 inches below the invert of the pipe to the top of suitable material or specified depth of overexcavation as determined by the Engineer. The width of unsuitable material shall be determined as outlined in the Typical Trench Detail included with the Contract Documents. The depth of unsuitable material in structure excavations shall be measured from 12 inches below the bottom of the structure slab to the top of suitable material or specified depth of overexcavation as determined by the Engineer. The width of unsuitable material in structure excavations shall be based on a 1:1 slope from the edge of the bottom of the structure to the top of the acceptable material.

#### BASIS OF PAYMENT / INCLUSIONS:

Overexcavation of Geotechnically Unsuitable Material shall be based on the cubic yards excavated complete for this item in the proposal. Under the unit price bid, the Contractor shall furnish all labor, materials, tools, equipment, and incidentals required for overexcavation of organic peat or silt, loose foundation soils, or other unsuitable material below the grade of structures, pipe, or manholes, as directed and approved by the Engineer and as may be indicated in the Contract Documents. The work includes, but is not limited to; excavate organic peat or silt, loose foundation soils, or other unsuitable material; transporting material to the temporary soil staging area; furnish and install required temporary excavation support; furnish and place approved geotechnically suitable replacement backfill; compaction and compaction testing; and construction dewatering and all work incidental thereto and all work not specifically included for payment under other items.

#### EXCLUSIONS/SPECIAL NOTES:

This item does not include payment for the disposal and transportation of soil, other than to temporary staging, as it is paid for under soil management, transportation, and disposal quantities.

#### **Item 2210.4– Unclassified Excavation**

#### METHOD OF MEASUREMENT:

Measurement for payment for Unclassified Excavation shall be made on the basis of cubic yards of asphalt, concrete subbase, and cobblestones, excavated to final grade as indicated elsewhere in the Construction Documents or as otherwise approved by the Engineer. Under the per cubic yard price for this item, the Contractor shall furnish all labor, materials, tools, equipment, and incidentals required for the removal of concrete subbase and cobblestones excavated to final grade. The work includes, but is not limited to; saw cutting bituminous and cement concrete; excavating, and all work incidental thereto and all work not specifically included for payment under other items.

**BASIS OF PAYMENT / INCLUSIONS:**

Payment for Unclassified Excavation shall be based on the cubic yards excavated complete for this item in the proposal. Under the per cubic yard price for this item, the Contractor shall furnish all labor, materials, tools, equipment, and incidentals required for the removal of asphalt, concrete subbase, and cobblestones excavated to final grade. The work includes, but is not limited to; saw cutting bituminous and cement concrete; excavating concrete subbase and cobblestones; and all work incidental thereto and all work not specifically included for payment under other items.

**EXCLUSIONS OR SPECIAL NOTES:**

This item does not include payment for as removal of asphalt or temporary asphalt within the trench limits of structures, manholes, or pipe, as it is paid for elsewhere in the Contract Documents. This item does not include payment for removal of existing sidewalks (all types) as it is paid for elsewhere in the Contract Documents. This item does not include transportation and disposal of Unclassified Excavation, as it is paid for elsewhere in the Contract Documents. This item does include payment for removal of soil or gravel, as it is paid for elsewhere in the Contract Documents.

[THIS PAGE INTENTIONALLY LEFT BLANK]



SECTION 02252

MANHOLES

**2252.1                    PRECAST 4-FOOT DIAMETER MANHOLES                    EACH**

PART 1 – GENERAL

1.1     SUMMARY

- A.     This Section includes the following:
  - 1.     Furnishing, installing, and testing of precast concrete drain manholes, complete and in place, within the limits and to the lines and grades indicated.
  - 2.     The Contractor shall not proceed with furnishing and installing precast concrete drain manholes in Newberne Street until the heavy cleaning and internal inspection of the exist. 8” VC drain is complete, and CCTV inspection is submitted to the Engineer for review and approval of the drain manhole Work. The Owner reserves the right to remove precast concrete drain manhole items after review of the post-heavy cleaning CCTV inspection.

1.2     RELATED TECHNICAL SECTION

- A.     Section 02210 – EARTH EXCAVATION, BACKFILL, FILL AND GRADING
- B.     Section 02590 – BRICK MASONRY
- C.     Section 07160 – BITUMINOUS DAMPPROOFING

1.3     SUBMITTALS

- A.     Submit the following in accordance with Section 01300 – SUBMITTALS:
  - 1.     Complete shop drawings for all precast manhole sections, cast iron frames and covers and appurtenances.
  - 2.     Prior to fabrication, submit shop drawings showing details of precast monolithic base sections; risers; eccentric cone and flat slab manhole tops; joints and gaskets; and construction details, tolerances, and other information as required by the Owner.
  - 3.     Submit manufacturer’s recommended installation procedures for informational purposes.
  - 4.     Submit concrete strength testing as specified herein.

#### 1.4 QUALITY CONTROL

- A. Provide in accordance with Section 01400 – QUALITY CONTROL and as specified.
- B. Owner reserves right to inspect and test by independent services at manufacturer's plant or elsewhere at his own expense.

#### 1.5 DELIVERY, STORAGE AND HANDLING

- A. Provide in accordance with Section 01600 – PRODUCTS, MATERIALS, AND EQUIPMENT.
- B. Removed manhole fixtures must not be reused and shall be salvaged and delivered to the City of Somerville Public Works storage yard unless directed by the Owner to dispose off site.

### PART 2 – PRODUCTS

#### 2.1 MATERIALS

- A. Precast Bases, Risers, and Tops:
  - 1. Except as otherwise indicated, precast reinforced concrete manhole bases and risers shall be 48 inches, 60 inches, 72 inches, or 96 inches, with top sections of types indicated or as directed.
  - 2. Manhole sections shall conform to the requirements of ASTM C478, latest revision, except as modified herein and/or on the drawings.
  - 3. Each manhole section shall be constructed with a bell-and-spigot or tongue-in-groove joint.
  - 4. The manhole sections shall be manufactured by the centrifugal, roller suspension or vertical cast process; workmanship and methods shall be in accordance with the best practices of modern shops for this type of work.
  - 5. The height and diameter of manhole bases shall be as required to accommodate size of pipe used, as approved. The manhole risers shall be available in 1, 2, 3, and 4-foot lengths.
  - 6. Manhole tops of the eccentric cone type shall be 3 or 4 foot lengths, with opening at top matching size of casting nominal diameter, unless otherwise noted as shown in the details.
  - 7. Manholes larger than 4 feet in diameter at the base shall be reduced in diameter to 4 feet at the top riser section unless noted otherwise on the

plans.

8. Manhole tops of the flat slab type, where space restrictions exist or where directed, shall not be less than 8 inches thick and reinforced as indicated, and shall have an opening having a minimum inside diameter of 24 inches.
9. Manhole bases and risers shall have the wall thicknesses as stated in the Drawings; cone type units shall taper to a minimum wall thickness of 8-inches at top.
10. Exterior concrete surfaces not otherwise manufactured with crystalline waterproofing admix shall be coated with bituminous damp proofing as per Section 07160 – BITUMINOUS DAMPPROOFING.

B. Concrete:

1. Cement shall be moderate heat-of-hydration Portland cement conforming to ASTM C150, latest revision, Type II. Absorption, determined by absorption test described in ASTM C478, latest revision, shall not exceed 8 percent of dry weight.
2. The concrete for precast manhole sections shall have an average strength of not less than 4,000 psi at 28 days. Strength shall be determined by tests on 6-inch by 12-inch vibrated test cylinders cured in the same manner as the manhole sections, cores cut from the manhole sections, or by other approved methods. Not less than two concrete strength tests shall be made for each 100 linear feet of manhole sections and the test results submitted to the Owner. Testing may be conducted at the manufacturer's plant or at an approved testing laboratory and shall be the responsibility of the Contractor, at no additional expense to the Owner.

C. Frames and Covers:

1. All frames shall have a minimum clear opening of 24 inches. Standard frame height shall be 8-inches high. Compact 4-inch high frames shall be used only where indicated on the drawings or directed by the ENGINEER.
2. Iron castings shall be true to pattern in form and dimensions, free from pouring faults, sponginess, cracks, blow-holes and other defects affecting the strength and value for the service intended. The finished coating shall be tough and tenacious when cold and not brittle or with any tendency to scale off under seasonable temperature changes.
3. Frames and Covers shall be Cast Iron, conforming to ASTM A48, Class 35B and as follows:

- a. Castings to be free from scale, lumps, blisters and sandholes.
  - b. Machine contact surfaces to prevent rocking.
  - c. Thoroughly clean and conduct hammer inspection.
  - d. Bolted to secure the cover to the frame, and the frame to the manhole.
4. Two pickholes cast 180° apart shall be closed loops to facilitate removing cover allowing manhole pick to “hook” the loops.
  5. Manhole frames with 26-inch covers for 24 –inch opening shall be East Jordan Iron Works model 2111, or approved equal.
  6. Frames and covers shall be capable of withstanding AASHTO H-20 loading unless otherwise indicated or specified.
  7. The Contractor shall furnish all manhole frames and covers conforming to the details shown on the drawings, or as herein specified. Frames and covers shall be of cast iron with diamond cover surface design. Manhole covers shall be machined to fit securely and evenly on the frame.
  8. Covers for all structures shall have the word “DRAIN” or other appropriate designation cast upon them.

D. Jointing:

1. Precast machine-made solid segments shall conform to ASTM C139.
2. Ends of each length of manhole riser, the bottom end of manhole tops of the cone type, base slabs, and the tops of monolithic bases shall be provided with bell-and-spigot or tongue-and-groove ends of concrete formed on machined rings to insure accurate joint surfaces.
3. Jointing shall be O-ring gaskets or butyl rubber molded sealants. All joints shall be provided so as to be watertight under all conditions of service. The ends of base, riser, and cone sections to be jointed using neoprene "O-ring" type joints shall be designed to enclose the gasket on four surfaces when the joint is in its final position.

E. Gaskets:

1. Gaskets for sealing joints using the "O-ring" type gaskets shall conform to ASTM C443, latest revision, and shall be of rubber of a special composition having a texture to assure a watertight and permanent seal and shall be the product of a manufacturer having at least five years

experience in the manufacture of neoprene gaskets for pipe joints, or shall be vulcanized butyl rubber sealants meeting or exceeding Federal Specifications SS-S-210.

2. Each gasket shall be a continuous ring of round solid cross-section having smooth surfaces free from blisters, porosity and other imperfections. The joint sealing gasket shall be of a composition and texture which shall be resistant to sewage, industrial wastes including gasoline, oils and groundwater, and which will endure permanently under the conditions likely to be imposed by this use. The tensile strength shall be at least 1,200 psi. The elongation shall be such that 2-inch gauge marks shall stretch to not less than 9 inches. The compression set (constant deflection) shall not exceed 25 percent of the original gauge length. The tensile strength after accelerated aging shall be not less than 80 percent of the original strength.
3. The butyl rubber sealant shall have a self-adhesive nature, shall have a diameter of 1 inch, and shall be furnished in coils. The sealant shall meet the following properties:

<u>DESCRIPTION</u>	<u>SEALANT PROPERTY</u>
Base	Vulcanized Butyl Rubber
Percent of Solids	100%
Shore "A" Durometer:	
- Initial	10
- Aged	20
Adhesion to Clean Surfaces	Excellent
Temperature Range:	
- Application	-20° F to 120° F
- Service	-65° F to 200° F
Water Absorption after 14 days immersion:	Less than 5%
Chemical Resistance after 7 days immersion in 5% Potassium Hydroxide and 5% Hydrochloride Acid	Excellent
Resistance to Water and Organic Solvents	Excellent
Resistance to Shock, Heat, and Cold	Excellent
Color	Black
Shelf Life	Excellent
Elongation	
- Initial	30%
- 2 weeks at 190° F, drying	250%
- 2 weeks in water	300%
Weather Resistance	Excellent
Moisture Diffusion Resistance	Excellent
Specific Gravity	1:18
Flash Point	None
Fire Point	Over 620° F

F. Mortar for Sealing Joints:

1. Mortar (grout), for sealing mortar-type joints or grouting field made pipe openings, shall be a non-shrink type mortar or grout which shall be a factory-mixed ready-to-use product containing especially prepared aggregate, cement and sand and other components which will produce a mortar or grout with properties to counteract shrinkage, increase density, withstand impact, improve workability, produce watertight joints, and which will be suitable for jointing around pipes entering manholes.

G. Mortar for Brickwork:

1. Per Section 02590 – BRICK MASONRY

H. Brick

1. Per Section 02590 – BRICK MASONRY

I. Flexible Pipe to Manhole Seals

1. Flexible manhole seals shall be:
  - a. New Lok Joint Flexible Sleeve by Interpace,
  - b. A-Lok Manhole Sleeve by L & L Concrete Products,
  - c. Press Wedge II by Press-Seal Gasket Corporation,
  - d. or approved equal.
2. Field applied seals shall be similar to a style typified by Kor-N-Seal boot or an approved equal.
3. Manhole sleeves, gaskets and sealants shall be furnished complete with lubricants, stainless steel stops, inserts, clamps, etc.

### PART 3 – EXECUTION

#### 3.1 HANDLING:

- A. Manhole sections shall not be shipped for at least five days after manufacture.
- B. All manhole sections which have been damaged after delivery, and manhole sections installed in the work which are found to be damaged will be rejected and shall be removed and replaced by the Contractor with new, sound and approved material, at no additional expense to the Owner. At the time of inspection, the surfaces of the sections shall be dense and close-textured. Cores shall serve as a basis for rejection of manhole sections if poor bond or reinforcement is exposed.
- C. Each manhole section shall be handled into its position in the trench only in such manner and by such means as recommended by the manufacturer of the manhole sections, and as approved. Provide all necessary slings, straps and other devices for the safe and satisfactory handling and support of the manhole sections during lifting, installation and final positioning of the sections. Lifting holes may be permitted provided suitable rubber or concrete stopper or other approved devices are provided for plugging and sealing the holes and watertight, all as approved.

#### 3.2 INSPECTION

- A. All manhole sections will be inspected upon delivery; manhole sections which do not conform to specification requirements will be rejected and shall be removed immediately from the site by the Contractor at no additional cost to the Owner. The Contractor shall furnish all labor and facilities necessary to assist the Owner in inspecting the material.

- B. The quality of all materials, processes of manufacture, and the finished manhole sections shall be subject to inspection and approval of the Owner. Such inspection may be made at the place of manufacture and/or on the site, and the manhole sections shall be subject to rejection at any time because of failure to meet any of the specification requirements, even though sample manhole sections may have been accepted as satisfactory.

### 3.3 INSTALLATION

- A. Manhole sections shall be installed level and plumb and set on 12 inches compacted crushed stone or gravel base as indicated on the Drawings.
- B. Manhole sections shall be installed using approved type neoprene "O-Ring" type gasket or butyl rubber sealants for sealing joints of manhole sections; jointing shall be performed in accordance with the pipe manufacturer's recommendations, and as approved.
- C. Water shall not be permitted to rise over newly made joints until after inspection as to their acceptability. All jointing shall be done in a manner to insure watertight joints.
- D. All holes in sections used for handling shall be thoroughly plugged with non-shrink grout.
- E. The manhole frames shall be set with tops conforming accurately to the grade of the pavement or finished ground surface or as indicated on the drawings utilizing brick and mortar or reinforced precast concrete rings as per Section 02590 – BRICK MASONRY. Frames shall be set in a full bed of mortar so that the space between the top of the brick and mortar and the bottom flange of the frame shall be completely filled and made watertight. A thick ring of mortar extending to the outer edge of the concrete shall be placed all around the bottom flange. The mortar shall be smoothly finished to a height of 4-inches above the flange. Exterior surfaces of brick masonry shall be plastered with 1/2 inch of cement mortar.
- E. Opening in precast manhole sections to extent indicated on the drawings to receive entering pipes shall be made at the place of the manufacturer. Where opening cannot be determined, they shall be hole cored in the field. Depending upon the type of pipe seals to be furnished, pipe openings shall be provided with manhole seals of proper sizes to accommodate pipe sizes and shall be cast into the manhole at the time of manufacture. When openings are hole cored in the field, the openings for entering pipes shall be of a size to provide a uniform annular space between the outside of pipe wall and the opening in the manhole section. The annular space for pipes requiring mortar connections (RCP pipe) shall be 3/4 inch, and after the pipe is in position the annular space shall be solidly filled with non-shrink mortar. The annular space for pipes requiring flexible connections (DI, PVC and FRP pipe) shall be made in accordance with the Drawing details. Care shall be taken to assure that the openings are made to permit setting of the entering pipe at its correct elevation as indicated or



directed. Openings which are hole cored in the manhole sections in the field shall be circular, not square and shall be made by the appropriate coring operation; damaged sections will be rejected and shall be replaced at no additional expense to the Owner.

- F. Manhole inverts shall be brick masonry or concrete and shall have a cross-section shaped to conform to connecting pipes; changes in size shall be made gradually and evenly. Concrete for manhole inverts shall conform to specified material in Part 2, constructed as indicated and as specified. Brick masonry for manhole inverts shall conform to Section 02590 – BRICK MASONRY, constructed as indicated and as specified.

### 3.4 BACKFILLING

- A. Conduct backfill operations of open cut trenches closely following laying, jointing, and bedding of pipe, and after initial inspection and testing are completed, all in accordance with Section 02210 – EARTH EXCAVATION, BACKFILL, FILL, AND GRADING.

### 3.5 INSPECTION AND TESTING

- A. Acceptance of precast reinforced concrete manhole sections will be made on the basis of plant tests, material tests, and inspection of the completed product, in accordance with the requirements of ASTM C478, latest revision, with the following modifications.
- B. Manhole sections shall not be shipped for at least five days after manufacture when cured by subjecting them to thoroughly saturated steam at a temperature between 100 and 150° F for a period of not less than 8 hours, or when necessary, for such additional time as may be required to enable the manhole sections to meet specification requirements.
- C. Leakage Tests
  - 1. Leakage tests for four (4) foot and five (5) foot diameter manholes may be made using vacuum testing equipment. This type of test may be used only immediately after assembly of the manhole and only prior to backfilling. The manhole to pipe connection should only be a flexible connector. All lift holes shall be plugged with a non-shrinking mortar. For this test, each four or five foot diameter manhole shall be tested under 10-inch of Hg vacuum. The test shall pass if the vacuum remains at 10-inch Hg or drops no lower than 9-inch Hg after 60 seconds for manholes 0 to 10 feet deep, 75 seconds for manholes 10 to 15 feet deep or 90 seconds for manholes 15 to 25 feet deep.

### 3.6 CLEANING

- A. All excess material including dirt, loose concrete, bricks, grit, stones and any other material, shall be removed from all manholes prior to final review by the

Engineer. A final cleaning shall be performed, to include complete removal of all accumulated debris and fluids from each catch basin, upon complete project completion.

#### PART 4 – COMPENSATION

##### **Item 2252.1 --- Precast 4-foot Diameter Manhole**

###### **BASIS OF PAYMENT/INCLUSIONS:**

Under the Unit Price bid for this item, the Contractor shall furnish all labor, materials, tools, equipment, and incidentals required for the complete procurement, installation, cleaning, and leakage testing/inspection of 4-foot diameter precast concrete manholes complete as indicated on the Drawings and Specifications, or as directed by the Owner or Engineer. This work shall include furnishing, installing, and/or performing the following: pavement or sidewalk sawcutting; removal of brick, concrete, or bituminous sidewalk; excavation of bituminous concrete roadway; excavation; transporting material to/from soil staging area; temporary excavation support consisting of timber or steel sheeting, left in place and cut off below grade where required by the Contract Specifications; sanitary sewer and storm drain flow handling; removal of groundwater from the trench; handling groundwater recharged back to the soil; filter fabric as required; bedding, including compaction; precast manhole sections with frames, covers, masonry chimney, appurtenances, bench and masonry invert construction, and storm drain (if applicable) pipe sleeve (if applicable); bituminous damp proofing (if applicable); furnishing, placing and compacting suitable backfill soil; grade and compact gravel pavement sub-base; compaction testing; and all appurtenances and incidental work.

###### **METHOD OF MEASUREMENT:**

Payment for Precast 4-foot Diameter Manhole shall be based on the Unit Price bid in the proposal. Measurement for payment shall be based on the actual number of complete and functional manholes as shown on the Contract Drawings or as directed by the Owner or Engineer.

Manholes installed but not successfully tested and accepted shall be paid for at a maximum of 95 percent of the unit prices bid under this item. The remaining 5 percent shall be paid upon receipt of successful test results by the Engineer. All reductions in payment due to unsuccessful testing shall be made prior to normal retainage.

###### **SPECIAL NOTES ON EXCLUSIONS:**

The following item(s) are not included for payment under this item and are included for payment elsewhere: disposal of bituminous concrete and construction debris; treatment of groundwater discharged under a MWRA Dewatering Discharge Permit; procurement, installation, and compaction of CDF.

-END OF SECTION 02252-

SECTION 02525

PAVING AND SURFACING, CURBS, AND WALKWAYS

<b>2525.1</b>	<b>HOT MIX ASPHALT TEMPORARY TRENCH PATCH FOR NEWBERNE ST.</b>	<b>TON</b>
<b>2525.2</b>	<b>HOT MIX ASPHALT BASE COURSE FOR NEWBERNE ST.</b>	<b>TON</b>
<b>2525.3</b>	<b>HOT MIX ASPHALT TOP COURSE FOR NEWBERNE ST.</b>	<b>TON</b>
<b>2525.4</b>	<b>SURFACE RESTORATION FOR CLIFTON ST.</b>	<b>LUMP SUM</b>

PART 1 – GENERAL

1.1 DESCRIPTION

- A. Furnish and install paving on all roadway areas as indicated and specified. Restore all asphalt walkways, concrete sidewalks, brick walkways, curbing to match existing or better conditions.
- B. Pavement and surfacing shall be constructed in courses as shown on the plans and as required in accordance with these specifications and in close conformity with the lines, grades, compacted thickness and cross sections shown on the plans.
- C. The Contractor shall take all reasonable measures to assure proper drainage on the final surface of the roadway. Pavement that does not drain properly due to poor workmanship shall not be accepted by the Owner and shall be replaced by the Contractor at no additional cost to the Owner.
- D. Concrete Paver Sidewalk: Existing subbase shall be reshaped and compacted, and 2 inches of binder course HMA pavement shall be placed. Concrete pavers shall be set on a bed of sand. Sand shall be swept into the joints.
- E. Reference is made herein to the Commonwealth of Massachusetts Department of Transportation, Standard Specifications for Highways and Bridges, latest edition, and all addendums/supplemental specs hereinafter referred to as the "Standard Specifications." All references to method of measurement, basis of payment, and payment items in the Standard Specifications are hereby deleted. References made to particular sections or paragraphs in the Standard Specifications shall include all related articles mentioned therein.

## 1.2 RELATED WORK

- A. Division 1 – General Requirements
- B. Section 02210 – EARTH EXCAVATION, BACKFILL, FILL AND GRADING

## 1.3 SUBMITTALS

- A. Shop Drawings: Submit the following in accordance with the General Conditions of Contract and Section 01300 – SUBMITTALS:
  - 1. Provide copies of materials certificates signed by material producer and Contractor, certifying that each material item complies with, or exceeds, specified requirements.
  - 2. Design Data: Submit design mix for asphalt base, binder and top course.

## 1.4 GRADE CONTROL

- A. Establish and maintain required lines and elevations.

## 1.5 QUALITY CONTROL

- A. The Engineer may require the Contractor to remove, at their own expense, any defective mix not conforming to the specified job mix formula within the stipulated tolerances. Samples of the actual mixture in use will be taken as many times daily as necessary and the mixtures shall be maintained uniform for the project. The Engineer may suspend further approval for use of the Plant mixtures if the mixtures do not conform to the specified requirements.
- B. Do not place materials when underlying surface is muddy, frozen, or has frost, snow, or water thereon.

## 1.6 GUARANTEE

- A. During the one-year guarantee period, the Contractor shall maintain the surfacing and shall promptly fill with similar material in compliance with the Specifications, any depressions and holes that may occur during that time period.

## PART 2 – PRODUCTS

### 2.1 MATERIALS

Bike Path Drainage Upgrades  
Willow Ave. to Grove St.  
Somerville, MA  
20163393.002A

PAVING AND SURFACING,  
CURBS AND WALKWAYS  
02525-2

- A. Gravel Subbase
  - 1. Materials including preparation of subgrades shall meet the requirements of the applicable sections of the Specifications.
  - 2. The trench gravel subbase shall be used in the upper 1-foot of trench backfill material immediately below pavements and graded in accordance with Massachusetts Highway Department "Standard Specifications" Section M1.03.1 and applicable subsections of Section 02210 – EARTH EXCAVATION, BACKFILL, FILL AND GRADING.
- B. Hot Mix Asphalt Pavement – Base Course
  - 1. Asphalt Base Course and Asphalt Tack Coat shall conform to the applicable subsections of Section 460, Hot Mix Asphalt Pavement, of the Massachusetts Highway Department's "Standard Specifications".
  - 2. Tack coat shall be RS-1 emulsion.
- C. Hot Mix Asphalt Pavement – Binder Course
  - 1. Asphalt Binder Course shall conform to the applicable subsections of Section 460, Hot Mix Asphalt Pavement, of the Massachusetts Highway Department's "Standard Specifications."
- D. Hot Mix Asphalt Pavement – Top Course
  - 1. Asphalt Top Course shall conform to the applicable subsections of Section 460, Hot Mix Asphalt Pavement, of the Massachusetts Highway Department's "Standard Specifications."
- E. Hot Poured Rubberized Asphalt Sealer
  - a. Hot Poured Rubberized Asphalt shall conform to Federal Specification Number SS-S-1401 as required in Section 460, Hot Mix Asphalt Pavement, of the Massachusetts Highway Department's "Standard Specifications."
- F. Cement Concrete for Sidewalks, Driveways and Pedestrian Ramps:  
Cement concrete shall conform to the Standard Specifications, M4.02.00 through M4.02.12 and be 4000 PSI at 28 day test, ¾-inch coarse aggregate, 610 pounds cement per cubic yard, 7% air entrained (AASHTO - M154), Type A water reducing admixture (AASHTO - M194), 3 to 4-inch slump, and Type II dark colored by adding 1 lb. of lamp black per

cubic yard at the plant. Cement concrete shall contain micro-fiber added during batching at the plant to insure uniform distribution.

- G. Micro-fiber: The cement concrete shall contain 1 pound of polypropylene microfiber per cubic yard. Fibers shall be 1/2" or 3/4" 100% polypropylene fibers, maximum 3 denier, complying with ASTM C 1116, Type III, Par. 4.1.3. Fibers per pound shall be not less than 50 million individual fibers. The micro-fiber shall be used in accordance with the manufacturer's specifications.
- H. Clear, Waterborne, Membrane-Forming Curing and Sealing Compound: ASTM C 1315, Type 1, Class A.
1. Available products: subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
    - a. Evaporation Retarder products shall be Eucobar manufactured by Euclid Chemical Co, E-Con manufacturer by L&M Construction Chemicals, LLC, Confilm manufactured by BASF Construction Chemicals, LLC or approved equal.
    - b. Clear, Waterborne, Membrane-Forming Curing Compound, 18 to 22 percent solids, products shall be Klear-Kote WBII 20 percent manufactured by Burke Chemicals, Dress & Seal WB; L&M Construction Chemicals, Inc., Vocomp-20 manufacturer by W.R. Meadows, Inc. or approved equal.
    - c. Clear, Waterborne, Membrane-Forming Curing and Sealing Compound products shall be Res-Cure manufactured by Atlas Tech Products, Lumiseal WB Plus manufactured by L&M Construction Chemicals, Inc., Vocomp-30 manufacturer by W.R. Meadows, Inc., or approved equal.
- I. Expansion Joints: Shall be 3/8" thick polyethylene foam and 1/4" thick polyethylene foam conforming to ASTM D1751.
- J. Bricks for sidewalks shall be a full dimension paver conforming to the quality standards, size and color range of: "Pathway Full Range" brick paver as manufactured by Pine Hall Brick, Winston-Salem, NC, or an equivalent approved by the Engineer. Size shall be 4" W by 8" L by 2 1/4" D. Brick shall meet or exceed the requirements of ASTM C902, Class SX, Abrasion Type I, Application PS with average water absorption of not more than 5% with the five hour boil and an average compressive strength of 8,000 PSI (55Mpa) or more. Brick shall pass a minimum of 100 freeze thaw cycles.

- K. Setting Bed: Shall contain coarse sand and aggregates mixed with the Portland Cement as processed by Rowe Contracting Company, Malden, Massachusetts or Quinn Perkins Company, Burlington, Massachusetts or approved equivalent, in order to add stability to the brick walk so that bricks will not roll, move, or rock. The sand for joint sweeping shall be mixed with Portland Cement Type II (2 parts sand to 1 part Portland Cement) and be free of coarse aggregates, enabling the fines to freely fill in around all sides of the bricks.
- L. Edge Restraints: Edge sections shall be L-shaped galvanized steel paver restraints and are to be notched to provide for smooth curves and crisp angles. Sections shall conform to the following specifications: Height: 1.5", Flange: 1.75", Lengths: 6'0" or 8'0" and Thickness: 3/16". Edge Restraints to be supplied by Border Concepts, Inc., P.O. Box 471185, Charlotte, NC 28241, Telephone Numbers: 1-800- 845-3343 or 1-704-541-5509, Fax Number: 1-704-541-5610 or approved equivalent.
- M. The mastic adhesive shall consist of 2% neoprene (grade WM1) oxidized asphalt with 155 degrees F softening point (80 penetration) and 10% asbestos-free fibers and 88% asphalt. Contractor shall follow manufacturer's installation procedure.
- N. Iron Edge Sections shall be provided at all tree pits, all locations where the back of sidewalk does not abut a hard edge and as directed by the Engineer. Iron Edge sections shall be L-shaped galvanized steel paver restraints and are to be notched to provide for smooth curves and crisp angles. Sections shall conform to the following specifications: Height: 1.5", Flange: 1.75", Lengths: 6'0" or 8'0" and Thickness: 16 gauge. Iron Edge to be supplied by Border Concepts, Inc., P. O. Box 471185, Charlotte, NC 28241, Telephone numbers: 1-800-845-3343 or 1-704-541-5509, Fax Number: 1-704-541-5610 or approved equal.
- O. Spikes: shall be galvanized steel spiral not less than 10" in length.
- P. Concrete Pavers for private property restoration shall be newport cobble "vineyard blend" as manufactured by Ideal Pavers, Westford, MA or an equivalent as approved by the Engineer. Concrete pavers shall be paid under the unit bid price item for private property restoration. Refer to Part 4, Measurement and Payment, of Section 02950. Pavers shall be L Shaped and the size shall be 10-1/4" Outside Length by 5" Inside Length by 5" Wide by 3-1/8" D. Brick shall meet or exceed the requirements of ASTM C936, with average water absorption of not more than 5% with the five hour boil and an average compressive strength of 8,000 PSI (55Mpa) or more. Brick shall pass a minimum of 100 freeze thaw cycles.

## PART 3 – EXECUTION

### 3.1 PROJECT SITE CONDITIONS/PROJECT DESCRIPTION

- A. In general, the following pavement repairs shall be made:
1. Trench repairs on Newberne Street shall consist of a 2-inch hot mix asphalt base course temporary pavement placed at trench width. After a winter settlement or 90-day period, the temporary pavement shall be removed, the existing pavement shall be cut back to a distance of 1' on either side of the trench, to a depth sufficient to place the pavement subbase as detailed, and replaced with a 2.5-inch permanent base course pavement and a 1.5-inch permanent top course pavement flush with existing grade.
  2. Furnish and remove steel plates as required.
  3. Driveway aprons and waterways shall be paved as part of the work.
  4. The paving thicknesses specified above may vary based on permit or field requirements.
  5. Curbing shall be removed and reset as part of the work where required.

### 3.2 SUBGRADE PREPARATION AND PROTECTION

- A. Bring subgrade to required grade as necessary prior to placing subbase material.
- B. Subgrade under walks, pedestrian ramps, driveways, and curbs shall be graded to required elevations and proof rolled.
- C. As required by the Engineer, over-excavate on-site fill material and any unacceptable materials below the subgrade. Utilize excavating equipment equipped with a toothless or smooth edged, excavating bucket to expose the on-site fill material and unacceptable materials to avoid disturbance of the bearing surface.
- D. Proof roll the overexcavated subgrade prior to placing crushed stone.
- E. Backfill the overexcavation with crushed stone and compact as indicated in Section 02210 – EARTH EXCAVATION, BACKFILL, FILL AND GRADING.

### 3.3 PLACEMENT OF SUBBASE

- A. Do not begin placement of subbase and paving work until deficient subgrade



areas have been corrected and are ready to receive paving.

- B. Subbase under roadway shall be installed and compacted as covered in the Contract Drawings and in Section 02210 – EARTH EXCAVATION, BACKFILL, FILL AND GRADING.
- C. Gravel subbase under sidewalks, pedestrian ramps, driveways, and curbs shall be graded to required elevations and compacted with plate-type mechanical compactors to ninety-five percent (95%) of the maximum dry density at optimum moisture content as determined by the AASHTO Standard Method of Test T99 Method.
- D. The subbase for sidewalks shall be graded to be sloped from the City right of way towards the street in order to meet ADA requirements, or as shown on the Contract Drawings, or as required by the Engineer.

#### 3.4 HOT MIX ASPHALT BASE COURSE

##### A. Weather Limitations

- 1. Apply prime and tack coats when ambient temperature is above 50 deg.F (10 deg.C), and when temperature has not been below 35 deg.F (1 deg.C) for 12 hours immediately prior to application. Do not apply when subbase is wet or contains an excess of moisture.
- 2. Base course pavement for temporary pavement may be placed when air temperature is above 30 deg.F (-1 deg.C) and rising.

##### B. Placement

- 1. Base course shall be spread and compacted to a finished thickness indicated on the Contract Drawings. A smooth even surface shall be produced.
- 2. Base course placement for temporary paving and trench paving shall be performed on a weekly basis or as otherwise approved by the Owner and Engineer. Cold Patch for temporary pavement shall not be allowed with the exception of in an emergency or to cover steel road plate edges.
- 3. Base course placed as temporary paving shall be maintained until removed prior to final paving.

#### 3.5 HOT MIX ASPHALT TOP COURSE

A. Weather Limitations

1. Construct asphalt surface course when atmospheric temperature is above 40 deg.F (4 deg.C) and when base is dry.

B. Settlement Period

1. After a 90-day minimum period, or a winter settlement period, permanent pavement shall be installed in accordance with the requirements of the trench paving detail provided in the drawings.

C. Placement

1. Top course shall be spread and compacted, to the width required in the Contract Documents and to a finished thickness indicated in the Contract Documents. A smooth, even surface shall be produced. Overlays shall be installed after the street has been cold planed or as approved by the Owner and Engineer.
2. Apply tack coat at a rate of 0.05 to 0.10 gallons per square yard over the base and binder courses. Apply material to penetrate and seal, but not flood, surface. Cure and dry as long as necessary to attain penetration and evaporation of volatile.

D. Placing Mix

1. Place hot mix asphalt mixture on prepared surface, spread and strike-off. Spread mixture at minimum temperature of 225 deg.F (107 deg.C). Place inaccessible and small areas by hand. Place each course to required grade, cross-section, and compacted thickness. Protect all adjacent construction from staining with mix or damage by mechanical equipment. Clean, repair or replace any construction stained or damaged at no additional cost to the Owner.
2. Place pavement in strips not less than 2-feet wide, unless otherwise acceptable to Engineer. After first strip has been placed and rolled, place succeeding strips and extend rolling to overlap previous strips. Complete binder course for a section before placing top course.
3. The Contractor shall supply an approved Dial Type Asphalt Thermometer (Range 10° C to 260° C) for each paving machine in operation on the project. The thermometer shall remain the property of the Contractor upon completion of the project.

E. Rolling

1. Begin rolling when mixture will bear roller weight without excessive displacement. Compact mixture with hot hand tampers or vibrating plate compactors in areas inaccessible to rollers.
2. Breakdown Rolling: Accomplish breakdown or initial rolling immediately following rolling of joints and outside edge. Check surface after breakdown rolling, and repair displaced areas by loosening and filling, if required, with hot material.
3. Second Rolling: Follow breakdown rolling as soon as possible, while mixture is hot. Continue second rolling until mixture has been thoroughly compacted.
4. Finish Rolling: Perform finish rolling while mixture is still warm enough for removal of roller marks. Continue rolling until roller marks are eliminated and course has attained maximum density.
5. Patching: Remove and replace paving areas mixed with foreign materials and defective areas. Cut-out such areas and fill with fresh, hot mix asphalt. Compact by rolling to match the surrounding surface density and smoothness.
6. Protection: After final rolling, do not permit vehicular traffic on pavement until it has cooled and hardened. Erect barricades to protect paving from traffic until mixture has cooled enough not to become marked by wheel traffic.

F. Existing Pavement/Joints

1. The edges of existing pavement, which are to remain, shall be saw cut to even, straight edges. This includes sidewalk, walkway, road and trench edges. Any joints at junction of old and new pavements shall be sealed with an asphalt emulsion and covered with sand.
2. Make joints between old and new pavements, or between successive days' work, to ensure continuous bond between adjoining work. Construct joints to have same texture, density and smoothness as other sections of asphalt course. Clean contact surfaces and apply tack coat.

G. Compaction

1. The asphalt mixture shall be compacted to at least 95% of the density achieved on the laboratory testing of the design mix for the project. Density will be checked by the Nuclear Density Gage Method, ASTM D2950. Testing shall be completed by Contractor at no

expense to Owner for every 200 square yards of surface area placed.

#### H. Field Quality Control

1. Thickness: Test in-place asphalt courses for compliance with requirements for thickness. Repair or remove and replace unacceptable paving as required by Engineer, and at no additional cost to the Owner. In-place compacted thickness will not be acceptable if exceeding following allowable variation from required thickness:
  - a. Base or Binder Course: 1/4-inch, plus or minus.
  - b. Surface Course: 1/4-inch, plus or minus.

#### I. Crack Sealing

1. Crack sealing shall be performed where required by the Engineer with modified asphalts (e.g. hot poured rubberized asphalt sealer). Prior to sealing a crack all compressible material shall be removed by high-pressure air or routing. If grass or vegetation is present in the crack the Contractor shall inject a liquid herbicide to prevent future growth. For small hairline cracks, an asphalt slurry mixture type SS-1, SS-1h shall be squeegeed over the surface and forced in the cracks. The slurry shall be maintained at a significant fluidity to be able to flow into the hairline cracks. Sealing of cracks shall be considered to be complete upon review and approval by the Engineer.

#### J. Liquid Asphalt Emulsion

1. Liquid Asphalt Emulsion shall be applied prior to installation of asphalt as incidental to all pavement pay items. Emulsion shall be AC-20 conforming to AASHTO M226 and shall be applied at a temperature over 100 degrees F by an emulsion truck.
2. The emulsion truck shall have pneumatic tires of such width and number that the load produced on the surface shall not exceed 672 lbs/in of tire width, and it shall be designed, equipped, and operated so that at an even heat the emulsion may be applied uniformly on variable widths of surface at a readily controlled rate of 1/20 gal/square yard or as required by the Engineer.
3. The emulsion shall be applied within a pressure range of 25 psi to 75 psi. Distributor equipment shall include a tachometer, pressure gauges, volume-measuring devices, and a thermometer for reading the temperature of tank contents. The distributor shall be self-powered

and shall be equipped with a power unit for the pump and full circulation spray bars adjustable laterally and vertically.

### 3.6 BRICK WALKS

- A. Hot mix asphalt base shall be installed to a depth of 4” and placed in accordance with the MHD Standard Specifications for hot mix asphalt.
  - 1. Hot mix asphalt surface shall be rolled to remove irregularities prior to installing stone dust.
- B. The iron edge shall be installed as detailed, longitudinally to the granite curb at the back edge of the specified brick walk width and at all tree wells. The iron edge shall be secured by 10” spiral galvanized steel spikes placed every 12”.
- C. A 3/4” sand setting bed shall be installed on the asphalt base. Wet saw is required for cutting of bricks and filling in pieces where needed. No other method will be acceptable.
- D. After all the bricks are in place, stone dust free of coarse aggregates shall be swept into the voids around the bricks.
- E. Once the bricks are placed in their specified patterns, they shall be compacted with a plate compactor. The compactor shall have a minimum force of 5000 lbs. and a frequency of 75 to 90 cycles per second.
- F. Contractor shall follow manufacturer’s installation procedures for the installation of mastic adhesive.
- G. The Contractor shall lay brick to match existing brick sidewalk pattern and grade, and shall meet ADA requirements.

### 3.7 RAISING AND ADJUSTING CASTINGS

- A. Prior to top course paving, all existing City or Owner owned catch basin and manhole castings and curb and valve boxes shall be raised, if necessary, to the proper grade by the Contractor.
- B. Castings owned by private utilities shall be raised by the responsible utility. The Contractor shall be responsible for coordinating this work.
- C. The method of adjusting catch basin and manhole castings shall be as follows: Cut around catch basin or manhole castings a minimum of 8 inches from casting. Excavate and, if required, rebuild up to 12 inches of masonry below the bottom of the casting. Backfill with suitable material and compact to bottom of casting. Place high, early strength cement concrete or hot mix asphalt collar, as required

by the Authority, to approximately 1½ inches below the raised casting grade. Masonry work shall conform to Section 02252 - MANHOLES and Section 02590 – BRICK MASONRY.

- E. The method of raising curb and valve boxes shall be as follows: Cut around valve box a minimum of 8 inches from valve box. Excavate as required and raise the valve box. Pour high early strength cement concrete or hot mix asphalt collar, as required, to approximately 1½ inches below the top of the valve box.

### 3.8 CEMENT CONCRETE WALKS AND DRIVEWAYS

- A. Concrete shall be installed to a depth of 6” at pedestrian ramps, across driveways, at street intersection corners (5’ beyond the point of tangency on either side of the corner curve), and at other locations as directed by the Engineer. At all other locations, concrete shall be installed to a depth of 4”.
- B. Concrete shall be placed between April 1<sup>st</sup> (pending no upcoming snow storms) and November 1<sup>st</sup> only. Ambient temperature shall be 40 degrees of more.
- C. Forms shall be placed in accordance with Standard Specification Section 701.61A.
- D. Concrete placement shall be in accordance with the Standard Specifications Section 701.61B.
  - 1. The concrete shall be placed in alternating slabs 30 feet in length unless otherwise required by the Engineer.
  - 2. The slabs shall be separated by transverse performed expansion joint filler as specified below:
    - a. Expansion joints of 3/8” thick foam shall be placed every 30 feet perpendicular to curb alignment extending through the sidewalk depth. Expansion joints of 3/8” thick foam shall also be placed around all appurtenances such as utility poles, hydrants, manholes, and other obstructions extending into and to a depth to match the adjacent sidewalk (4” or 6”). Six-inch expansion joints shall be placed at all locations where six-inch concrete driveways meet four-inch concrete walks. Expansion material protruding above the finished sidewalk shall be trimmed flush with a sharp instrument as soon as the concrete has set.

- b. A 3/8" thick expansion joint shall be installed between all new cement concrete installations and existing cement concrete.
  3. The slabs shall be separated by the curb by longitudinal expansion joint filler as specified below:
    - a. Expansion joints of 1/4" thick foam shall be placed 4" or 6" deep longitudinally along the granite curb between curb and the concrete and also between buildings and retaining walls and the concrete as required by the Engineer. Six-inch expansion joints shall be placed at all locations where six-inch concrete corner slabs or driveways meet four inch concrete walks. Expansion material protruding above the finished sidewalk shall be trimmed flush with a sharp instrument as soon as the concrete has set.
  4. In conveying the concrete from the place of mixing to the place of deposit, the operation shall be conducted in such a manner that no mortar will be lost and the concrete shall so be handled that the concrete will be of uniform composition throughout, showing neither excess nor lack of mortar in any one place.
- D. Concrete finishing shall be in accordance with the Standard Specifications Section 701.61B.
  1. No finishing operation shall be performed while free water is present. Finishing operations shall be delayed until all bled water and water sheen has left the surface and concrete has started to stiffen.
  2. Between the expansion joints at 30 foot spacing, the sidewalk shall be divided at five foot intervals with score joints, made with creasing tools, having a penetration depth of minimum 1/2" and at 10 foot intervals with construction joints. Joints shall be placed 90° transverse with the direction of traffic and shall be straight within a tolerance of 1/4-inch of a straight edge laid along the joint. Longitudinal joints shall be installed, at the requirements of the Engineer when the sidewalk is greater than 6' wide.
  3. The surface shall be floated after completion of edging.
  4. Immediately after floating the surface shall be steel troweled. If necessary the joints and edges shall be rerun before and after

troweling to maintain uniformity.

5. After troweling the surface shall be brushed by drawing a soft-bristled pushbroom with a long handle over the surface of the concrete to produce a non-slip surface.
- E. Concrete shall be membrane-cured. The curing compound shall not discolor the concrete, shall be compatible with linseed oil application after 28 days, and shall be applied according to the manufacturer's specifications. The mixture shall be applied immediately after the finishing is complete and free water has left the concrete's surface. The Contractor shall provide the Engineer with the curing compound specification prior to its use.
- F. Penetrating Liquid Concrete Sealer: Prepare, apply, and finish penetrating liquid concrete sealer according to manufacturer's written instructions.
1. Remove curing compounds, sealers, oil, dirt, laitance, and other contaminants and complete surface repairs.
  2. Do not apply to concrete that is less than 14 days old.
- G. Forms shall be left in place for a period of 12-hours prior to removal. Upon removal, the Contractor shall backfill the void with either loam in accordance with Section 02210 – EARTH EXCAVATION, FILL, BACKFILL AND GRADING and seeded in accordance with Section 02900 – LANDSCAPING or match the existing material and grade as specified.
- H. After 28days, using pressure-spray equipment, the Contractor shall apply a mixture of boiled linseed oil to the new concrete pavement as an anti-spalling seal. The mixture shall consists of 50% double boiled linseed oil and 50% petroleum spirits, AASHTO M-233-79. Upon approval by the Engineer, the Contractor may use other products available on the market in accordance with manufacturer's recommendations (2 applications at right angles to each other are required for complete coverage). The sidewalk shall be swept and cleaned of any debris, gum, etc. and pressure washed, just prior to application of curing linseed oil compound.
- I. The Contractor shall fully protect all new concrete work for a minimum of forty-eight hours. A representative of the Contractor shall remain on site at least three hours after the last section of concrete is placed. In addition, the contractor shall fully protect the concrete with plastic sheeting or matting. Plastic sheeting shall be installed so that it cannot pull or blow



away under windy conditions and not damage installed concrete. Sidewalk vandalized or disturbed within three hours after the last section of concrete is placed shall be replaced by the Contractor at no additional cost to the Owner.

### 3.9 Private Property Concrete Pavers

- A. Install pavers in accordance with the manufacturer's instructions and as specified herein. Use edge restraints where the pavers do not butt up to a permanent structure or curb
- B. A 3/4" sand-asphalt setting bed shall be installed on the asphalt base. Wet saw is required for cutting of bricks and filling in pieces where needed. No other method will be acceptable.
- C. After all the pavers are in place, sand free of coarse aggregates shall be swept into the voids around the pavers.

## PART 4 – COMPENSATION

### **Item 2525.1 - Hot Mix Asphalt –Temporary Trench Patch**

#### METHOD OF MEASUREMENT:

Measurement for Payment for Hot Mix Asphalt - Temporary Trench Patch shall be based on the tons of base course placed complete, to a maximum width defined by the trench width payment limits shown on the Contract Drawings or as required by the Engineer and as measured by the Engineer. Tonnage of pavement placed will be verified through calculation based on the actual thickness and trench widths and lengths or the pavement thicknesses, widths, and lengths defined in the Contract, whichever is less. The formula for calculating the tonnage of pavement shall be  $W' \text{ (trench width)} \times L' \text{ (trench length)} \times D' \text{ (trench depth)} \times 0.075 \text{ ton/cf} = \text{tons}$ . Calculated tonnage will be compared to the actual tonnage placed as submitted on pavement tonnage slips. If the tonnage calculated is greater than 10% lower than the tonnage on the pavement slips, the lesser tonnage shall be paid to the Contractor. Placement of pavement to excess thicknesses and outside the limits defined in the Contract Documents shall be at no additional cost to the Owner.

#### BASIS OF PAYMENT:

Payment for Hot Mix Asphalt – Temporary Trench Patch shall be based on the unit price bid for this item in the proposal. Under the unit price for this item, the Contractor shall furnish all labor, materials, tools, equipment, and incidentals required to install hot mix asphalt base course within the limits of the trenches to depth and width indicated within the payment limits, complete, as shown in the Contract Documents or at the requirements of the Engineer. The work includes, but is not limited to the following; raising and resetting existing structures, castings and boxes; installation and compaction of hot mix asphalt base course to the depth and width and in the area specified; hand placement and compaction of hot mix

asphalt around structures, aprons, driveways and as required; power sweeping; keyways and other jointing between new and existing asphalt; furnish and place tack coat on all edges; and all incidental work not included for payment elsewhere.

**SPECIAL NOTES ON EXCLUSIONS:**

Items not included for payment herein include, but are not limited to; hot mix asphalt for permanent base course placed within trenches; hot mix asphalt for permanent top course; and pavement installed to replaced asphalt damaged by the Contractor.

**Item 2525.2 - Hot Mix Asphalt – Base Course (Permanent Trench Patch)**

**METHOD OF MEASUREMENT:**

Measurement for Payment for Hot mix asphalt Base Course – Trench Width shall be based on the tons of base course placed complete, to a maximum width defined by the payment limits shown on the Contract Drawings or as required by the Engineer and as measured by the Engineer. Tonnage of pavement placed will be verified through calculation based on the actual thickness and trench widths and lengths or the pavement thicknesses, widths, and lengths defined in the Contract, whichever is less. The formula for calculating the tonnage of pavement shall be  $W' \text{ (trench width)} \times L' \text{ (trench length)} \times D' \text{ (trench depth)} \times 0.075 \text{ ton/cf} = \text{tons}$ . Calculated tonnage will be compared to the actual tonnage placed as submitted on pavement tonnage slips. If the tonnage calculated is greater than 10% lower than the tonnage on the pavement slips, the lesser tonnage shall be paid to the Contractor. Placement of pavement to excess thicknesses and outside the limits defined in the Contract Documents shall be at no additional cost to the Owner.

**BASIS OF PAYMENT:**

Payment for Hot mix asphalt Base Course – Trench Width shall be based on the unit price bid for this item in the proposal. Under the unit price for this item, the Contractor shall furnish all labor, materials, tools, equipment, and incidentals required to install hot mix asphalt base course and top course within the limits of the trenches to depth and width indicated within the payment limits, complete, as shown in the Contract Documents or at the requirements of the Engineer. The work includes, but is not limited to the following; raising and resetting existing structures, castings and boxes; installation and compaction of hot mix asphalt base course and top course to the depth and width and in the area specified; milling of base course material after the settlement period; hand placement and compaction of hot mix asphalt around structures, aprons, driveways and as required; power sweeping; keyways and other jointing between new and existing asphalt; furnish and place tack coat on all edges; and all incidental work not included for payment elsewhere.

**SPECIAL NOTES ON EXCLUSIONS:**

Items not included for payment herein include, but are not limited to: pavement installed to replace asphalt damaged by the Contractor.

**Item 2525.3 - Hot Mix Asphalt – Top Course**

**METHOD OF MEASUREMENT:**

Measurement for Payment for Hot mix asphalt Top Course shall be based on the tons of top course placed complete, to a maximum width defined by the payment limits shown on the Contract Drawings or as required by the Engineer and as measured by the Engineer. Tonnage of pavement placed will be verified through calculation based on the actual thickness and trench widths and lengths or the pavement thicknesses, widths, and lengths defined in the Contract, whichever is less. The formula for calculating the tonnage of pavement shall be  $W' \text{ (trench width)} \times L' \text{ (trench length)} \times D' \text{ (trench depth)} \times 0.075 \text{ ton/cf} = \text{tons}$ . Calculated tonnage will be compared to the actual tonnage placed as submitted on pavement tonnage slips. If the tonnage calculated is greater than 10% lower than the tonnage on the pavement slips, the lesser tonnage shall be paid to the Contractor. Placement of pavement to excess thicknesses and outside the limits defined in the Contract Documents shall be at no additional cost to the Owner.

**BASIS OF PAYMENT:**

Payment for Hot mix asphalt Top Course shall be based on the unit price bid for this item in the proposal. Under the unit price for this item, the Contractor shall furnish all labor, materials, tools, equipment, and incidentals required to install hot mix asphalt top course within the limits of the trenches and overlay to depth and width indicated within the payment limits, complete, as shown in the Contract Documents or at the requirements of the Engineer. The work includes, but is not limited to the following; raising and resetting existing structures, castings and boxes; installation and compaction of hot mix asphalt base course and top course to the depth and width and in the area specified; milling of base course material after the settlement period; hand placement and compaction of hot mix asphalt around structures, aprons, driveways and as required; power sweeping; keyways and other jointing between new and existing asphalt; furnish and place tack coat on all edges; and all incidental work not included for payment elsewhere.

**SPECIAL NOTES ON EXCLUSIONS:**

Items not included for payment herein include, but are not limited to: pavement installed to replace asphalt damaged by the Contractor.

**Item 2525.4 – Surface Restoration for Clifton St.**

**METHOD OF MEASUREMENT:**

Measurement for Surface Restoration for Clifton St. shall be based on a percent of the Lump Sum bid based on the percentage of the work completed as determined or approved by the engineer for Surface Restoration for Clifton St. completed, within the payment limits, as shown on the Contract Drawings or as required by the Engineer.

**BASIS OF PAYMENT / INCLUSIONS:**

Payment for Surface Restoration for Clifton St. shall be based on the Lump Sum of Surface Restoration for Clifton St. completed for this item in the proposal. Under the Lump Sum price for this item, the Contractor shall furnish all labor, materials, tools, equipment, and incidentals required for the Surface Restoration for Clifton St. as detailed

and where indicated or required by the Owner or Engineer. The work includes, but is not limited to; the furnishing of all labor, equipment, appliances and materials, and in performing all operations in connection with restoration and reconstruction of site features at the Clifton St. and Somerville Community Path intersection to their original condition and location including landscape restoration: loam and seed of the impacted areas to match existing, storing and resetting existing site features, paving the Clifton St. ramp, trench restoration for 2” Drain service, ADA compliant handrails along the Clifton St. ramp, and brick patio and stone staircase restoration.

**SPECIAL NOTES ON INCLUSIONS/EXCLUSIONS:**

The following items are not included for payment under this item; preconstruction survey, sidewalks, walkways, Private Property selective demolition and restoration of 32 Clifton St., 71, 73, 89, 91 ,93, 95, 97 Winslow Avenue and all other areas within 32 Clifton Street property limits installed to replace areas damaged by the Contractor during construction. This item includes restoration related to the City’s 24” Storm Drain rehabilitation.

END OF SECTION 02525

SECTION 02604

CATCH BASINS

**2604.1 CATCH BASIN - TYPE 1 SINGLE GRATE EACH**  
**(4-FOOT DIAMETER)**

PART I – GENERAL

1.1 WORK INCLUDED

- A. The work covered under this Section includes the furnishing of all plant, labor, equipment, appliances and materials, and performing all operations in connection with installing catch basins, frames and grates, and hoods at the locations and to the details indicated and/or directed, including pre-cast concrete sections, bases, and tops; brick, grout, and mortar; catch basin hoods; and frame and grate; as well as repairing sidewalks, pavement and curbs affected by catch basin installation.
  
- C. The Contractor shall not proceed with furnishing and installing catch basins, frames and grates, and hoods until the heavy cleaning and internal inspection of the exist. 8” VC drain is complete, and CCTV inspection is submitted to the Engineer for review and approval of the catch basin Work. The Owner/Engineer reserves the right to remove catch basin item after review of the post-heavy cleaning CCTV inspection.

1.2 SUBMITTALS

- A. The Contractor shall furnish complete shop drawings for all pre-cast sections, cast iron frames, grates and other appurtenances in accordance with Section 01300 – SUBMITTALS
- B. Shop drawings and manufacturers data showing dimensions, reinforcing, and materials for all items furnished under this section.

PART 2 – PRODUCTS

2.1 CATCH BASINS

- A. Catch basins shall be constructed as detailed. Single grate catch basins shall be a minimum of 4 feet inside diameter dimensions. Catch basins shall be

designed for a minimum of H-20 loading. Catch basins shall have a minimum of 4 ft sump depth, unless otherwise noted and shall conform to ASTM C478-72.

- B. Pre-cast concrete catch basins, infiltration basins, and sump manholes shall further conform to the applicable requirements of Section 02252 – MANHOLES and applicable details.
- C. Mortar where required shall conform to Section 02590 – BRICK MASONRY.

## 2.2 FRAMES

- A. Single Catch Basin Frames shall be as manufactured by East Jordan Iron Works (formerly E. L. LeBaron Foundry Co.), model 5525Z, or equivalent.

## 2.3 GRATES

- A. Single Catch Basin Grates shall be cascade type, as manufactured by East Jordan Iron Works (formerly E. L. LeBaron Foundry Co.), model 5520M8, or equivalent unless otherwise shown on the Drawings.

## 2.4 HOODS

- A. Catch Basin Hoods shall be as manufactured by East Jordan Iron Works (formerly E. L. LeBaron Foundry Co.), model 5954 for Type 1 Catch Basins, or equivalent.

## PART 3- EXECUTION

### 3.1 SETTING PRECAST CONCRETE CATCH BASIN SECTIONS

- A. Catch basins shall be constructed with a pre-cast concrete base placed on a firm compacted  $\frac{3}{4}$ -in crushed stone sub-base as specified and as detailed on the Drawings. Catch basins shall be installed level, plumb and in accordance with the provisions of Section 02252 - MANHOLES.
- B. Catch basins shall be installed with specified joint sealant as specified in Section 02252 - MANHOLES.
- C. Care shall be taken to assure that the openings are made to permit setting of the entering pipe at its correct elevation as indicated or required and also to accommodate the correct outside diameter of the pipe.
- D. All holes in sections used for handling shall be thoroughly plugged with

non-shrink grout.

- E. Cutting or tampering of catch basin and/or infiltration basin structures in the field, for the purpose of creating new openings or modifying existing openings, will not be permitted.

### 3.2 LAYING BRICKWORK

- A. Only clean bricks shall be used in brickwork for catch basins and infiltration basins. The brick shall be moistened by suitable means, as directed, until they are neither so dry as to absorb water from the mortar nor so wet as to be slippery when laid.

### 3.3 SETTING CATCH BASIN FRAMES AND GRATES

- A. Catch Basin frames shall be set with tops conforming accurately to the grade of the pavement or finished ground surface or as indicated on the Drawings. Frames shall be set concentric with the top of the manhole and in a full bed of mortar so that the space between the top of the brick and mortar and the bottom flange of the frame shall be completely filled and made watertight. A thick ring of mortar extending to the outer edge of the concrete shall be placed all around the bottom flange. The mortar shall be smoothly finished to a height of 4-inches above the flange.

### 3.4 INSTALLING HOODS

- A. Hoods shall be built into the catch basin wall, shall be watertight, and shall be installed in conformance with the manufacturer's instructions.

### 3.5 CLEANING

- A. All excess material including dirt, loose concrete, bricks, grit, stones and any other material, shall be removed from all manholes prior to final review by the Engineer. A final cleaning shall be performed, to include complete removal of all accumulated debris and fluids from each catch basin, upon complete project completion.

## PART 4 - COMPENSATION

### **Item 2604.1 --- Catch Basin - Single Grate (4-Foot Diameter)**

Bike Path Drainage Upgrades

Willow Ave. to Grove St.

Somerville, MA

20163393.002A

CATCH BASINS

02604-3

**BASIS OF PAYMENT / INCLUSIONS:**

Catch Basin - Single Grate (4-Foot Diameter) shall be based on the unit price bid for this item in the proposal. Under the Unit Price for this item, the Contractor shall furnish all labor, materials, tools, equipment, and incidentals required for the complete installation of Catch Basin - Single Grate (4-Foot Diameter) as shown and indicated in the Contract Documents, at the requirements of the Engineer and as specified. The work includes but is not limited to; saw cutting bituminous and cement concrete; excavation; construction dewatering; furnish and install pre-cast sections and structures; furnish and install temporary support of excavation; for vertical wood sheeting or soldier piles and lagging, cut off 5-ft below grade and leave in place where required or directed; furnish, install and compact bedding; furnish and install backfill per one of the approved methods; furnish, install and compact gravel road sub-base; compaction and compaction testing; frames and grates; hoods; dampproofing; testing; grouting; gaskets; pipe connections, including flexible sleeves; and all other work required for the installation of Catch Basin - Single Grate (4-Foot Diameter), not included for payment elsewhere.

**METHOD OF MEASUREMENT:**

Payment for Catch Basins - Single Grate (4-Foot Diameter) shall be based on the Unit Price bid in the proposal. Measurement for payment shall be based on the actual number of complete and functional manholes as shown on the Contract Drawings or as directed by the Owner or Engineer.

Catch Basins installed but not successfully tested and accepted shall be paid for at a maximum of 95 percent of the unit prices bid under this item. The remaining 5 percent shall be paid upon receipt of successful test results by the Engineer. All reductions in payment due to unsuccessful testing shall be made prior to normal retainage.

**SPECIAL NOTES/EXCLUSIONS:**

Installation of sediment filter devices and the removal and disposal of existing infiltration basins shall not be paid for under this Bid Price Item and are paid for elsewhere.

END SECTION 02604



## SECTION 02612

### VALVES AND APPURTENANCES

#### PART 1 – GENERAL

##### 1.1 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.

##### 1.2 SUMMARY

- A. Contractor shall provide check valve to be installed into proposed drain manhole at Newberne St. The Contractor shall not proceed with furnishing and installing check valve until heavy cleaning and internal inspection of the exist. 8" VC drain is complete, and CCTV inspection is submitted to the Engineer for review and approval of the check valve Work. The Owner/Engineer reserves the right to remove check valve after review of the post-heavy cleaning CCTV inspection.
- B. Provide valves and miscellaneous piping appurtenances as indicated and specified. Check Valve shall be paid under bid item 02622.2. Refer to measurement and payment in Section 02622 Part 4.
  - 1. Sizes and capacities as indicated or specified.
- C. Related Sections: The following sections contain requirements that relate to this Section:
  - 1. Section 02210 – Earth Excavation, Backfill, Fill and Grading
  - 2. Section 02252 – Manholes
  - 3. Section 02622– Polyvinyl Chloride Pipe

##### 1.3 SUBMITTALS

- A. Shop Drawings: Submit the following in accordance with Section 01300 – Submittal Procedures:
  - 1. Submit manufacturer's specifications, catalog data, descriptive matter, illustrations, certified shop drawings, wiring, diagrams, etc.
  - 2. Operating and maintenance instructions and parts lists.

3. Submit certified copy of test results, for each check valve, hydrostatically tested in both directions at factory, for review.

#### 1.4 QUALITY Control

- A. Provide in accordance with Section 01400 and as specified.
- B. Suitable-type enclosures for specified atmospheres.
- C. Manufacturer shall have conducted independent hydraulic testing to determine headloss, jet velocity and vertical opening height characteristics on a minimum of three (3) sizes of check valves ranging from 6" through 24". The testing must have been conducted for free discharge (pressurized and open channel flow discharging to atmosphere) and submerged conditions.

#### 1.5 DELIVERY, STORAGE AND HANDLING

- A. Provide in accordance with Section 01600.

### PART 2 – PRODUCTS

#### 2.1 ELASTOMERIC CHECK VALVES

- A. Check Valves are to be all rubber and the flow operated check type with an integral flanged end connection. The port area shall contour down to a duckbill which shall allow passage of flow in one direction while preventing reverse flow. The flange and flexible duckbill sleeve shall be one-piece rubber construction with nylon reinforcement. The duckbill shall be offset so that the bottom line of the valve is flat, keeping the invert of the pipe parallel with the invert of the valve. The top of the valve shall rise to form the duckbill shape. The bill portion shall be thinner and more flexible than the valve body and formed into a curve of 180°.
- B. The flange drilling shall conform to ANSI B16.1 Class 125/ANSI B16.5, Class 150 standards. The valve shall be furnished with galvanized or stainless steel back-up rings for installation.
- C. Manufacturer must have available flow test data from an accredited hydraulics laboratory to confirm pressure drop data. Company name, plant location, valve size and serial number shall be bonded to the check valve.
- D. Valves with flared bottom and straight bill will not be acceptable.
- E. Function: When line pressure inside the valve exceeds the backpressure outside the valve, the line pressure forces the bill of the valve open, allowing flow to pass. When backpressure exceeds the line pressure, the bill of the valve is forced closed preventing backflow.

- F. All valves shall be manufactured in the U.S.A. All valves shall be of the Series 35-1 as manufactured by Tideflex Technologies, Carnegie, PA 15106, DBF series as manufactured by Cla-Val, or approved equal.

### PART 3 – EXECUTION

#### 3.1 GENERAL

- A. Prior to installation, protect stored valves and appurtenances from damage due to exposure to sunlight, heat, dirt, debris, freezing and thawing, vandalism, etc.
- B. Clean all debris, dirt, gravel, etc, from inside of piping before placing valves in place.
- C. Erect and support valves in respective positions free from distortion and strain on appurtenances during handling and installation. Inspect material for defects in workmanship and material. Clean out debris and foreign material from valve openings and seats, test operating mechanisms to check proper functioning, and check nuts and bolts for tightness. Repair, valves and other equipment which do not operate easily or are otherwise defective.
- D. Set plumb and support valves adequately in conformance with instructions of manufacturer. Shim valves mounted on face of concrete vertically and grout in place. Install valves in control piping for easy access.

#### 3.2 FLAP VALVE

- A. Valve shall be installed in accordance with manufacturer's written Installation and Operation Manual and approved submittals.

#### 3.3 CONTRACT CLOSEOUT

- A. Provide in accordance with Section 01701.

### PART 4 – COMPENSATION (NOT USED)

END OF SECTION 02612

[THIS PAGE INTENTIONALLY LEFT BLANK]

SECTION 02622

POLYVINYL CHLORIDE PIPE

<b>2622.1</b>	<b>24" PVC STORM DRAIN</b>	<b>LINEAR FOOT</b>
<b>2622.2</b>	<b>8" PVC STORM DRAIN</b>	<b>LINEAR FOOT</b>

PART 1 – GENERAL

1.1 DESCRIPTION

- A. This Section includes the following:
  - 1. Furnishing, installing, and testing of PVC pipe, 8" Check Valve for Newberne St. manhole, and fittings complete and in place, within the limits and to the lines and grades indicated.
- B. Contractor shall provide 8" PVC Storm Drain, bid item 2622.2, to be installed within Newberne St. The Contractor shall not proceed with furnishing and installing 8" PVC Storm Drain until heavy cleaning and internal inspection of the exist. 8" VC drain is complete, and CCTV inspection is submitted to the Engineer for review and approval of the 8" PVC Storm Drain Work. The Owner/Engineer reserves the right to remove the 8" PVC Storm Drain bid item, 2622.2 after review of the post-heavy cleaning CCTV inspection.

1.2 RELATED TECHNICAL SECTIONS

- A. Section 02210 – EARTH EXCAVATION, BACKFILL, FILL AND GRADING
- B. Section 02252 – MANHOLES
- C. Section 02604 - CATCH BASINS
- D. Section 02612 – VALVES & APPURETENANCES

1.3 SUBMITTALS

- A. Submit the following in accordance with Section 01300 – SUBMITTALS:
  - 1. Shop drawings of pipe and fittings,
  - 2. Product data and certified dimensional drawings of all pipe, joints, bends, special fittings, and appurtenances.
  - 3. Gasket and pipe manufacturer's joint assembly directions,

4. Certified affidavit of compliance for all pipe and other products or materials furnished under this Section of the Specifications, as specified in the referenced standards,
5. For informational purposes only, submit manufacturer's printed installation instructions.
6. Certification with each delivery, that pipe complies with this specification,
7. Anticipated production and delivery schedule.
8. Results of leakage tests performed prior to final paving.
  - a. Test results shall be logs maintained during Infiltration or Exfiltration Tests, or footage and logs of Close Circuit Television Inspection.

#### 1.4 QUALITY CONTROL

- A. Provide in accordance with Section 01400 – QUALITY CONTROL and as specified.
- B. Owner reserves right to inspect and test by independent services at manufacturer's plant or elsewhere at his own expense.

#### 1.5 DELIVERY, STORAGE AND HANDLING

- A. Provide in accordance with Section 01600 – PRODUCTS, MATERIALS, AND EQUIPMENT.

### PART 2 – PRODUCTS

#### 2.1 MATERIALS

- A. General
  1. All PVC pipe shall be continuously and permanently marked with the manufacturer's name, pipe size, and pressure rating or stiffness in psi (kpa).
  2. The Contractor shall also require the manufacturer to mark the date of extrusion on the pipe. This dating shall be done in conjunction with records to be held by the manufacturer for 2 years, covering quality control tests, raw material batch number, and other information deemed necessary by the manufacturer.
- B. Pipe

1. All PVC pipe shall be joined by compression joints unless otherwise shown or specified, and shall conform to the following requirements:
2. Non Perforated Polyvinyl chloride pipe (PVC) shall conform to the requirements of ASTM D 3034, Class SDR 35. Material for PVC pipe shall conform to the requirements of ASTM D 1784 for Class 12454-B or 12454-C as defined therein. All diameters shall be as specified on the Contract Drawings.
3. Elastomeric seals for compression type joints for PVC pipe and fittings shall conform to the requirements of ASTM D 3212.

C. Fittings

1. All fittings shall conform to the requirements of ASTM D 3034 or ASTM F 679. The ring groove and gasket ring shall be compatible with PVC pipe ends. Flanged fittings shall be compatible with cast-iron or ductile iron pipe fittings.
2. The strength class of the fittings shall be not less than the strength class of any adjoining pipe.
3. PVC pipe fittings shall be full-bodied, either injection molded or factory fabricated. Saddle-type tee or wye fittings are acceptable in accordance with Figure 02622 A. Inserta-tees may be used only where approved by the Engineer and if allowed, shall be cast in 6-inches of concrete.

D. Shielded Flexible Couplings

1. General
  - a. Shielded flexible couplings shall be used to connect to drain pipe. Typical applications are where new pipe connects to existing pipe or a pipe with dissimilar material or size.
  - b. Couplings and shields shall be sized to fit the outer diameter of pipe, and be rated for the pipe material and conditions of service by the manufacturer.
  - c. Eccentric couplings shall be used where connecting pipes of different nominal diameter.
  - d. The CONTRACTOR will not be allowed to substitute any other type of coupling unless approved by the ENGINEER.

2. Construction

- a. Flexible couplings shall be in accordance with ASTM C1173 – Standard Specification for Flexible Transition Couplings for Underground Piping Systems.
- b. Rubber sleeves shall be rated for heavy earth loads and be immune to attack by chemicals and impurities normally found in water or wastewater.
- c. Shields shall consist of a rigid stainless steel shear ring.
- d. Bolts, nuts, straps, and all miscellaneous hardware shall be Type 316 stainless steel.

3. Manufacturer

- a. Shielded flexible couplings shall be Fernco (5000 Repair series), Mission Rubber (Flex-Seal Repair series), Indiana Seal (Heavy Duty Repair series) or approved equal.

E. Service Connections

- 1. Storm Drain services shall be connected to new, parallel, replacement or existing sanitary sewer or storm drain lines with full bodied tees, wye fittings, or saddle-type tees in accordance with the following:
  - a. For 6-inch dia. services to storm drain mainlines a saddle type (Romac Style CB or equal) or full bodied fitting with solid transition coupling shall be used;
  - b. For 8-inch dia. services to existing 12-inch dia or less storm drain mainlines a full bodied fitting with solid transition coupling shall be used;
  - c. For 8-inch dia. services to new 15-inch dia or less storm drain mainlines a full bodied fitting with solid transition coupling shall be used;
  - d. For 10-inch dia. services consult with engineer; and
  - e. Otherwise reference Figure 02622 A.



**Figure 02622 A**

Service Connection On New Mainline Pipes  
**Dia. of Mainline Pipe**

Service Dia.	8"	10"	12"	15"	18"	21"	24"
New Sanitary Sewer							
6"*	FB/S	FB/S	FB/S	FB/S	FB/S	FB/S	FB/S
8"	FB	FB	FB	FB	FB/S	FB/S	FB/S
10"	C	C	C	C	C	C	C
New Storm Drain							
6"*	FB/S	FB/S	FB/S	FB/S	S	S	S
8-10"	C	FB / C	FB / C	FB / C	FB / C	FB / C	FB / C
12"	C	C	FB / C	FB / C	FB / C	FB / C	FB / C

**Note:** In every situation a full body fitting is acceptable

\* Minimum allowable service diameter

C: consult engineer

FB: full bodied fitting required

S: saddle

F. Bedding Materials

1. Unless otherwise specified or shown, all material used for pipe bedding shall conform to the requirements in Section 02210 – EARTH EXCAVATION, BACKFILL, FILL AND GRADING.

G. Gaskets

1. Gaskets shall be flexible elastomeric rings conforming to ASTM F 477.

PART 3 – EXECUTION

3.1 PIPE AND PIPE FITTINGS

- 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. 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.

### 3.2 INSTALLATION

- A. Install PVC pipe and fittings in accordance with manufacturer's printed instructions.
- B. No pipe or fitting shall be permanently supported on saddles, blocking, or stones. Bedding material shall be as specified in Section 02210 – EARTH EXCAVATION, BACKFILL, FILL AND GRADING.
- 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 the drawings.
- D. 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 and 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.
- E. Contractor shall verify line and grade of sewers using a laser level, or other means of equivalent accuracy during installation and before proceeding to the next section.
- F. All joint surfaces shall be cleaned. Immediately before jointing the pipe, the bell or groove shall be checked to see that the rubber ring is properly seated. Apply lubricant to the spigot end only, paying particular attention to the bevel, 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. Joints shall not be "pulled" or "cramped" unless permitted by the Engineer. The resulting joints shall be watertight and flexible.

- G. 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.
- H. Allowable Pipe Deflection
1. 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.
  2. At the discretion of the Engineer and Owner, a minimum of 90 days after 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. Deflection shall be measured before final paving.
  3. Should the installed pipe fail to meet this requirement, the Contractor shall do all work to correct the problem without additional compensation.
- I. Open ends of pipe and branches shall be closed with polyvinyl chloride stoppers secured in place in an acceptable manner.
- J. After each pipe has been properly bedded, enough bedding material 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 bedding material and compacted, and additional material shall be placed and compacted to complete the pipe bedding.
- K. The Contractor shall take all necessary precautions to prevent flotation of the pipe in the trench. 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.
1. 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. Pipelines shall not be used as conductors for trench drainage during construction.
- L. For installation near crossing utilities and encasement requirements, refer to Contract Drawings.
- M. For lateral service connections and encasement requirements, refer to Contract Drawings.

N. Cleaning

1. 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.

O. Shielded Flexible Couplings

1. Where couplings are used, plain ends of pipe shall be made smooth and round for a distance of 12 inches from the ends of the pipe, with an outside diameter not more than 1/64 inch smaller than the manufactured outside diameter of pipe. Install couplings per manufacturer's written instructions.
2. Spare parts - Contractor shall maintain an on-site inventory of couplings suitable for use with the various nominal diameters and materials of proposed and existing pipe referenced in the contract documents. Contractor shall be responsible to verify the outer diameter of pipe in advance through measurements taken at access manholes and test pits. The lead times for fabrication, stocking and shipping of couplings shall not be cause for delay or the use of other types of couplings.

3.3. LEAKAGE TESTS

- A. Storm drains shall be made as nearly watertight as practicable. Where practical, as determined by the Owner, leakage tests will be performed for the new sewers.
- B. Testing of sewers will be limited, as determined by the Owner, to physical inspection of the pipe sections by closed circuit television inspection. Any defective pipe, joints, or other construction shall be replaced or repaired by the Contractor at no additional expense to the Owner.
- B. The contractor shall perform CCTV inspection of the sewer at no additional cost to the Owner. The Engineer must be able to witness the tests and must be provided with a video recording of each test for further inspection.

PART 4 – COMPENSATION

**Item 2622.1 – 24” PVC STORM DRAIN**

**BASIS OF PAYMENT/INCLUSIONS:**

Under the Unit Price bid for item 2622.1, the Contractor shall furnish all labor, materials, tools, equipment, and incidentals required for the complete procurement, installation, cleaning, and leakage testing/inspection of 24” PVC Storm Drain complete as indicated on the Drawings and Specifications, or as directed by the Owner or Engineer. This work shall

include furnishing, installing, and/or performing the following: pavement or sidewalk sawcutting; removal of brick, concrete, or bituminous sidewalk; excavation of bituminous concrete roadway; excavation; transporting material to/from soil staging area; temporary excavation support consisting of timber or steel sheeting, left in place and cut off below grade where required by the Contract Specifications; removal of groundwater from the trench; handling groundwater recharged back to the soil, a settling tank, hose connections, hoses and other dewatering apparatus as required for staging and reinfiltration of groundwater; filter fabric as required; bedding, including compaction; drain pipe, fittings, couplings, and appurtenances; connecting existing laterals; connections to structures; cleanout assemblies (if required); placing and compacting suitable backfill soil; grade and compact gravel pavement sub-base; compaction testing; and all appurtenances and incidental work.

**METHOD OF MEASUREMENT:**

Payment for 24" PVC Storm Drain shall be based on the Unit Price bid in the proposal.

Measurement for payment of item 2622.1 shall be based on the actual linear feet of complete and functional pipe as shown on the Contract Drawings or as directed by the Owner or Engineer. Measurement shall be taken along the centerline of the pipe from the inside face of structures to inside face of structures, or to the points of connection with existing pipes.

Pipe installed but not successfully tested and accepted shall be paid for at a maximum of 95 percent of the unit prices bid under this item. The remaining 5 percent shall be paid upon receipt of successful test results by the Engineer. All reductions in payment due to unsuccessful testing shall be made prior to normal retainage.

**SPECIAL NOTES ON EXCLUSIONS:**

The following item(s) are not included for payment under this item: disposal of bituminous concrete and construction debris; treatment of groundwater discharged required by an MWRA Dewatering Permit; procurement, installation, and compaction of CDF.

**Item 2622.2 – 8" PVC STORM DRAIN**

**BASIS OF PAYMENT/INCLUSIONS:**

Under the Unit Price bid for item 2622.2, the Contractor shall furnish all labor, materials, tools, equipment, and incidentals required for the complete procurement, installation, cleaning, and leakage testing/inspection of 8" PVC storm drain pipe complete as indicated on the Drawings and Specifications, or as directed by the Owner or Engineer. This work shall include furnishing, installing, and/or performing the following: pavement or sidewalk sawcutting; removal of brick, concrete, or bituminous sidewalk; excavation of bituminous concrete roadway; excavation; transporting material to/from soil staging area; temporary excavation support consisting of timber or steel sheeting, left in place and cut off below grade where required by the Contract Specifications; removal of groundwater from the trench; handling groundwater recharged back to the soil, a settling tank, hose connections, hoses and other dewatering apparatus as required for staging and reinfiltration of groundwater; filter fabric as required; bedding, including compaction; drain pipe, 8" check valve, fittings, couplings, and appurtenances; connecting existing laterals; connections to structures; cleanout assemblies (if required); placing and compacting suitable backfill soil; grade and compact gravel pavement sub-base; compaction testing; and all appurtenances and incidental work.

**METHOD OF MEASUREMENT:**

Payment for 8" PVC Storm Drain shall be based on the Unit Price bid in the proposal.

Measurement for payment of item 2622.2 shall be based on the actual linear feet of complete and functional pipe as shown on the Contract Drawings or as directed by the Owner or Engineer. Measurement shall be taken along the centerline of the pipe from the inside face of structures to inside face of structures, or to the points of connection with existing pipes.

Pipe installed but not successfully tested and accepted shall be paid for at a maximum of 95 percent of the unit prices bid under this item. The remaining 5 percent shall be paid upon receipt of successful test results by the Engineer. All reductions in payment due to unsuccessful testing shall be made prior to normal retainage.

**SPECIAL NOTES ON EXCLUSIONS:**

The following item(s) are not included for payment under this item: disposal of bituminous concrete and construction debris; treatment of groundwater discharged required by an MWRA Dewatering Permit; procurement, installation, and compaction of CDF.

END OF SECTION 02622

SECTION 02760

PIPELINE CLEANING AND INTERNAL INSPECTION

**2760.1 HEAVY CLEANING AND CLOSED CIRCUIT TELEVISION INSPECTION OF 8" STORM DRAIN LUMP SUM**

PART 1 – GENERAL

1.1 DESCRIPTION

A. This Section includes the following:

1. Furnishing, and performing gravity-flow infrastructure cleaning and inspection work for pipe diameters ranges of 6-in to 24-in in accordance with these Specifications.
2. Work shall include cleaning and videotaping of existing, reconstructed, rehabilitated, or new sewers and drains, as well as flow handling and/or bypass pumping of existing flows as needed to perform the cleaning and inspection.
3. Requirements for the testing of removed sediment and its proper disposal.

1.2 RELATED TECHNICAL SECTIONS

- A. Section 01500 – TEMPORARY FACILITIES AND CONTROLS
- B. Section 02080 – SOIL AND WASTE MANAGEMENT
- C. Section 02095 – TRANSPORTATION AND DISPOSAL OF SOIL AND FILL.
- D. Section 02761 – FLOW BYPASS

1.3 SUBMITTALS

A. Submit the following in accordance with Section 01300 – SUBMITTALS:

1. Sewer and Storm Drain Cleaning Plan at least two weeks prior to the start of any cleaning, in which shall include:
  - a. Proposed method of pipe cleaning and dewatering including the equipment to be used and OSHA-compliant confined space entry procedures.
  - b. Proposed method of managing wastewater, erosion controls, solid waste management, and which, if any, additional permits are required,

- c. A list of lawful disposal sites proposed for dumping debris from cleaning operations.
- 2. Work Plan including: hours of operation, location of proposed access manholes, sequencing of work description, number of shifts, number of crews, and expected time to complete the work.
- 3. Vehicular and Pedestrian Management Plan including: access, avoiding damage to existing trees, preventing leakage from hoses, and minimizing noise from pumps.
- 4. Internal Inspection Report including:
  - a. Pre-rehabilitation or pre-cleaning internal inspection logs and video (if required),
  - b. Post-construction, post-rehabilitation, or post-cleaning internal inspections logs and video,
  - c. Summary highlighting results of the investigations. All documentation shall be cross-referenced by footage meter device to enable the reviewer to identify a particular location being viewed.
    - 1. These records shall be in printed form showing: the Owner's name; type of project; Contractor's name; date; manhole location; depth to invert; section cleaned and televised; the number of lateral connections to the section televised; type (e.g. sanitary sewer, combined sewer, or storm drain); street address and type of all laterals connected to storm drain; diameter of pipe; length of section; exact location(s) of pipeline defects; type of equipment used; and any special remarks concerning the conditions of the pipe line, manholes, and separation plates.
- 5. A sample DVD showing the quality of work obtained by the proposed assembly prior to internal inspection work. The quality of work shall be acceptable to the Engineer.

#### 1.4 QUALITY CONTROL

- A. Provide in accordance with Section 01400 – QUALITY CONTROL and as specified.
- B. The cleaning and inspection of the infrastructure may require manned entry in the sewer or drain to place or remove equipment, or to facilitate manual cleaning of the pipeline. All confined space entry procedures must be in compliance with OSHA regulations.

#### PART 2 – MATERIALS (Not Used)

Bike Path Drainage Upgrades  
 Willow Ave. to Grove St.  
 Somerville, MA  
 20163393.002A

PIPELINE CLEANING  
 AND INTERNAL INSPECTION  
 02760-2



## PART 3 – EXECUTION

### 3.1 PIPE CLEANING

- A. The purpose for cleaning of the sewer or drain is to facilitate the inspection and/or rehabilitation of the sewer or drain, or to increase pipe capacity.
- B. It is the intent of this Contract that sewers or drains be cleaned by either hydroflushing with jetting and vacuum truck, or manual scouring using pressure washing and vacuum truck.
  - 1. Hydraulic equipment shall consist of high velocity type equipment, capable of jetting up to 2,000 psi and 125 gpm of water. No hydraulic equipment that operates under a “head of water” or that would cause excessive internal pressure shall be permitted without written approval of the Engineer.
- C. The sewer or drain shall be cleaned using mechanical, hydraulically-propelled, and/or high-velocity pipe cleaning equipment, which does not exert internal pressures great enough to damage sewer or drain pipe and manholes. Selection of the cleaning equipment shall be based on the condition of the sewer or drain at the time work commences based on the Pre-rehabilitation/cleaning inspection. The equipment and methods selected shall be reviewed by the Owner.
- D. Satisfactory precautions shall be taken to protect the sewer or drain from damage that could be inflicted by improper use of cleaning equipment. Any damage inflicted upon the sewer or drain due to improper use of cleaning equipment, regardless of the technique used, shall be repaired by the Contractor to the satisfaction of the Owner, at no additional cost to the Owner.
  - 1. If areas of misalignment of pipe, dropped joints, infiltration, structural failures, or other obstructions are suspected during cleaning operations, and confirmed during exploratory televising, the Contractor shall record the approximate location of the defective area and notify the Owner.
- E. All sludge, dirt, sand, rocks, grease, and other solid or semi-solid materials that may cause an obstruction in the sewer or drain or impair the inspection or rehabilitation of the sewer or drain shall be removed from the sewer or drain and site during cleaning operations (at least once each work day) in suitable watertight containers, and disposed of in a manner acceptable to the Engineer and in strict conformance with all applicable federal, state, and local laws and regulations, at no additional cost to the Owner. It shall be the responsibility of the Contractor to secure a legal dump site for the disposal of the material.
  - 1. The Contractor shall collect all data required by all permits or their issued conditions. It shall consist of periodic sampling and analysis of system effluents and discharge quantities.

- G. Clean-up operations shall include all removal of debris out of manholes and off the ground around manholes and access pits. The Contractor shall not be allowed to accumulate debris and cleaning discharge materials on the project site unless stored in totally enclosed watertight containers approved by the Engineer.
- H. Acceptance of the sewer or drain cleaning shall be made upon the successful completion of the television inspection and shall be to the satisfaction of the Engineer. For the purposes of these specifications cleaning shall be considered complete when eighty-five percent (85%) of the interior pipe surface area is visible during internal inspection in flow or limited flow conditions. Bypass pumping may be required to measure compliance with this standard. If the television inspection indicates that the cleaning has not been completed in accordance with these Specifications, the Contractor shall be required to re-clean and re-inspect the sewer or drain line until the cleaning is shown to be satisfactory, at no additional cost to the Owner. The Engineer may require the Contractor to pull a double squeegee (with each squeegee the same diameter as the sewer or drain) through each manhole section as evidence of adequate cleaning. Particular attention should be given to the adequacy of the cleaning to provide for the proper installation of the lining system.
- I. The Contractor shall be responsible for locating and uncovering all known buried manholes required to complete the work at no additional cost to the Owner.
- J. Maintain flow around the work in a manner that will not cause excessive surcharging of sewers or drains, and that will protect the public and private property from damage and flooding. Bypass pumping may be required to comply with this task. Refer to Section 01010 – SUMMARY OF WORK for the anticipated flow through the system.
- K. No debris, equipment, tools, or other foreign matter shall be left in the sewers, drains and manholes, or at the work sites, as a result of the Contractor's operations.
  - 1. A manhole may be used as a temporary collection point for debris. The debris shall be completely removed from the manhole by a vacuum truck, clamshell or other mechanical means before televising any type of pipe. Sandbags, or suitable equal, may be required to prevent flushed material from continuing downstream.
  - 2. Any debris that migrates past the Contractor's efforts to collect the loosed material and then deposits in downstream MWRA interceptors shall be removed from the MWRA pipes at no additional costs to the Owner per Section 01500 – TEMPORARY FACILITIES AND CONTROLS.
- L. All amounts of sludge, dirt, sand, rock, roots, grease, and other solids or semi-solid material shall be removed from the pipe interior with a collective device and disposed of by the Contractor at no additional cost to the Owner. All such

material, may cause an obstruction or impair in the inspection or rehabilitation of the sewer or drain, and shall be flushed downstream and removed at each downstream manhole of the reach being cleaned with a collection device.

- M. All of Contractor's personnel shall be thoroughly familiar with all phases of sewer or drain line cleaning to ensure optimum performance, without causing damage to the sewer, drain, manholes, and appurtenances.
- N. When water from fire hydrants is necessary to avoid delay in normal work procedures, the water shall be conserved and not used unnecessarily. No fire hydrant shall be obstructed at any time, nor shall a hydrant be used for the work described in these Contract Documents, unless a reduced pressure backflow preventor is provided by the Contractor and prior approvals have been obtained from the City of Somerville Water Department for use of the fire hydrant. Use of the backflow prevention device shall be in accordance to Massachusetts Department of Environmental Protection (DEP) Regulation 310. CMR 22.22 and approved by the Somerville Water Department Backflow Prevention Inspector. The Contractor shall be responsible for all related charges for the set-up, including the water usage bill. All expenses shall be considered incidental to the cleaning of the existing sewer or drain.
- O. During the course of cleaning, when obstructions are encountered in an existing pipe, an attempt shall be made to clean from both the upstream and downstream manholes. Should the obstruction(s) prevent the line from being cleaned, the Engineer shall be immediately notified. If, in the opinion of the Engineer, a repair is required to facilitate cleaning, cleaning shall be completed upon satisfactory completion of the repair. The repair may be completed by the Owner or completed by the Contractor as a change order. No additional compensation will be paid to the Contractor for any portion of the sewer/drain, which requires re-cleaning after successful completion of the repair.
- P. Approved type of equipment for pipe cleaning shall include, at a minimum, the following:
  - 1. High velocity equipment shall have a minimum of 800 feet of high-pressure hose and carry its own water tank, auxiliary engines and pumps and hydraulically driven hose reel. Install a gauge to indicate working pressure on the discharge of high-pressure water pumps.
    - a. For unmanned jetting method, two or more high velocity nozzles shall be available. The nozzles shall be capable of producing a scouring action for 15° to 45° in all size lines designated to be cleaned. All controls shall be located so that the equipment can be operated above ground.
    - b. For manned pipe and manhole cleaning method, a high velocity gun shall be capable of producing flows from a fine spray to a long distance solid stream. Hand tools or intrinsically safe power tools may also be required.

2. Mechanical cutting device suitable for root removal shall be available for use as necessary.
  3. Footage metering devices shall be used for location of all equipment, devices, points of reference, on measuring target that is known at all times at the ground level. Footage metering device shall be designed so that distance recorder can be set at zero when equipment or device is at entrance of pipe inside manhole. Entering device shall have an occurrence of not less than one-tenth of a foot. Marking of cable, or similar means, that require interpolation of depth of manhole shall not be permitted. The accuracy of the metering devices shall be checked daily by the Contractor by the use of a walking meter, roll-a-tape, or other suitable device.
- Q. The Contractor shall be responsible for removal of any equipment that may become lodged or hung up in the system being cleaned. The Contractor will not be reimbursed for work, including television inspection, required to retrieve lost equipment.
- R. The walls and inverts of all manholes within the reaches of lines shall be cleaned thoroughly with a high velocity water spray.
- S. Upon completion of the cleaning of each section or in a flooded condition, a full sized brush or scraper shall be pulled through the line to insure complete removal of all debris from the line. Dumping or forcing of debris into a larger diameter line or receiving water body is not permitted.
- T. Do not allow solids removed in the cleaning process to be released onto streets or into ditches, surface waters, catch basins, cleanouts, storm drains, or sewer or drain manholes.
- U. Acceptance of sewer and storm drain cleaning work is subject to review by the Engineer. If visual inspection or internal television inspection shows solids, soil, sand, grit, or other debris remaining in the line, cleaning will be considered unsatisfactory. Repeat cleaning, and inspection of the storm drain line until the Engineer judges cleaning satisfactory.
- V. Repair manholes dismantled or damaged during the cleaning process, and replace manhole frames and covers damaged during the cleaning process.

### 3.2 CLOSED CIRCUIT TELEVISION

- A. The method of Technicolor internal inspection of pipelines and manholes is dependent on pipe size. The height of the camera shall be a level that is within the middle third of the pipe, preferably at the springline to equally capture the crown and invert of the pipe. The camera shall be at a level that can look up the first 12 inches of service laterals.

1. Where permitted, the preferred method of inspection shall be by use of a robotic camera vehicle assembly, capable of being controlled from an aboveground command center.
  2. For larger pipes where the height of the camera crawler can't not be adjusted to the middle of the pipe, the inspection shall be obtained by use of manned entry and "walking the pipe".
- B. The Contractor shall follow all OSHA standards or other applicable regulations related to work in confined spaces.
- C. The Contractor shall provide to the Owner two (2) sets of DVDs of all internal inspections.
1. All field DVDs must be submitted in a casing with the names of all streets displayed on the front and side cover with field reports.
  2. All final reports submitted along with the DVD must be bound together using an approved method, have street names with DVD numbers listed in alphabetical order along with the project title on the cover and have a clear plastic cover on the front. DVDs must be clearly labeled so that future viewers will be able to easily identify at any point of the DVD what location and type of sewer line was televised. The street address and type of all lateral connections to the storm drain shall be verbally noted on the DVD and in the report.
- D. The reporting of observations during the TV inspection of sewer and drains from one manhole to the next, and the database shall follow the format published in the Pipeline Assessment and Certification Program (PACP) as developed by the National Association of Sewer Service Companies (NASSCO). The Owner may require additional database fields.
1. At the beginning and end of each continuous pipeline inspection, the total pipeline shall be described by the narrator stating the size, type, start and end location, street name, intersecting street, invert elevation, and limits of each pipe section.
- E. The Contractor shall utilize the City's manhole identification numbering system when reporting the results of TV inspections. Contractor shall also provide written description or site map of each manhole such that the location of the manhole is clearly defined and retrievable. If a buried manhole is discovered during the televising of any mainline, the Contractor should allocate a new manhole number (supplied by Owner) and record it.

### 3.3 PROCEDURES



- E. All video recordings of manholes and structures shall have a time, date, and location display, as detailed in paragraph 3.3.D of this Section.
- F. All inspections shall be documented on DVD media. The DVD shall be capable of being played on a DVD player. Reprocessed DVDs will not be acceptable.
- G. During the inspection, the camera shall be stopped at the points where one or more of the following conditions are observed:
1. Infiltration/Inflow Sources
  2. Lining Defects
  3. Structural Defects, including broken pipe, collapsed pipe, cracks, and all other structural abnormalities.
  4. Abnormal joint conditions, such as root intrusion, protruding pipes, in-line pipe size changes, mineral deposits, grease, obstructions, etc.
  5. Pipe Connections
  6. Obstructions, offset joints, misalignments, or other conditions that may affect pipe bursting, slip-lining or cured-in-place pipe rehabilitation operations.
- All such conditions shall be recorded and shall be considered a point repair if the conditions inhibit rehabilitation work. Color photographs of all questionable conditions shall be taken and labeled as to location, condition, and date for subsequent review.
- H. The Contractor will take and label still pictures for all extruding laterals, any locations where sections of the sewer pipe are missing or the pipe is near collapse or whenever directed by a City Representative. The Contractor shall provide a sketch showing tie distances from at least three permanent features to the starting and ending manhole. A distance between the starting and ending manhole, as measured on the ground, shall be provided.
- I. For large pipe that exceed the limits of the mechanical crawler and required manned entry to "walk the pipe", intrinsically safe 2-way communication must be maintained between entrant(s) and spotter(s) and also between entrant(s) and command center to facilitate procedure in Paragraphs 3.3.G and 3.3.H of this Section.
1. Care shall be taken to accurately measure the footage throughout the inspection. If measurements recorded via cable length is inaccurate due to slack created while "walking the pipe", distances shall be obtained by

alternate means (e.g. intrinsically safe laser measuring) and recorded in the written logs as such. Verbal correction on the audio track shall override any conflicting digital footage on the video display.

- J. The Contractor shall be responsible for access to the sewer or drain system, including; locating, uncovering, and opening manholes, flow control diversion bypassing and/or dewatering within manholes, or pipe reaches, dewatering, surface restoration, and all other work required to perform the specified work to the Engineer's satisfaction.
- K. All internal inspections shall be performed by a firm specializing in large diameter sewer/drain line inspections, and shall be witnessed by representative of the Pipelining Manufacturer (when applicable) and the Owner/Engineer.

#### 3.4. DYE TRACING

- A. In the event that a building or catch basin lateral requires dye tracing confirmation during the time of the television inspection, the Contractor shall coordinate the private property access with the television operations.
- B. The Contractor shall introduce the dye into the system (e.g. catch basin, internal plumbing) and be responsible for recording the test result and providing to the City.

#### 3.5 ACCEPTANCE

- A. Internal inspection operations, both pre- and post-construction/cleaning, shall be considered for approval upon receipt by the Owner of the following:
  - 1. Two (2) copies of the internal inspection reports including: DVD media showing pipelines, manholes, and structure inspections, and photographs complete with location, time, and date stamp depicting all information described in paragraph 3.3.G in this Section.
- B. The rehabilitated sewer or drain shall not receive acceptance until final approval by the Owner.

### PART 4 – COMPENSATION

#### **Item 2760.1 --- Heavy Cleaning And Closed Circuit Television Inspection Of 8” Storm Drain**

##### METHOD OF MEASUREMENT:

Payment for Heavy Cleaning and Closed Circuit Television Inspection of Sanitary Sewers and Storm Drains shall be based on the Lump Sum Price bid in the proposal. Measurement for payment for Heavy Cleaning and Closed Circuit Television Inspection of Sanitary Sewer and



Storm Drains will be on a percent of the Lump Sum bid calculated by dividing the elapsed time to date by the contractual construction time limit as approved by the Engineer.

**BASIS OF PAYMENT/INCLUSIONS:**

Under the Unit Price bid for this item, the Contractor shall furnish all labor, materials, tools, equipment, and incidentals required for Heavy Cleaning and Closed Circuit Television Inspection of Storm Drains complete as indicated on the Drawings and Specifications, or as directed by the Owner or Engineer. The Heavy Cleaning work shall include furnishing, installing, and/or performing the following: required submittals and work plans; securing a temporary dump site; storm and sewer flow handling including sand bagging, temporary plugs and bulkheads, dewatering and flow bypassing; making arrangements for a water source; loosening, cleaning, and extracting deposits throughout the structure; transporting material to/from dump site; end-of-day surface cleaning around access manhole; repair of any damage caused by the Contractor; restoration of surface; and incidental work not indicated for payment elsewhere.

The Closed Circuit Television Inspection work shall include furnishing, installing, and/or performing the following: required submittals and work plans; storm and sewer flow handling including sand bagging, temporary plugs and bulkheads, dewatering and flow bypassing; making arrangements for a water source; closed circuit television inspection; furnishing digital video and digital report files on DVD; repair of any damage caused by the Contractor; restoration of surface; and incidental work not indicated for payment elsewhere.

-END OF SECTION 02760-

[THIS PAGE INTENTIONALLY LEFT BLANK]

SECTION 02761

FLOW BYPASS

**ITEM 2761.1                      DRY WEATHER FLOW BYPASS                      LUMP SUM**

PART 1 – GENERAL

1.1 SUMMARY

- A. This Section includes the following:
  - 1. Furnishing, installing, and testing a temporary system to bypass the flow of the existing infrastructure around the work in accordance with these Specifications.
  - 2. Maintaining flow from main pipelines without interruption of service, and maintaining flow in lateral connections with minimal interruption of service.
  - 3. Performing the work in a sequence that is the least disruptive to vehicular and pedestrian traffic and in a manner that shall protect the public from damage to persons and property.
- B. Contractor shall design the bypass flow handling system.
- C. It is anticipated that the Contractor shall only be required to bypass minimal dry weather sanitary flows resulting from illicit connections to the Bike Path Drain.
  - 1. Contractor shall refer to Specification 02767 for weather limitations for CIPP lining
  - 2. Contractor shall make provisions to reinstate normal gravity flow in wet weather conditions while installing new drain pipe by inserting a closure piece and temporarily connecting to the existing pipe being replaced.

1.2. RELATED TECHNICAL SECTIONS

- A. Section 01500 – TEMPORARY FACILITIES AND CONTROLS

1.3 SUBMITTALS

- A. Submit the following in accordance with Section 01300 – SUBMITTALS:
  - 1. Shop drawings and/or manufacturer’s descriptive literature indicating materials, equipment and methods to complete bypass flow handling operations.

3. List of 24-hour emergency telephone numbers at which the Contractor may be reached.

#### 1.4 QUALITY CONTROL

- A. Provide in accordance with Section 01400 – QUALITY CONTROL and as specified.

#### 1.5 DELIVERY, STORAGE AND HANDLING

- A. Provide in accordance with Section 01600 – PRODUCTS, MATERIALS, AND EQUIPMENT.

### PART 2 – PRODUCTS

#### 2.1 EQUIPMENT

- A. The bypass flow handling equipment shall be of sufficient size and material to convey existing flows as required without overflow, spillage or discharge to the surrounding environment.
- B. Contractor shall be fully equipped to operate and respond to any repair or replacement of the system (24 hours per day and 7 days per week) while the bypass flow handling system is in use.
- C. The Contractor shall have adequate standby equipment available and ready for immediate operation and use in the event of emergency or breakdown. One standby pump for each size pump utilized.

#### 2.2 DESIGN CRITERIA

- A. Contractor shall verify flow conditions in the existing system prior to the commencement of construction. The Contractor shall have no claim for additional compensation by reason of delay or inconvenience in adapting its operations to the need for maintaining existing flows.
- B. Estimated wet weather flows are as follows. Flows are estimated from the maximum conveyance at the existing slope and diameter. Actual flows might vary and shall be verified by the Contractor.

- a. Maximum Daily Flow: 12.1 MGD

- C. Minimal dry weather sanitary flows are anticipated to be present during construction. Contractor shall field verify dry weather flows and provide dry weather flow bypass accordingly.

## PART 3 – EXECUTION

### 3.1 PREPARATION

- A. Contractor shall perform all work in accordance with municipal, state and federal requirements.
- B. Contractor shall obtain all permits required to perform work prior to the commencement of construction, at no additional cost to the Owner.
- C. Prior to the commencement of construction, Contractor shall perform all possible preparatory work. The Contractor shall, at all times, conduct operations to interfere as little as possible with existing flows.
- D. Prior to start-up of bypass flow handling system, Contractor shall notify, in writing each property owner whose service shall be shutdown albeit temporarily. Contractor shall prepare notifications in accordance with Owner's requirements.
- E. The Contractor shall protect water resources, wetlands and other natural resources.

### 3.2 GENERAL

- A. Contractor shall design the layout and routing of the bypass flow handling system to minimize disturbance to public and private land and to maintain access for pedestrians and traffic. Traffic shall be maintained throughout the bypass operations according to applicable standards and local requirements.
- B. If excavation is required across roadways, all work shall be performed in accordance with municipal and/or state requirements.
- C. Contractor shall furnish, install, maintain and operate all temporary facilities such as dams, pumping equipment, conduits and all other labor and equipment necessary to intercept the flow before it reaches points where it would interfere with the work.
- D. Contractor may utilize pipelines in an existing parallel system as an alternative to installing a full bypass flow handling system pending approval by the Engineer and the Owner. Contractor shall submit a Certificate of Design prior to utilizing the parallel system and shall restore the parallel system to pre-construction conditions upon completion of construction.

- E. Contractor shall design, furnish and install individual bypass flow handling systems for flowing lateral connections or high occupancy buildings.
- F. The Contractor shall protect existing facilities from damage, during pumping activities.
- G. Plugging or blocking of flows shall incorporate a primary and secondary plugging device. When plugging is no longer required for performance of the work, it is to be removed in a manner that permits flows to slowly return to normal without surge, surcharge or other major disturbance.

PART 4 – COMPENSATION

**Item 2761.1 --- Flow Bypass**

METHOD OF MEASUREMENT:

Measurement for payment for Flow Bypass will be based on a percent of the Lump Sum bid calculated by dividing the elapsed time to date by the original Contractual construction time limit as approved by the Engineer.

BASIS OF PAYMENT:

Payment for Flow Bypass will be based on the unit price bid for this item in the proposal. Under the Lump Sum price for Flow Bypass, the Contractor shall furnish all labor, materials, tools, equipment, and incidentals required to furnish, install, move, maintain and remove gravity or pumped flow bypasses complete as required to handle existing flows while completing the required elements of the Work at all locations. The work includes, but is not limited to; design of the bypass systems; pumps; suction hoses; discharge hoses; generators; install and remove temporary bulkheads; gravity bypasses including furnishing and installing pipe of all sizes at all depths; excavation for buried hoses or pipe; furnish and placing backfill around buried hoses and pipe; preparation of subgrade; temporary pavement over buried hoses or pipe; ramps; protection of bypass measures; emergency service during non-work hours; manning pumps or other bypasses as may be required; fittings, couplings and appurtenances; connections to existing and proposed pipes and structures; protection of discharge locations; and all incidental work not specifically included for payment elsewhere required to bypass existing flows in all storm drain, combined sewer or sanitary sewer.

SPECIAL NOTES ON EXCEPTIONS:

Items not included for payment herein include, but are not limited to; permanent bulkheads; bypass for CCTV and cleaning sections of pipe, and water main bypasses.

-END OF SECTION 02761-

SECTION 02767

CURED-IN-PLACE PIPELINING

<b>02767.1</b>	<b>CIPP 24" STORM DRAIN</b>	<b>LINEAR FOOT</b>
<b>02767.2</b>	<b>CIPP 8" STORM DRAIN</b>	<b>LINEAR FOOT</b>
<b>02767.3</b>	<b>POINT REPAIRS</b>	<b>EACH</b>

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. Inspecting and measuring the interior of the pipe to be lined.
  - 2. Grout sealing of leaks which may interfere with installation and/or curing of the lines. Sealing shall include all required materials including packers.
  - 3. Furnishing all plant, labor, equipment and materials as well as performing all operations associated with the installation of cured-in-place pipelining (CIPP) inside the existing pipeline where indicated on the Drawings and in accordance with municipal, state and federal requirements, including OSHA, and these Specifications.
  - 4. Performing the work in a sequence that is the least disruptive to vehicular and pedestrian traffic and in a manner that shall protect the public from damage to persons and property within the limits and for the duration of the work.
  - 4. Handling and disposal of discharge water from the CIPP curing operation.
- B. For the Work paid under Bid Item 02767.2 - CIPP 8" Storm Drain, the Contractor shall CIPP 8" Storm Drain with a Pulled In Place liner within the existing Newberne Street Catch Basin 2. The Contractor shall not proceed with furnishing and installing check valve until heavy cleaning and internal inspection of the exist. 8" VC drain is complete, and CCTV inspection is submitted to the Engineer for review and approval of the 8" Storm Drain CIPP

Work. The Owner/Engineer reserves the right to remove bid item 02767.2 after review of the post-heavy cleaning CCTV inspection.

### 1.3 SUBMITTALS

A. After Notice to Proceed, and before beginning Pre-inspection work in preparation for CIPP construction, the Contractor shall submit:

1. Shop drawings and/or manufacturer's descriptive literature indicating materials, equipment and methods specific to this project to be used to complete CIPP operations.
  - a. Material Safety Data Sheets (MSDS's) for all materials used during preparation and installation.
  - b. Certification stating that the Contractor is fully licensed by the CIPP manufacturer (if different).
  - c. Method(s) and equipment for repairs of any uncured areas, defects, and test sample section repairs or other deformities in the completed product.
  - d. Certified copies of all test reports on the material properties of the cured liner by the material manufacturer indicating that the supplied materials conform to the design criteria used in calculating the liner thickness.
  - e. Description of odors anticipated as a result of the curing process and methods to mitigate odors to prevent migration outside of the pipeline.
  - f. Confined Space Entry Certifications for all Contractors' personnel entering pipeline or access structures.
  - g. Name(s) of all supervisory personnel to be directly involved with each cured-in-place pipelining method of pipe rehabilitation for this project. Supervisory personnel shall meet the experience requirements listed under Section 1.4 of this specification. Attach resumes of each person named. Resume information shall include, as a minimum, educational background, the number of years in a supervisory capacity and a list of projects worked on within the past five years, describing the type of construction, project description, complexity, and contract amounts.
2. A work plan to include the following items:
  - a. Details and description of construction methods and any intended variances from the specified methods, materials, equipment, and



process description, including on-site or off-site tube wet out, insertion procedure, curing and cool down procedure including procedures to account for constrained downstream access through the Tannery Brook Conduit, access structures and lateral connection details, method of cutting lateral connections, method for sealing ends of liner and lateral cut-outs, water sources and method of cure-water/steam discharge.

- b. Description of surface activities including access structures, staging and inversion locations.
- c. A plan for maintaining vehicular and pedestrian access, avoiding damage to existing trees, preventing leakage from hoses, and minimizing noise from pumps.
- d. A description of the process or technique(s) to be used to progressively round the liner tube to remove all trapped water between the liner pipe and the existing pipe.
- e. Detailed action plan and description of techniques and equipment used in the event of odor migration into public and/or private property (indoors as well as outdoors).
- f. Traffic and pedestrian management plan.
- g. A written description of curing water or steam condensate disposal method.
- h. The name, address, and EPA identification number of the transporter and disposal facility in the event a treatment or disposal facility is used for cure water discharge. Test results and disposal documentation from the facility shall also be submitted.
- i. The Contractor shall submit method of repair of any rejected inversion/installation length for review and approval by the Owner prior to any such repair or replacement.

B. After Pre-Inspection, and prior to CIPP installation, the Contractor shall submit:

- 1. Design calculations specific to each inversion. The submittal shall provide documentation supporting the basis of the values used in the design calculations. The calculations shall be prepared and stamped by a Professional Engineer registered in the state within which the work shall take place in accordance with the requirements of ASTM F1216. For pulled-in systems, Contractor shall submit design calculations for the maximum allowable pulling force on tube as well as the type of equipment and monitoring provisions to measure such forces during installation.

2. Curing tables indicating resin\liner manufacturer's recommended water\steam temperature during the cure period; or for UV cure systems the UV lamp firing rate, pull back speed, air pressure, and liner surface temperature for the liner diameter, thickness and length to be installed. Curing tables for UV systems shall specifically indicate the acceptable liner surface temperature range which will assure that the cure will complete.
  3. A certification stating that the sources of all lateral connections identified during internal inspection have been investigated within the pipeline as well as in adjacent buildings and structures and that the Contractor has secured these connections to prevent the migration of odors.
- C. The Contractor shall submit curing logs within 24 hours of cool-down completion for each inversion consisting of the specified monitoring reports from the curing process.
  - D. The Contractor shall submit final CIPP testing reports and post construction inspection videos and reports after CIPP construction as specified herein.

#### 1.4 QUALITY ASSURANCE

- A. The Contractor installing the CIPP system shall have completed at least three (3) projects, in the United States, within the past two (2) years and projects that included CIPP installation lengths of at least 300 continuous linear feet, on-site or off-site wet-out or resin impregnation of the liner tube, and design and installation of at least 24-inch diameter CIPP with a wall thickness based on a fully deteriorated condition.

Note: A combination of projects satisfying each of the above provisions may be acceptable as long as two (2) projects have been successfully completed for each provision.

- B. Supervisory personnel shall have a minimum of five (5) years experience and shall have completed at least two (2) projects of similar size and complexity as this project in the United States within the past five (5) years. Resume information shall include, at a minimum, educational background, the number of years in a supervisory capacity and a list of completed projects within the past five (5) years, including project description, complexity and contract total amounts.
- C. Rejection of any contractor and/or manufacturer by the Engineer due to insufficient qualifications shall not be grounds for modifications to the Contract Documents such as change in scope, time of completion or contract amount.
- D. Designated supervisory personnel shall be directly involved with and used on this project. Substitutions of personnel will not be allowed without written authorization of the Engineer.

- E. At the time of manufacture, inspect each lot of liner for defects. At the time of delivery, the liner shall be homogeneous throughout, uniform in color, free of cracks, holes, foreign materials, blisters, or deleterious faults.
- F. All Contractor's personnel entering pipeline or access structures shall be Confined Space Entry trained per OSHA, Title 29 CFR 1910.46 and shall have a copy of their certification available on site at all times.

#### 1.5 ASTM STANDARDS

- A. CIPP work and materials shall comply with all applicable sections of the following ASTM standards.
  - 1. ASTM D790 – Standard Test Methods for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials.
  - 2. ASTM D2412 – Standard Test Method for Determination of External Loading Characteristics of Plastic Pipe by Parallel-Plate Loading.
  - 3. ASTM D2990 - Standard Test Methods for Tensile, Compressive, and Flexural Creep and Creep-Rupture of Plastics
  - 4. ASTM D543 - Standard Practices for Evaluating the Resistance of Plastics to Chemical Reagents
  - 5. ASTM D3567 - Standard Practice for Determining Dimensions of "Fiberglass" (Glass-Fiber-Reinforced Thermosetting Resin) Pipe and Fittings
  - 6. ASTM F2019 - Standard Practice for Rehabilitation of Existing Pipelines and Conduits by the Pulled in Place Installation of Glass Reinforced Plastic (GRP) Cured-in-Place Thermosetting Resin Pipe (CIPP)
  - 7. ASTM F1216 – Standard Practice for Rehabilitation of Existing Pipelines and Conduits by the Inversion and Curing of a Resin-Impregnated Tube.
- B. If conflicts exist between the specifications and the above-referenced standards, the more stringent requirements, as determined by the Engineer, shall apply.

#### 1.6 WARRANTY REQUIREMENT

- A. As a minimum, all project work and components shall be warranted for one (1) year from the date of substantial completion or owner's acceptance.
- B. Related Damages and Losses: When correcting warranted Work that has failed, remove and replace other Work that has been damaged as a result of such failure or that must be removed and replaced to provide access for correction of warranted Work.

- C. Reinstatement of Warranty: When Work covered by a warranty has failed and been corrected by replacement or rebuilding, reinstate the warranty by written endorsement. The reinstated warranty shall be equal to the original warranty with an equitable adjustment for depreciation.
- D. Replacement Cost: Upon determination that Work covered by a warranty has failed, replace or rebuild the Work to an acceptable condition complying with requirements of Contract Documents. The Contractor is responsible for the cost of replacing or rebuilding defective Work regardless of whether the Owner has benefited from use of the Work through a portion of its anticipated useful service life.
- E. Owner's Recourse: Written warranties made to the Owner are in addition to implied warranties, and shall not limit the duties, obligations, rights and remedies otherwise available under the law, nor shall warranty periods be interpreted as limitations on time in which the Owner can enforce such other duties, obligations, rights or remedies.
- F. Rejection of Warranties: The Owner reserves the right to reject warranties and to limit selections to products with warranties not in conflict with requirements of the Contract Documents.
- G. The Owner reserves the right to refuse to accept Work for the Project where a special warranty, certification, or similar commitment is required on such Work or part of the Work, until evidence is presented that entities required to countersign such commitments are willing to do so.
- H. Disclaimers and Limitations: Manufacturer's disclaimers and limitations on product warranties do not relieve the Contractor of the warranty on the Work that incorporates the products, nor does it relieve suppliers, manufacturers, and subcontractors required to countersign special warranties with the Contractor.

## PART 2 - PRODUCTS

### 2.1 MATERIALS

- A. Cured-In-Place Piping
  - 1. Designed and constructed in accordance with ASTM F1216 for “Rehabilitation of Existing Pipelines and Conduits by the Inversion and Curing of a Resin-Impregnated Tube”, and/or ASTM F2019 for “Standard Practice for Rehabilitation of Existing Pipelines and Conduits by the Pulled in Place Installation of Glass Reinforced Plastic (GRP) Cured-in-Place Thermosetting Resin Pipe (CIPP)” and these Specifications.

2. Fabricated to a size that, when installed, shall neatly fit the internal circumference of the existing pipeline. Allowances shall be made for circumferential stretching during installation.
3. Consisting of one or more layers of flexible needled felt, an equivalent woven, non-woven or combination material, or one or more layers of fiberglass laminate in a resin-impregnated flexible tube.
4. Capable of carrying resin withstanding installation pressures and curing temperatures. Curing the liner shall form a continuous, hard, impermeable, tight-fitting lining between each installed reach.
5. The finished product in place shall meet the minimum chemical resistance requirements for domestic storm drain applications as listed in table X2.1 of ASTM F1216. Exposure shall be for a minimum of 30 days at 73.4°F (23°C). At least three (3) specimens shall be used for each material being tested and for each chemical solution involved. Specimens shall be removed from each chemical solution and tested. If any specimen fails to meet the 30 days requirements specified herein, the material will be subject to rejection. During this period, CIPP test specimens shall lose no more than 20 percent of their initial flexural strength and flexural modulus when tested in accordance with Section 8 of ASTM F1216.
6. For glass fiber reinforced liner materials, the Contractor shall provide chemical resistance test reports required under ASTM 3681 “Chemical Resistance of ‘Fiberglass’ (Glass-Fiber, Thermosetting-Resin) Pipe in a Deflected Condition” as indicated herein.

B. Resin

1. General purpose, unsaturated, styrene-based resin and catalyst system, an epoxy resin and hardener, or an epoxy vinyl ester resin and catalyst system, or other approved material compatible with the installation and curing method process that provides cured physical strength properties specified herein.

C. Lateral Connection and End Sealing

1. The sealing material shall be an acrylamide based gel with a minimum of ten (10) percent acrylamide base material by weight in the total sealant mix. The chemical sealing material shall have a viscosity of approximately two (2) centipoises, which can be increased with additives, and a controllable reaction time from ten (10) seconds to one (1) hour. The application of the sealant shall be through a lateral sealing packer. Joint sealing shall be accomplished by forcing chemical sealing materials through the lateral packer into the surrounding soil through the leaking joint, crack or other lateral defect. Final acceptance of the sealed

lateral shall be accomplished via an air test of the joint or a visual inspection to verify that water is not leaking through the repaired lateral connection.

2. End seals shall be compression type hydrophilic seals consisting of seamless neoprene rubber, suitable for use with all pipe materials and held in place by spring loaded retaining rings during the inversion process. End seals shall be Insignia End Seal as manufactured by LMK Technologies of Ottawa, IL, or approved equal.

## 2.2 DESIGN CRITERIA

### A. General

1. The CIPP shall be designed to have sufficient structural strength to support all dead loads, live loads, and groundwater load imposed, including 100 year flood elevation requirements as applicable, with the assumption that the existing pipeline is fully deteriorated and cannot share any loading or contribute to structural integrity of the CIPP.
2. All CIPP shall have a wall thickness that, when tested by the parallel plate deflection method in accordance with ASTM D2412, shall have a minimum pipe stiffness of six (6) psi.
3. The properties of the CIPP, when cured, shall have the following minimum values, verified by ASTM testing as indicated in the table below:

<u>Property</u>	<u>ASTM Test Method</u>	<u>Initial<sup>1</sup> psi</u>	<u>Long Term<sup>2</sup> psi</u>
Flexural Strength	D790	4,500	NA
Flexural Modulus	D790 & D2990	300,000	150,000

Notes: <sup>1</sup>Initial values are determined by ASTM D790.

<sup>2</sup>Long term value is defined as fifty (50) years and is determined by ASTM D2990.

### B. Design Performance Limits and Design Parameters

1. The CIPP shall be designed such that the lining shall not fail, collapse, buckle, crack or delaminate under load. The maximum long-term fifty (50) years calculated deflection under all loads shall not exceed five (5) percent. For glass fiber reinforced liner pipe, the bending strain fifty (50) years developed shall not exceed the higher of the minimum long-term value in ASTM D3262 for the pipe stiffness supplied or that substantiated by long-term strain tests done in accordance with ASTM D3681 using 1.0 N sulfuric acid.

- C. The following design parameters shall be used and all criteria shall apply to each CIPP installations:

Depth of Cover Above Crown of Pipe <sup>1</sup>	6.5'
Depth of Groundwater Above Crown (Perm.)	Ground surface.
Specific Weight of Soil	120 pcf
Wheel Load <sup>2</sup>	16,000 lbs.
Temperature	80° F
Deflection Lag Factor, D <sub>L</sub>	1.0 (Initial)      1.5 (50 years)
Modulus of Soil Reaction E'	1,100 psi
Ovality Correction Factor	2%.
Long Term Modulus of Elasticity	50 years under constant stress, when submerged in water, to be used for constrained buckling resistance design for combined external loads from groundwater and earth cover.
Minimum Factor of Safety (Perm.)	2.0, unless otherwise specified
Manning's Roughness Coefficient, n	0.010

Notes: <sup>1</sup>Design of the CIPP shall be based on prism load on the liner pipe, using the outside diameter of the liner in the calculations.

<sup>2</sup>Impact factors to be included when depth of cover is less than three (3) feet per values recommended by AASHTO.

- D. The minimum thickness of the CIPP shall be as determined for the design parameters imposed and based on material properties meeting the requirements of Section 2.2.A above. Calculations for the determination of the required liner pipe stiffness shall be the largest pipe stiffness for each CIPP installation reach (inversion/installation access structure to termination point), as determined by calculations provided for the following parameters: (1) Maximum Deflection; (2) Minimum Pipe Stiffness; (3) Ring Bending Strain; and (4) Constrained Buckling Resistance Using Long Term Modulus of Elasticity. The design calculations shall consider all cases of loading on the CIPP and the liner thickness required shall withstand these loads without collapsing.

### PART 3 - EXECUTION

#### 3.1 GENERAL

- A. Contractor shall perform all work in accordance with municipal, state and federal requirements.
- B. Contractor shall obtain all permits required to perform work prior to the commencement of construction except those permits already obtained by the owner.

- C. The Contractor shall verify the internal pipe diameter/dimension(s) and lengths in the field prior to liner manufacture.
- D. Individual inversions/installations may be performed via one or more existing access structures as determined by the Contractor and as approved by the Owner.
- E. The CIPP shall be performed with minimal excavation or removal of existing structures. Excavation for point repairs or emergencies shall be permitted, but only as approved by the Owner.
- F. Contractor shall review all existing conditions data prior to the commencement of construction.
- G. Contractor shall inspect, clean and CCTV the existing pipe prior to commencement of CIPP operations, and provide the Engineer the opportunity to verify the condition of the pipe for CIPP operations.
- H. Contractor shall commence CIPP operations at the beginning of a period of at least three (3) days of anticipated dry weather or otherwise directed by the Owner and as directed by the Engineer.

### 3.2 PREPARATION

- A. Contractor shall inspect interior of the pipelines to determine locations of any conditions which may prevent proper installation of the liner. Inspections shall note protruding service taps, collapse/crushed pipe and reductions in cross-sectional area that could impact lining of the pipe.
- B. Contractor shall grout seal visible leaks prior to installation of the liner material.

### 3.3 INSTALLATION

- A. Contractor shall install a resin impregnated flexible felt tube inverted/installed into the existing pipe utilizing a vertical inversion standpipe and hydrostatic head method, air pressure inversion method, pulled-in and inflate method or other method approved by the Engineer.
- B. Curing shall be accomplished by circulating hot water, steam, ultraviolet light, or other approved methods to cure the resin into a hard, impermeable pipeline. When cured, the new material shall extend over the length of the inversion/installation reach in a continuous, tight-fitting, watertight pipe-within-a-pipe.
- C. The Contractor shall designate the locations where the reconstruction tube will be vacuum impregnated prior to installation. The Contractor shall allow the Engineer and the Owner to inspect the materials and “wet-out” procedure. A catalyst system compatible with the resin and reconstruction tube shall be used. The wet-out reconstruction tube shall be inserted through an existing access structure or other access point by approved techniques/processes of the



Contractor. Tubes that are pulled in place shall be done in a manner that shall not damage the tube. The winch shall be equipped with a dynamometer to record the pulling forces required during installation. Pull forces shall not exceed manufacturer's recommendations that shall be based on a maximum longitudinal stretch of five (5) percent of the total tube length. Inversion heads for tubes that are inverted in place shall not exceed manufacturer's recommendations so as not to overstress the tube material or exceed 5% longitudinal stretch. Progressive rounding of the liner shall be performed, prior to curing, to eliminate all trapped water between the liner and the existing pipeline.

- D. After inversion/installation is completed, the Contractor shall supply a suitable heat source and fluid recirculation equipment, suitable application of Ultraviolet (UV) light, or other approved methods. The equipment shall be capable of delivering hot water/steam/UV throughout the section by means of a pre-strung hose to uniformly raise the water/steam temperature above the temperature required to effect a cure for the resin or other approved methods. Curing temperature or level of exposure to UV shall be as determined by the CIPP manufacturer and based on the resin/catalyst system employed.
- E. For hot water or steam cured CIPP liners:
- a. The heat source shall be fitted with suitable monitors to gauge the temperature of the incoming and outgoing water/steam supply. Another such gauge shall be placed between the impregnated reconstruction tube and the pipe invert at the terminating manhole to determine the temperatures during cure. Water/steam temperature in the line during the cure period shall be recommended by the resin manufacturer.
  - b. Initial cure shall be deemed to be completed when inspection of the exposed portions of cured liner appear to be hard and sound and the remote temperature sensor indicates that the temperature is of a magnitude to realize an exotherm. The cure period shall be of a duration recommended by the resin manufacturer, as modified for the CIPP process, during which time the recirculation of the water/steam and cycling of the heat exchangers to maintain the temperature continues. Curing temperatures and duration shall be in accordance with previously submitted data and information.
  - c. The Contractor shall cool the hardened pipe to a temperature below 100 degrees F before relieving the static head. Cool-down may be accomplished by the introduction of cool water or air, as applicable, into the inversion standpipe to replace water/steam being drained from a small hole made in the downstream end. If Contractor elects to drain cure-water via the upstream end, the water shall be pumped to a discharge location approved by the Owner at no additional cost to the Owner. Care shall be taken in the release of the static head so that a vacuum shall not develop that could damage the newly installed pipeline.

- d. After completion of pipeline curing, the Contractor shall dispose of curing water or condensate in accordance with all federal, state, and local requirements. The Contractor may elect to transport the curing water off site for disposal utilizing a uniform hazardous waste manifest. The transporter shall be appropriately licensed and the disposal facility shall be a licensed wastewater treatment facility. The Contractor shall sample and analyze appropriate samples as required by the disposal facility.
  - e. Contractor shall verify with the Owner that discharging the cure-water directly into the existing system is acceptable. If deemed unacceptable, Contractor shall collect and pump cure-water to a location to be determined by the Contractor and approved by the Owner.
- F. For UV cured CIPP liners:
- a. The light source shall be fitted with a computer control system that shall control the ignition speed of the UV lamps and the pull speed of the light train. The computer control system shall monitor and record the liner inflation pressure and liner surface temperature in addition to UV lamp ignition speed and light train pull speed throughout the cure process. The computer control system shall also record video output from the light train for inclusion in the curing log. These records shall be submitted to the Engineer after the cure as required by subsection 1.3 of this specification.
  - b. The liner system manufacturer shall provide to the installer curing tables specific to the installers equipment, dictating acceptable ranges of lamp ignition speed, pull back speed, liner inflation pressure, and surface temperature of the liner during the curing process based on liner diameter, length, and thickness. The computer control system shall be programmed based on these tables. Installation shall be conform to the requirements of these curing tables.
- G. Contractor shall mitigate all odors onto public or private property due to renewal operations immediately after notification from the Owner or the Engineer including, but not limited to, forced-air ventilation and/or chemical cleaning of buildings at no additional cost to the Owner.
- H. If odors persist on public or private property to a point that air sampling and/or associated testing is required by the Owner, the Engineer or a regulatory agency, the Contractor shall perform this work at no additional cost to the Owner.
- I. Contractor shall repair all uncured areas, defects, test sample section repairs or other deformities in the liner during inversion operations in accordance with the manufacturer's recommendations.
- J. The finished CIPP shall be continuous over the entire length of an inversion/installation run and be as free as commercially practicable from visual defects such as foreign inclusions, dry spots, pinholes, wrinkles, blisters,

delamination or other deformities. Any such conditions deemed by the Owner shall be repaired and/or replaced at no additional cost to the Owner.

### 3.4 SYSTEM REINSTATEMENT

- A. Once a section of liner has been cured completely, the Contractor shall reinstate all access structures located along its alignment. At inversion/installation or termination access structures, the Contractor shall extend the liner a sufficient distance into the structure to allow for a smooth, clean cut to match the configuration of the riser and base sections. The top half of the pipe shall be neatly cut off, and not broken or sheared off, at least four (4) inches away from the walls. The channel in the manhole shall be a smooth continuation of the pipe(s) and shall be merged with other lines or channels, if any. Any nominal annular gap between the liner and the host pipe shall be filled with a resin mixture and/or epoxy compatible with the CIPP liner and the terminated ends of the liner shall be beveled to allow for a smooth transition.
- B. Lateral connections shall be reestablished with a cutting device specifically designed for cutting CIPP. The exact location and number of lateral connections shall be determined during the internal inspection(s) and/or in the field. The Contractor shall reconnect all lateral connections to the liner pipe, including those unoccupied, abandoned, or from vacant lots, unless otherwise directed by the Engineer. Shape of pipeline cut-out shall match shape of lateral connection. The annular space between the liner pipe and the lateral connection shall be sealed with a resin mixture and/or epoxy compatible with the CIPP.
- C. Lateral connections shall be reinstated by experienced operators so that no blind attempts are made in the liner. Location shall be re-verified with pre-construction videotapes for accuracy, especially where dimples are not defined or clearly ascertained. The cut shall be smooth and circular with no jagged edges. The hole shall be a maximum of 100 percent and a minimum of 95 percent of the lateral pipe inside diameter. It shall be properly aligned and be concentric to the existing connection.
- D. The Contractor shall minimize the time that an inversion/installation access point remains open. Consideration shall be provided to complete and coordinate all work including pipeline cleaning, pre installation internal inspection, pipeline renewal and post installation internal inspection to minimize disturbance to adjacent property owners.

### 3.5 TESTING

- A. For each separate length of CIPP installed, the Contractor shall prepare at least two (2) samples in accordance with ASTM F1216, Section 8.1.1 or Section 8.1.2 for testing at a laboratory approved by the Engineer. For samples used per section 8.1.1, the Contractor shall hold the pipe in place by a suitable heat sink, otherwise this method will not be acceptable. For samples taken from UV cured liners, contractor shall line through a spool piece pipe of matching interior

diameter in order to obtain collection sample, as described in ASTM F 1216 subsection 8.1.1.

- B. The Contractor shall provide one sample for each inversion to the Engineer for independent testing. The samples shall be labeled with each pipe inversion identification and date.
- C. Samples secured as specified shall be tested to verify that the pipe flexural modulus and flexural strength of the CIPP is at least equal to that required by the approved design submittal, and the wall thickness is at least equal to that required in the approved design submittal. Wall thickness shall also be verified at each inversion, intermediate manholes, and termination access at four equidistant points around the perimeter.
- D. If any sample fails the verification tests specified, the Contractor shall take five (5) additional samples throughout the length of the inversion/installation and retested to ensure the specified criteria has been met. If any sample fails these retests, the entire inversion/installation length shall be rejected.
- E. Any rejected inversion/installation shall be relined or replaced by the Contractor at no additional cost to the Owner in accordance with the submitted method of repair/replacement. Any samples taken from within the final completed liner pipe shall be repaired by the Contractor, in accordance with the shop drawings, at no expense to the Owner.
- F. Contractor shall submit curing water or condensate test reports as applicable.
- G. Contractor shall submit the names, address, and EPA identification number of the transporter and disposal facility in the event a treatment or disposal facility is used for cure water discharge. Test results and disposal documentation from the facility shall also be submitted.

### 3.6 ACCEPTANCE

- A. Prior to final acceptance, any defects that may affect the integrity or strength of the pipeline in the opinion of the Engineer shall be repaired by the Contractor at no additional cost to the Owner. Wrinkles or fins in the bottom half of the lined pipe shall not exceed 2% of nominal pipe diameter and shall not have an adverse effect on the flow. If in excess, the liner shall be repaired and/or removed and replaced at no additional cost to the Owner.
- B. Pipeline shall be true to line and grade, with no bulges, sags, protrusions, wrinkles transverse to the flow, deflections, offset joints, leaking joints, or other visible infiltration, or other defects that would impair the intended use of the completed pipeline.
- C. All active service connections shall be open and clear.

- D. Final acceptance of work shall not be granted until all defective areas are repaired in accordance with the CIPP manufacturer's recommendations and to the Owner's satisfaction.
- E. Any repairs required by the Engineer as a result of the post construction internal inspection shall be performed by the Contractor.
- F. Contractor shall perform a post construction internal inspection via Closed Circuit Television Inspection (CCTV) and provide a post construction inspection report which details the condition of constructed items and describes recommendations for repairs of any defects.
  - 1. All areas where the construction is defective due to workmanship, chemical deterioration, or other, shall be identified by the Contractor.
  - 2. If repairs are required, the Contractor shall produce a second post construction inspection report.
- G. Contractor shall perform testing as specified. Final acceptance of the work shall not be granted until the appropriately formatted testing results have been reviewed and approved by the Engineer.

#### PART 4 – COMPENSATION

##### **02767.1 – CIPP 24" Storm Drain**

##### **02767.2 – CIPP 8" Storm Drain**

##### **BASIS OF PAYMENT/INCLUSIONS:**

Payment for items 02767.1 and 02767.2 shall be based on Unit Price bid in the proposal. The per linear foot unit price for Items 02767.1 and 02767.2 shall constitute full compensation for all work, complete, as indicated on the drawings and as specified. Under the price specified to be paid, the Contractor shall furnish all labor, materials, tools, equipment, and incidentals associated with the installation of cured-in-place pipelining where indicated on the Drawings or as directed by the Engineer and in accordance with these Specifications, and perform all operations to complete the work as indicated and specified in order to provide complete working and fully functional systems. Furnishing, installing, and testing the pipe liner as described in the Contract Specifications; pipeline cleaning; transportation of the material removed during cleaning operations to a temporary stockpile area; temporary storage and control of stockpiling; sealing around manhole connections; light cleaning, CCTV inspection, digital video recordings and digital data logs, bypass pumping, plugging or blocking of storm drain flow, manhole preparation to receive cured in place pipe liners to include removal of manhole frames and covers as required, and reinstating service connections shall be considered incidental to the work and shall not be measured separately for payment. All digital recordings and logs shall be provided to the Owner upon completion of the project. Contractor shall provide all supervision, overhead items, protection and precautions, and all other costs incidental to the construction work, complete, and as specified. A complete

working and operational job shall be produced whether or not any particular wording or direction is omitted or not clearly stated.

**METHOD OF MEASUREMENT:**

Measurement for payment shall be based on the actual linear feet of complete and functional cured-in-place pipeliner as shown on the Contract Drawings or as directed by the Owner or Engineer. Measurement shall be taken along the centerline of the pipe from the inside face of structures to inside face of structures.

Cured-In-Place Pipe liner installed but not successfully tested and accepted shall be paid for at a maximum of 95 percent of the unit prices bid under this item. The remaining 5 percent shall be paid upon receipt of successful test results by the Engineer. All reductions in payment due to unsuccessful testing shall be made prior to normal retainage.

**SPECIAL NOTES ON EXCLUSIONS:**

The following item(s) are not included for payment under this item and are included for payment elsewhere: disposal of bituminous concrete and construction debris; adjusting castings for paving.

**02767.3 – Point Repairs**

**BASIS OF PAYMENT/INCLUSIONS:**

Payment for Point Repairs shall be based on the per Each Unit Price bid in the proposal. Under the per Each Unit Price bid for item 2767.3, the Contractor shall furnish all labor, materials, tools, equipment, and incidentals required for the complete procurement and installation of gravity drain pipe for point repairs complete as indicated on the Drawings and Specifications, or as directed by the Owner or Engineer. This work shall include furnishing, installing, and/or performing the following: pavement or sidewalk sawcutting; removal of brick, concrete, or bituminous sidewalk; excavation of bituminous concrete roadway; excavation; transporting material to/from soil staging area; temporary excavation support consisting of trench boxes, timber lagging, or steel sheeting, left in place and cut off below grade where required by the Contract Specifications; removal of groundwater from the trench; handling groundwater recharged back to the soil, a settling tank, hose connections, hoses and other dewatering apparatus as required for staging and reinfiltration of groundwater; filter fabric as required; bedding, including compaction; 24” PVC drain pipe, fittings, couplings, and appurtenances; connecting existing laterals; connections to structures; cleanout assemblies (if required); placing and compacting suitable backfill soil; grade and compact gravel pavement sub-base; compaction testing; and all appurtenances and incidental work.

**METHOD OF MEASUREMENT:**

Measurement for payment of item 2767.3 shall be based on the actual number of complete and functional point repairs as shown on the Contract Drawings or as directed by the Owner or Engineer.

**SPECIAL NOTES ON EXCLUSIONS:**

The following item(s) are not included for payment under this item: disposal of bituminous concrete and construction debris; treatment of groundwater discharged required by an MWRA Dewatering Permit; procurement, installation, and compaction of CDF.

END OF SECTION 02767

Bike Path Drainage Upgrades  
Willow Ave. to Grove St.  
Somerville, MA  
20163393.002A

CURED-IN-PLACE PIPELINING  
02767-17

[THIS PAGE INTENTIONALLY LEFT BLANK]



## SECTION 02900

### LANDSCAPING

#### PART 1 – GENERAL

##### 1.1 SUMMARY

A. This section includes the following:

1. Providing loam, fertilizer, seed, plants and related work as indicated and specified.

##### 1.2 SUBMITTALS

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

1. Submit with seed, certificates concerning seed mixture, purity, germinating value, and crop year identification.
2. Submit test samples of loam to a certified soils consultant to determine fertilizer and lime requirements and return two copies of results for implementation.
3. If hydroseeding is to be used, provide written description containing seed analysis, fertilizer, and lime addition data.
4. Submit list of plant material to be used and source.
5. Prior to end of maintenance period, furnish two copies of written maintenance, instructions for maintenance and care of installed plants and lawn areas.

##### 1.3 QUALITY ASSURANCE

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

B. General:

1. Furnish suitable quantities of water, hose and appurtenances.
2. Use loam, having prior vegetative growth that did not contain toxic amounts of either acid or alkaline elements.
3. Begin maintenance immediately after each portion of lawn is seeded and continue for minimum of 45 days.

4. Repair or replace seeded areas which, in judgment of Engineer, have not survived and grown in a satisfactory manner, for a period of one year after acceptance.
5. Provide as specified seedings replacements of the same type and size as specified.
6. The Engineer reserves the right to test and reject any material not meeting specifications by utilizing tests in accordance with methods adopted by the Association of Official Agricultural Chemists. Costs for these tests shall be paid by the Contractor.

#### 1.4 DELIVERY, STORAGE AND HANDLING

- A. Provide in accordance with Section 01600 and as specified.
- B. Delivery:
  1. Deliver fertilizer to site in original unopened containers bearing manufacturer's guaranteed chemical analysis, name, trade name, trademark, and conformance to state law.

#### 1.5 JOB CONDITIONS

- A. See drawings for trees to be protected. Clear trees required to be removed only after approval by Engineer. Engineer to approve changes or exceptions required in grading on the job.
- B. Planting Seasons:
  1. Recommended Spring Planting Season: Deciduous materials - March 31 through June 15; Evergreen materials - April 27 through June 15.
  2. Recommended Fall Planting Season: Deciduous materials – August 15 through October 1; Evergreen materials - August 15 through October 1.
- C. Perform actual planting only when weather and soil conditions are suitable in accordance with locally accepted practice.
- D. Protection:
  1. Protect seeded and planted areas against damage by trespass and other causes.

2. Protect work until accepted.
  3. Replace, repair, restake, or replant as directed by Engineer, and at own expense, seeding or planting which is damaged.
- E. Wherever landscape work must be executed in conjunction with construction of other work, arrange a schedule of procedure that will permit execution of landscape work as specified.

## 1.6 WARRANTY

- A. Guarantee lawn areas for duration of one full year after seeding to be alive and in satisfactory growth at end of guarantee period.
1. For purpose of establishing an acceptable standard, scattered bare spots, none of which is larger than 1 sq. ft. will be allowed up to a maximum of 3% of lawn area.

## PART 2 - PRODUCTS

### 2.1 BONE MEAL

- A. Commercial raw bone meal, finely ground and containing a minimum of 1 percent nitrogen and 18 percent phosphoric acid.

### 2.3 LOAM

- A. Fertile, friable, natural topsoil typical of locality, without admixture of subsoil, refuse or other foreign materials, and obtained from well-drained arable site. Free of stumps, roots, heavy or stiff clay, stones larger than 1 inch in diameter, lumps, coarse sand, noxious weeds, sticks, brush or other deleterious matter.
- B. Not less than 4 percent nor more than 20 percent organic matter as determined by loss on ignition of oven-dried samples.

### 2.4 LIME, FERTILIZER AND SEED

- A. Ground agricultural limestone containing not less than 85 percent of total carbonates.
- B. Commercial type fertilizer, uniform in composition, free flowing, conforming to state and federal laws, and at least 50 percent of nitrogen derived from natural organic sources of ureaform and containing following percentages by weight: Nitrogen 10 percent, Phosphorus 10 percent, Potash 10 percent.

- C. Lawn seen mix [this is a general mix and maybe adjusted if extreme conditions are known such as shade, drought, etc.] clean, high in germinating value and of the latest year's crop mixed as follows:

Name	Minimum proportion by weight
Creeping Red Fescue	50%
Perennial Ryegrass	30%
Colonial Bentgrass	5%
Kentucky Bluegrass	15%

- D. Weeds shall not exceed 0.25 percent.

### PART 3 - EXECUTION

#### 3.1 LOAM

- A. Spread loam on areas to be seeded, to required depth indicated on Contract Drawings or as directed by Engineer, fine grade and compact. Specified depth shall be that after compaction.

#### 3.2 LIME, FERTILIZER AND SEEDING

- A. Apply lime by mechanical means at rate of 50 pounds per 1,000 sq. ft., or as soil analysis recommends.
- B. Apply fertilizer at rate of 50 pounds per 1,000 sq. ft., or as soil analysis recommends.
- C. Remove weeds or replace loam and reestablish finish grades, if any delays in seeding lawn areas and weeds grow on surface or loam is washed out prior to sowing seed and without additional compensation. Sow seed at rate of 4 pounds per 1,000 sq. ft. on calm day, by mechanical means. Sow one-half of seed in one direction, and other half at right angles to original direction. Rake seed lightly into loam, to depth of not more than 1/4 inch and compact by means of an acceptable lawn roller weighing 100 to 150 pounds per linear foot of width.
- D. Water lawn areas adequately at time of sowing and daily thereafter with fine spray, and continue throughout maintenance and protection period.
- E. Loam, lime, fertilize and seed required areas outside of perimeter same as lawn areas. Apply seed at rate of 150 pounds per acre. Rake seed lightly, after sowing, into top 1/4 in. of loam, and compact by suitable rollers weighing 100 to 150 pounds per linear foot of width.

#### 3.3 CLEAN-UP

- A. Remove soil or similar material which has been brought onto paved areas, keeping these areas clean.
- B. Upon completion of planting, remove excess soil, stones and debris which has not previously been cleaned up and legally dispose of off-site.
- C. Prepare lawns and planting areas for final inspection.
- D. Protect slopes and embankments against erosion until work is accepted. Repair eroded portions of seeded or sodded areas by refilling, resodding, mulching and reseeded as required by condition and to satisfaction of Engineer. Protection may be by installation of sod strips or other methods.

### 3.4 MAINTENANCE - SEEDED AREAS AND PLANTING

- A. Maintain lawn areas and other seed areas at maximum height of 2-1/2 inches by mowing. Weed thoroughly once and maintained until time of final acceptance. Reseed and refertilize with original mixtures, watering or whatever is necessary to establish over entire area of lawn and other seeded areas a close stand of grasses specified, and reasonably free of weeds and undesirable coarse native grasses.
- B. Begin maintenance immediately after each planting and continue until final acceptance of work. Water, mulch, weed, prune, spray, fertilize, cultivate and otherwise maintain and protect all plants.

### 3.5 INSPECTION FOR ACCEPTANCE

- A. Upon written request by the Contractor, the Engineer shall inspect all lawn areas to determine completion of contract work. This request must be submitted at least 10 days prior to the anticipated date. The lawns will become acceptable if they show a uniform, thick, well developed stand of grass that may be occupied by the Owner for their intended use. When acceptance is made in writing to the Contractor, the Contractor's responsibility for maintenance shall terminate.
- B. The Contractor shall furnish to the Owner complete written instructions for maintenance of all lawn areas at time of acceptance.
- C. Acceptance of the lawn area shall not occur before acceptance of the entire facility.

### 3.7 CONTRACT CLOSEOUT

- A. Provide in accordance with Section 01701.

## PART 4 – COMPENSATION

Bike Path Drainage Upgrades  
Willow Ave. to Grove St.  
Somerville, MA  
20163393.002A

LANDSCAPING  
02900-5

Not Used

-END OF SECTION 02900-

Bike Path Drainage Upgrades  
Willow Ave. to Grove St.  
Somerville, MA  
20163393.002A

LANDSCAPING  
02900-6

SECTION 02930

TREE PROTECTION

2622.1

TREE PROTECTION

EACH

PART 1 -- GENERAL

1.1 SUMMARY

- A. The work to be done under this section consists of instituting and maintaining positive measures to protect and maintain public and private shade trees within and adjacent to the limits of work as detailed on the Drawings and as directed by the Owner's Representative.
- B. This work includes proactive measures prior to, during and after construction to ensure the short- and long-term health of existing trees to remain on site and to prevent damage due to construction operations.
- C. Tree Protection should be assumed for existing trees to remain within the project limit of work where proposed construction activity is to occur beneath the canopy and within the drip lines of existing trees to remain. Tree protection shall remain in place throughout the duration of the construction project but may be temporarily relocated to allow for work in select areas in close proximity to the trees to occur as approved by the Owner's Representative. Tree protection shall be promptly restored following work operations. The measures described herein are anticipated to be required and will be verified based on actual field conditions. Provisions under this item include: tree protection fencing measures to minimize disturbance to existing trees and their root systems; canopy system review and evaluation; canopy pruning in areas of proposed disturbance; and post-pruning care including mulching and watering of root zones.
- D. Work in this section includes the following:
  - 1. Tree Protection
  - 2. Preparation of a Tree Protection and Maintenance Plan and Work Schedule
  - 3. Hiring of a Certified Arborist for the Duration of the Construction Activity
  - 4. Tree Pruning

1.2 RELATED TECHNICAL SPECIFICATIONS

- A. The Contractor shall carefully examine all of the Contract Documents for requirements which affect the Work of this Section.

1.3 GENERAL REQUIREMENTS

- A. All tree protection fencing must be installed and approved by the Owner's Representative and the City Tree Warden or City Arborist before site preparation or other construction activity commences. Any modifications to tree protection fencing during construction can only take

place with advanced written approval from the Owner's Representative and the City Tree Warden or City Arborist.

- B. Pruning: The Contractor shall prune City and private trees within the limit of work under the direction of a Massachusetts Certified Arborist and only as directed by Owner's Representative.
- C. Provide protection of existing trees and vegetation not designated for removal within the limits of work and along truck routes outside the limit of work. Temporarily stump or stockpile as applicable topsoil, shrubs, and vegetation within the limits of work that will interfere with construction and as required.
- D. Conduct site clearing and pruning operations to ensure minimum interference with roads, streets, walks, and other adjacent occupied or used facilities only as directed by the Owner's Representative. Do not close or obstruct streets, walks or other occupied or used facilities without permission from the Owner's Representative.
- E. Public trees are protected by Massachusetts State Law, Chapter 87. Section 12 states that a fine of up to five hundred dollars, (\$500.00) per incident of damage to public shade trees can be levied. Each branch broken or improperly pruned, each improper wounding of the trunks of the trees, and each root improperly pruned shall constitute an infraction. Section 12 further provides that anyone who negligently or willfully damages a tree will be liable to the City for all damages.
- F. The Contractor shall take the utmost care to avoid unauthorized, unnecessary or improper wounding of City or private shade trees. Prior to construction, the Contractor shall provide a Tree Protection and Maintenance Plan and Work Schedule. A Massachusetts or International Society of Arboriculture Certified Arborist shall be sub-contracted by the Contractor to provide a protection and maintenance plan and perform specified work. All plans and schedules shall be subject to review and approval by the City Tree Warden or City Arborist. Infraction of Massachusetts State Law Chapter 87 or failure to provide a protection plan and work schedule will result in fines or the immediate cancellation of the contract.
- G. The Contractor shall engage a board certified arborist with a **minimum of five (5) years of experience** including experience with supersonic air tools such as the "airspade" for the project.
- H. The work shall consist of the provision of all labor, materials, equipment, and transportation required to complete the pruning as required by the Owner's Representative in strict accordance with the conditions and specifications of these Contract Documents. The work shall include, but is not necessarily limited to, the following:
  - 1. Attending initial site visit and assessment with City representatives
  - 2. Securing necessary permits and approvals before commencement of work
  - 3. Posting work areas for parking restrictions
  - 4. Securing police details, if necessary
  - 5. Marking work zones for traffic and pedestrian control



6. Providing a schedule of work for City review and approval
7. Meeting with City staff on a periodic basis (up to 5 meetings)
8. Visual assessment of each tree to be pruned
9. Determination of pruning objectives
10. Making pruning cuts and wound care
11. Wood waste and debris consolidation & disposal
12. Site cleanup

#### 1.4 QUALITY ASSURANCE

- A. Tree Protection measures to be performed by Massachusetts Certified Arborist with a minimum of five years of experience and as reviewed and approved by the Owner's Representative and City Tree Warden or City Arborist.

#### 1.5 SUBMITTALS

- A. Certification: Submit the Certification of the arborist to be performing the work.
- B. Tree Protection and Maintenance Plan, Plant Health Care Program and Work Schedule: submit for review and approval by the Owner's Representative and City Tree Warden/ City Arborist at least two (2) weeks prior to beginning initial work on a project street.
- C. Product Data: Submit most recent printed information from manufacturers for:
  1. Slow Release Fertilizer
- D. Samples: Submit samples of:
  1. Tree Trunk Wrapping
  2. Tree Protection Fencing
  3. Wood Chips
- E. Shop Drawing/ Field Mock-Up: Submit for review and approval by the Owner's Representative and City Tree Warden:
  1. Tree Box. Owner's Representative to approve first tree box constructed prior to Contractor completing remaining boxes.

## PART 2 -- PRODUCTS

### 2.1 TREE BOX

- A. Tree Box shall be constructed from 2 in. x 4 in. lumber creating a box around the border of the tree pit with 2 in. x 4 in. lumber standing straight up at the corners and wrapped with orange snow fence. Fasteners as per detail.

### 2.2 TREE TRUNK WRAPPING PROTECTION LUMBER shall consist of 2 in. x 4 in. and 8 ft. height lumber wired together in close spacing with 16 gauge galvanized steel wire to form a protective enclosure around tree trunks.

### 2.3 WOOD CHIPS

- A. Wood Chips shall conform to provisions of Wood Chip Mulch under Materials Section M6.04.3 of the MassDOT Standard Specifications.

### 2.4 WATER

- A. Water shall be furnished by Contractor, suitable for irrigation and free from ingredients harmful to plant life. Hose and other watering equipment required for work shall be furnished by Contractor.

## PART 3 -- EXECUTION

- A. Remove trees, shrubs, grass and other vegetation, improvements, or obstructions that interfere with installation of new construction and as required. Removal includes digging out stumps in their entirety and grubbing roots to at least 2.5 feet below existing grades shown on the Drawings.
- B. Prior to start of subsurface work, Contractor shall conduct project-wide pruning of existing trees and shrubs within the right-of-way.
- C. A list of additional trees requested to be removed or pruned by the City as part of this project are attached to the end of this specification section. This work is required to be completed at the beginning of construction operations (Fall 2013). Associated removal of stumps can be postponed to coordinate with the work on individual streets.

### 3.2 SPECIAL REQUIREMENTS

- A. The Contractor is required to conform to the requirements of the City of Somerville Office of Strategic Planning and Community Development regulation "Tree Protection During Construction". This regulation contains specific measures and remedies should the Contractor fail to abide the City's requirements.
- B. For definitions and pruning standards, the Contractor is required to adhere to the requirements of ANSI A300, American National Standard for Tree Care Operations "Tree, Shrub and Other Woody Plant Maintenance Standard Practices".

### 3.3 SITE REVIEW OF EVALUATION OF TREES AND POTENTIAL CONSTRUCTION RELATED IMPACTS TO ROOT SYSTEMS

- A. Prior to mobilization and construction operations, Contractor, Arborist, Owner's Representative and City Tree Warden or City Arborist shall conduct a site review of the existing trees to remain in relation to proposed limits of construction operations, confirm the limits of tree protection fencing, and confirm which trees are to receive other types of Tree Protection including those designated as "Special Mature Trees". Contractor to document the trees and strategy to receive type of Tree Protection and submit for Owner's Representative's approval.

### 3.4 PROTECTION OF EXISTING TREES AND IMPROVEMENTS

- A. Provide protection necessary to prevent damage to existing trees and improvements indicated to remain in place inside or outside of the limit of work. Existing trees and shrubbery to remain shall be protected from injury. Except as otherwise approved, cutting and trimming of existing tree limbs and roots will not be permitted. Existing trees to remain which can potentially be damaged by construction operations shall be protected. Trees having a caliper under 20" diameter at breast height (dbh) shall be wrapped with tree protection lumber. "Special Mature Trees", those trees with a caliper over 20" dbh, shall be wrapped with tree protection lumber and protected with a tree box. Protection shall be maintained until completion of the work of the Contractor. Tree protection requirements are described in City of Somerville Office of Strategic Planning and Community Development regulation "Tree Protection During Construction".
- B. Protect trees and improvements on adjoining properties and within Cityright-of-way. Restore improvements damaged by Contractor's clearing and construction activities to their original condition, at no additional expense to the City. Remove and replace trees damaged by Contractor's clearing and construction activities at no additional expense to the City.
- C. Protect existing trees and other vegetation indicated to remain in place or outside of the clearing/grading limit lines.

### 3.5 TEMPORARY ACCESS

- A. Temporary access within plant protection areas is permitted to perform construction operations as approved by the Owner's Representative. Work within tree protection areas shall be performed by hand or with small equipment that will not damage or threaten damage to trees. Restore tree protection at the end of each day's operation.

### 3.6 TREE PROTECTION FOR SPECIAL MATURE TREES

- A. The Contractor shall stake out the following in relation to "Existing mature trees" as identified as being greater than 20" dbh or as identified in the field by the City Arborist at the start of the project. This should be done prior to initiating excavation and should be reviewed together in the field by the City's representatives, the Contractor, Contractor's arborist, and Owner's Representative. This includes:
  - 1. limits of utility trenching
  - 2. limits of sidewalks and proposed tree pit openings

3. limits of proposed construction fences,
  4. alignment of proposed limits of excavation.
- B. After areas of potential negative impact are reviewed and confirmed in the field, the Contractor's arborist shall perform subsurface root exploration and evaluate root distribution in the area of the final cut lines.
  - C. As a guideline, the minimum final cut line distance from trunk of tree shall be established by taking the tree's diameter at breast height in inches and converting it to feet, (For example, 12" caliper tree translates into a 12' offset from the edge of the trunk to the final cut line). Site constraints may dictate that the final cut line is closer to the trunk than guidelines will allow. Do not perform subsurface exploration near the trunk or within the drip line without authorization from the Owner's Representative.
  - D. The Contractor's arborist shall perform subsurface exploration in areas of negative impact adjacent to the final cut line using an air spade to cut windows in the soil to a depth of 10" or greater to expose the root systems without damaging them.
  - E. Based on the proposed alignment of the new utilities, pavement, curbs, formwork, etc. in relation to "Existing mature trees" the Contractor's arborist with the Owner's Representative's review and approval, will define the final cut lines depending on the density and distribution of the root systems.
  - F. The Contractor's arborist shall redirect root systems within the final cut line area and shall prune roots that extend beyond the final cut line with pruning tools. The Contractor and arborist shall minimize exposure of tree root systems during the exploration and pruning/construction activities over exposed roots, support edge of excavation and mulch to a depth approved by the Owner's Representative. The Contractor shall saturate burlap and mulch with water and maintain the burlap in a damp condition during daylight hours as to not allow roots to dry out. If tree roots will be exposed for a period of time longer than 1 week, the contractor shall install 2" depth of wood chip mulch.
  - G. Once final cuts are completed by the Contractor's arborist with pruning tools, no mechanical excavation shall be allowed beyond the final cut line around the existing tree to remain.

### 3.7 GENERAL HORTICULTURAL TREE AND ROOT RELATIONSHIPS

- A. The majority of a tree's roots are located in the upper few inches of topsoil. For this reason, trees are vulnerable to immediate and long-term damage. Immediate damage to roots is caused by grading, use of vehicles and tools, and excess pedestrian traffic above the roots. Long-term damage is caused by the compaction of the soil above the roots by use of vehicles, storage of materials, and excess pedestrian traffic.
- B. Protection of a tree therefore includes the protection of the roots of the tree as well as its trunk, branches, and leaves. Roots are best protected by fencing off as large an area as possible around each tree, so that no driving, parking, walking, or storage of materials takes place where it may cause damage.

- C. The roots of a tree often extend far into the surrounding landscape, including areas well beyond the outer perimeter of the tree's canopy / drip line. For this reason, operations should be confined to the smallest possible area.
- D. As a practical minimum, however, every effort shall be made to protect the area beneath the canopy of the tree, also known as the area inside the "drip line." This area is sometimes referred to as the "root zone."
- E. Soil is most vulnerable to compaction, and roots to damage, when the soil is wet.

### 3.8 ROOT PROTECTION

- A. Roots that cannot be avoided during construction for all other trees to remain shall be carefully and cleanly cut. Only hand methods for grubbing roots will be accepted inside drip lines of trees to be left standing. All pruning of any roots greater than 2" must be completed under the supervision of the City Arborist. Root pruning shall include application of root treatment or fertilizer as required. In order to minimize impacts to roots, Contractor shall uncover roots with air spade for all Special Mature Trees as identified under Section 3.8 of this specification. Additionally, the City Arborist may determine that certain significant roots of trees under 20" in diameter may also require the use of an air spade.
- B. Trucks and heavy equipment shall not pass over or park on roots of public shade trees; nor shall construction materials, debris, or excavated material be stored within drip line of trees or within tree pits. For occasional or one time access over roots, 1/2-inch plywood overlapped may be used. Permeable materials such as gravel or wood chips shall be placed over root systems of trees which are not covered by hardscape and over which trucks and heavy equipment must travel during construction operations, when such travel is unavoidable, to prevent soil compaction and root damage. Material shall be replaced as needed. Contractor must have prior approval for access from the Owner's Representative or City Arborist.
- C. During sidewalk construction adjacent to trees, suitable soil shall be maintained within tree wells. Moist soil or mulch shall also be maintained around surface roots outside of tree wells which may become exposed during construction. Such covering shall be placed as soon as possible after roots are exposed. If roots are going to be exposed for more than one hour, cover roots with damp burlap. Burlap shall be kept moist until most soil and mulch can be used for permanent cover.
- D. Tunneling shall be the preferred method of excavation adjacent to tree roots to avoid root pruning. If root pruning is unavoidable, a certified arborist shall be onsite to execute or oversee the operation with sufficiently sharpened hand tools and in such a fashion as to have minimum negative impact on tree health and safety.

### 3.9 EXCAVATION WITHIN DRIP LINE

- A. Where excavation for new construction is required within drip line of trees, tie branches out of the way, hand clear and excavate to minimize damage to root systems and place wood chips to a depth of six inches (6") on the ground to protect the root systems.
- B. Use narrow-tine spading forks and comb soil to expose roots. Relocate roots in backfill areas where possible. If encountering large, main lateral roots, expose roots beyond excavation limits to bend and relocate them without breaking. No roots greater than two (2) inches in diameter

shall be cut from trees to remain without prior approval of the Owner's Representative or City Arborist. Provide protection for roots over one inch (1") diameter cut during construction operations. Prune roots that are either cut or broken with a smooth, clean cut.

### 3.10 ROOT PRUNING

- A. Do not cut main lateral roots or taproots; cut only smaller roots that interfere with installation of structures. Cut roots with sharp pruning instruments; do not break or chop; cutting of roots with machinery is expressly prohibited. When roots that must be cut are encountered, work shall cease until roots have been properly cut.

### 3.11 ROOT SYSTEM EXPOSURE AND SUPPORT

- A. Provide saturated burlap or temporary earth to cover tree roots exposed by construction. Do not allow exposed roots to dry out before placing permanent backfill. Water and maintain roots in a moist condition. Temporarily support and protect roots from damage until they are permanently relocated and covered with soil.

### 3.12 PRUNING SAFETY STANDARDS

- A. Tree pruning and airspading shall be performed only by certified arborists or arborist trainees who, through related training or on-the-job experience, or both, are familiar with the practices and hazards of arboriculture and the equipment used in such operations.
- B. The Contractor's certified arborist must be present at all times while tree pruning is performed.
- C. Tree pruning operations shall comply with the American National Standard for Tree Care Operations—Safety Requirements (ANSI Z133.1), as approved by the American National Standards Institute, and published by the National Arborists Association. Operations shall also comply with applicable Occupational Health and Safety Administration (OSHA) standards.

### 3.13 PRUNING OBJECTIVES

- A. The pruning operation shall focus on the following types of pruning:
  - 1. **Cleaning.** Cleaning shall consist of selective pruning to remove one or more of the following parts—dead, diseased, and/or broken branches. All deadwood that is two (2) inches or greater in diameter shall be removed. Branches with splits, large cavities or any defect that may result in failure shall be reduced, or removed to the trunk if reduction is not feasible.
  - 2. **Thinning.** Thinning shall consist of selective pruning to reduce density of live branches. Thinning shall result in an even distribution of branches on individual limbs and throughout the crown.
  - 3. **Raising.** Raising shall consist of selective pruning to provide vertical clearance. The intent of crown raising for this project will be the removal of all branches extending lower than fourteen (14) feet above a public roadway and eight (8) feet above a public sidewalk. This includes trees endangered by traffic re-routing as the result of construction operations, as well as trees over existing roadways and sidewalks which do not presently meet these height requirements. However, the level of pruning of each tree will be determined at the

site walk with the Contractor, Contractor's arborist, Owner's Representative and City Arborist. Additionally, any cuts to lateral branches over 4" as well as any questionable cuts will require the approval of the City Arborist.

4. Reducing. Reduction shall consist of selective pruning to decrease height and/or spread. Consideration shall be given to the ability of a tree species to tolerate this type of pruning. All branches obstructing park signs, street signs, traffic signs, traffic lights, and park or street lighting shall be removed. Branches shall be pruned away from all houses and buildings a minimum of five (5) feet, or more if appropriate to the tree shape and structure.
5. Specialty (Young) Trees. For young yet established trees, branches that are rubbing or poorly attached shall be removed. A central leader or leaders as appropriate to the species should be developed. A strong, properly spaced scaffold branch structure should be selected. For newly planted trees, pruning shall be limited to cleaning.
  - a. During the First Three Years After Planting: A central leader or leaders (as most appropriate for the species and specimen) shall be developed by removing competing leaders and removing vigorously growing branches that compete with the selected leader(s). A strong scaffold branch structure shall be developed by selecting the primary scaffold branches. To improve the scaffold structure, branches that are crossing, have included bark or interfere with the scaffold branches shall be removed. Scaffold branches shall be properly spaced. For deciduous shade trees that will reach or exceed 40 ft (12.2 m) in height at maturity, the recommended spacing is approximately 18 in (457.2 mm). For smaller species, 6 to 8 in. (152.4 mm to 203.2 mm) would be adequate.
  - b. Between Four and Six Years After Planting: The development of a good, structurally sound scaffold branch system should be continued by selective thinning of or on branches and removing dead, interfering, split and broken branches. Large-growing branches with narrow angles of attachment shall be removed from the trunk and canopy. The crown shall be raised for pedestrian clearance and vehicular clearance.

### 3.14 PRUNING PRACTICES

- A. The Contractor's certified arborist shall visually inspect each tree before commencing work.
- B. If a condition is observed requiring attention, the condition should be reported to the City within 24 hours. Such conditions may include structural weakness, rot or decay that cannot be corrected by cleaning, and dead trees.
- C. Equipment and work practices that damage living tissue and bark beyond the scope of work shall be avoided. Climbing spurs shall not be used when climbing and pruning trees. Spurs may be used to reach an injured climber or when removing a tree.
- D. Pruning tools (e.g. chain saws, pole saws, hand saws, pole pruners, etc.) shall be sharp and regularly sharpened and maintained throughout the Contract Term.
- E. Not more than 25% of the foliage of an individual tree should be removed within an annual growing season. The percentage and distribution of foliage to be removed shall vary according to the tree species, age, health and site, in accordance with the types of pruning identified above.

- F. Not more than 25% of the foliage of a branch or limb shall be removed when it is cut back to a lateral. The lateral shall be large enough to assume apical dominance.
- G. Heading shall be permitted only by the expressed permission of the City, when needed to reach a defined objective.
- H. Topping and lion tailing shall be considered unacceptable pruning practices.
- I. All pruning cuts shall be made in accordance with the American National Standard for Tree Care Operations—Standard Practices (ANSI A300 Part 1), as approved by the American National Standards Institute, and published by the National Arborists Association (revised 2001). All terminology included in these Technical Specifications shall be defined by ANSI A300 Part 1.
- J. When tracing wounds, only loose, damaged tissue should be removed. No other wound treatments shall be used.
- K. On mature trees the maximum diameter of any undesirable branch (dead, broken, rubbing, structurally unsound) that may be left shall not exceed 2 in. (50.8 mm).
- L. Pruning cuts shall be clean and smooth with the bark at the edge of the cut firmly attached to the wood.
- M. Large or heavy branches that cannot be thrown clear shall be lowered on ropes to prevent injury to the tree and other property.
- N. Rope injury to trees from leading out heavy wood shall be avoided by using a cambium guard or installing a false crotch.

### 3.15 UTILITY CONSTRUCTION NEAR TREES

- A. Route utilities away from existing trees. Review re-routing with Owner's Representative. Do not proceed without written direction. Minimize the cutting of tree roots, and when cutting is unavoidable, cut cleanly with a power saw and not an excavating machine.

### 3.16 ACTIVITIES PROHIBITED WITHIN DRIP LINE

- A. Do not store and stockpile construction materials and/or excavated materials, park vehicles, drive vehicles, remove soils, and stockpile soils within the drip line of trees, including trees located on adjacent properties which overhang the site unless otherwise indicated in Contract Drawings. Excavation within these areas shall be subject to special care as described below in “Excavation within Drip line”.

### 3.17 EQUIPMENT

- A. The following equipment and vehicles shall be available on-site for use. All gas-powered equipment and vehicles must be five years old or less and in good condition as determined by the Owner's Representative.
  1. One (1) aerial lift trucks with an articulating boom that have a working height of not less than sixty (60) feet with Contractor's name painted on each side.



2. One (1) wood chippers with a capacity for 16" diameter limbs.
3. All relevant traffic control devices as prescribed by the Manual of Uniform Traffic Control Devices (MUTCD) of the U.S. Department of Transportation.

### 3.18 PLANT HEALTH CARE PROGRAM

- A. Prior to mobilization and construction operations, Contractor's arborist to document and submit a strategy for maintaining the health of existing trees within the project limits including strategies for watering and fertilizing as outlined below.
- B. Watering: Water trees and other vegetation to remain within limits of contract work as required to maintain their health during course of construction operations.
- C. Drainage: Do not permit water to stand around the base of plants within the drip line during construction operations except during that period of inundating flooding which would, in its natural course, cover the base of trees. Provide temporary drainage where required to avoid ponding during construction operations.
- D. Fertilizing: After pruning operations are completed, fertilize trees to increase vigor with a complete, slow release nitrogen, phosphorus, potassium (1:1:1 or 2:1:1) liquid injected fertilizer. Where liquid injected fertilizer is not practical, and when approved by Owner's Representative, drill holes 6" to 10" deep and place granular fertilizer at frequent spacing.

### 3.19 DAMAGE DUE TO CONSTRUCTION OPERATIONS

- A. Contractor shall be responsible for the health of the existing trees in the immediate vicinity of construction. Trees damaged by construction operations which, as determined by the Owner's Representative, can be remedied by corrective pruning measures shall be addressed immediately.
- B. Owner's Representative shall engage an independent qualified Arborist to inspect the damaged trees and to make a determination on damage, sustainability, and remediation procedures.
- C. The Contractor shall strictly adhere to the independent Arborist's recommendations.
- D. Broken limbs shall be pruned according to industry standards.
- E. Wounds shall not be painted.
- F. The total cost of tree repair, including the cost of the independent Arborist, shall be borne by the Contractor.

### 3.20 TREE REPLACEMENT DUE TO DAMAGE

- A. If the independent Arborist determines that the damaged tree cannot be repaired and restored to full-growth status, the Contractor shall replace the damaged tree(s) and pay liquidated damages as noted below.
- B. The size of the replacement tree shall equal ½" caliper for every 1" caliper inch of the damaged tree (size of the damaged tree shall be measured, the new tree shall be based on nursery

measurements). The species of the replacement tree shall be determined by the Owner's Representative and the City.

- C. In addition to providing a new tree replacement, Contractor shall pay City \$250.00 for every caliper inch of the damaged tree (the size of the damaged tree shall be as shown on the Drawings).
- D. An example of the conditions stated above: A 20" caliper tree was damaged and determined to need replacement. To remedy this situation, the Contractor would purchase and install a 10" caliper tree and pay the Owner \$5,000. Type of tree and installation specifications to be determined and signed off by the City Arborist.
- E. The total cost of tree replacement, including the cost of the tree and stump removal and the independent Arborist, shall be borne by the Contractor.

### 3.21 TEMPORARY REMOVAL OF SHRUBS AND TOPSOIL

- A. Topsoil, shrubs, and vegetation to be temporarily removed shall be carefully removed from overall areas to be excavated, and over all other areas to be disturbed as a result of the Contractor's operations in the performance of the Contract work. The topsoil shall be transported and deposited in storage piles convenient to the areas which are subsequently to receive the application of topsoil, separate from other excavated materials, and in approved locations. The topsoil shall be stockpiled free of roots, stones and other undesirable material. The Contractor shall take all necessary precautions to prevent other excavated material or other objectionable material from becoming intermixed with the topsoil, either before or after the stripping and stockpiling operations. Shrubs and other vegetation shall be balled and burlaped with the root ball size equal to or greater than that recommended in American National Standards Institute (ANSI) Z60.1-2014 American Standard for Nursery Stock, and then transported and stored until they can be replaced after construction has been completed in that area. Move all balled and burlaped plants by the root ball; never pick up or move using the trunk or stem as a handle. All The shrubs and vegetation must be watered regularly and maintained to remain healthy while being temporarily stored. Any shrubs and vegetation that do not remain healthy during storage shall be replaced by the Contractor at no additional cost to the City.

### 3.22 DISPOSAL OF WASTE MATERIALS

- A. Remove waste materials and unsuitable topsoil from project area and dispose of off site in a legal manner. Waste materials shall include but not be limited to timber, brush, refuse, stumps, roots, vines, debris and other objectionable matter. Removal includes raking and sweeping after completion of clearing and pruning operations.
- B. Tree branches shall be removed in such a manner so as not to cause damage to other parts of the tree, or to surrounding people and property. Where necessary, ropes or other equipment shall be used to lower large branches to the ground. To avoid injury when lowering heavy branches, use a cambium guard or install a false crotch.
- C. All severed limbs shall be chipped, hauled away from the site, and disposed of in a legal manner. All wood waste, sawdust, leaves, and associated organic debris shall be collected from both public ways and adjacent private property, hauled away from the site, and disposed of in a legal manner.

D. Site cleanup shall follow as closely as possible to the pruning operation.

3.23 POST-CONSTRUCTION CLEANUP

A. After construction is complete, but prior to preparation and seeding of lawn area and planting, remove and properly dispose of the following off site: wood chips, temporary fencing, branch protection, tree boxes and trunk protection, and other materials.

PART 4 – COMPENSATION

**Item 2930.1 – Tree Protection**

METHOD OF MEASUREMENT:

Measurement for payment for Tree Protection will be based on the per each as approved by the Engineer.

BASIS OF PAYMENT/ INCLUSIONS:

Under the Unit Price for Tree Protection, the Contractor shall furnish all labor, materials, instrumentation, tools, equipment, and incidentals required to furnish, and install tree protection as specified in the Contract Specifications and also as required by the Engineer. Payment under this Item includes, but is not limited to; furnishing, installation, and maintenance during construction of all tree protection wrap and materials as specified in the tree protection detail on Sheet CG-1 for trees greater than 20” DBH, submission of shop drawings and submittals as required, tree protection wrap and installation for trees less than 20” DBH will also be included.

END OF SECTION

[THIS PAGE INTENTIONALLY LEFT BLANK]

SECTION 02950

PRIVATE PROPERTY RESTORATION

<b>2950.1</b>	<b>PRIVATE PROPERTY SELECTIVE DEMOLITION &amp; RESTORATION – 73 WINSLOW AVE.</b>	<b>LUMP SUM</b>
<b>2950.2</b>	<b>PRIVATE PROPERTY SELECTIVE DEMOLITION &amp; RESTORATION – 89 WINSLOW AVE.</b>	<b>ALLOWANCE</b>
<b>2950.3</b>	<b>PRIVATE PROPERTY SELECTIVE DEMOLITION &amp; RESTORATION – 91 WINSLOW AVE.</b>	<b>LUMP SUM</b>
<b>2950.4</b>	<b>PRIVATE PROPERTY SELECTIVE DEMOLITION &amp; RESTORATION – 93 WINSLOW AVE.</b>	<b>LUMP SUM</b>
<b>2950.5</b>	<b>PRIVATE PROPERTY SELECTIVE DEMOLITION &amp; RESTORATION – 95 WINSLOW AVE.</b>	<b>LUMP SUM</b>
<b>2950.6</b>	<b>PRIVATE PROPERTY SELECTIVE DEMOLITION &amp; RESTORATION – 97 WINSLOW AVE.</b>	<b>LUMP SUM</b>
<b>2950.7</b>	<b>PRIVATE PROPERTY SELECTIVE DEMOLITION &amp; RESTORATION – 32 CLIFTON ST.</b>	<b>LUMP SUM</b>

PART 1 - GENERAL

1.1 DESCRIPTION

- A. The work covered under this Section includes the furnishing of all labor, equipment, appliances, and materials, and in performing all operations in connection with restoration and reconstruction of private property features to their original condition and location or as specified including removal and replacement of existing stockade fencing, selective demolition and replacement of existing 1-foot, 2-foot and 4-foot high retaining walls, removal of an existing wood deck, loam and seed, removal and replacement of two 3-inch diameter trees, selective demolition and replacement of existing garden planter boxes, matching the original patterns of brick or concrete paver patios or walkways such as herringbone, basket weave, running bond, etc, and all other necessary appurtenant work to reconstruct private property areas to their original condition, as directed by the engineer, complete and accepted in

accordance with the Drawings and Specifications and as required.

- B. The Work shall not begin without prior Right of Entry to the existing private properties. The OWNER will obtain all Right of Entry to the existing private properties. The Contractor shall not contact the property owner until Right of Entry has been obtained.
- C. The Contractor shall be responsible for all

## 1.2 RELATED WORK

- A. Section 01300 – SUBMITTALS
- B. Section 01390 – PRECONSTRUCTION SURVEY
- C. Section 02051– DEMOLITION, MODIFICATION, AND ABANDONMENT
- D. Section 02900 – LANDSCAPING

## 1.3 SUBMITTALS

- A. Shop Drawings: Submit the following in accordance with Section 01300 – SUBMITTALS. Contractor to prioritize private property restoration submittals minimum 3 weeks before the Restoration Work.
- B. For plants and landscaping submittal requirements refer to Section 02900.1.2.
- C. For concrete pavers, brick walkways, and driveway restoration submittal requirements contractor shall refer to Section 02525.1.3.
- D. For gravity block retaining wall submittal requirements refer to Section 03303.1.6.

## PART 2 - MATERIALS

### 2.1 General

- A. Materials for all Private Property Restoration shall be of the type, size, grade, and class to match the existing material and pattern as directed by the engineer.

PART 3 - EXECUTION:

- 3.1 Refer to Section 02051 – Demolition, Modification and Abandonment for demolition requirements.
- 3.2 All workmanship shall conform to the best standard practice, and all work shall be conducted by skilled workmen. The contractor shall repair/reconstruct all areas impacted by the work to match existing conditions or as indicated on the Drawings to the satisfaction of the Engineer.
- 3.3 Landscape restoration shall be completed between April and October.
- 3.4 Refer to Section 02900- Landscaping for landscaping maintenance requirements.

PART 4 – COMPENSATION

**Item 2950.1 – Private Property Selective Demolition & Restoration – 73 Winslow Ave.**

METHOD OF MEASUREMENT:

Measurement for Private Property Selective Demolition and Restoration within the property limits of 73 Winslow Avenue shall be based on a percent of the Lump Sum bid based on the percentage of the work completed as determined or approved by the engineer for Private Property Restoration completed, within the payment limits, as shown on the Contract Drawings or as required by the Engineer. [JLA1]

BASIS OF PAYMENT / INCLUSIONS: [AO2][JLA3]

Payment for Private Property Selective Demolition and Restoration within the property limits of 73 Winslow Avenue shall be based on the Lump Sum bid for Private Property Selective Demolition and Restoration. Under the Lump Sum price for this item, the Contractor shall furnish all labor, materials, tools, equipment, and incidentals required for the Restoration of all Private Property Selective Demolition and Restoration at 73 Winslow Avenue as detailed and where indicated or required by the Owner or Engineer. The work includes, but is not limited to; the furnishing of all labor, equipment, appliances and materials, and in performing all operations in connection with restoration and reconstruction of private property site features to their original condition and location including raising the existing drainage manhole frame and cover to existing grade, landscape restoration: loam and seed of the impacted areas to match existing, removal and replacement of Japanese Maple tree, azalea bush, and ground cover plantings, storing and resetting existing site features and fencing, and the removal and replacement of any existing site features damaged by the work.

SPECIAL NOTES ON INCLUSIONS/EXCLUSIONS:

The following items are not included for payment under this item; preconstruction survey,  
Bike Path Drainage Upgrades PRIVATE PROPERTY  
Willow Ave. to Grove St. RESTORATION  
Somerville, MA 02950-3  
20163393.002A

sidewalks, walkways, Private Property selective demolition and restoration of 71, 89, 91, 93, 95, 97 Winslow Avenue and 32 Clifton Street, and all other areas restored within the 73 Winslow Avenue property limits to replace areas damaged by the Contractor during construction. This item includes restoration related to the City's 24" Storm Drain rehabilitation.

**Item 2950.2 – Private Property Selective Demolition & Restoration – 89 Winslow Ave.**

**METHOD OF MEASUREMENT:**

Payment will be made against the allowance based on invoices submitted by the General Contractor on a monthly basis. Labor, professional services, technician, and other invoices shall include a breakdown of hours, labor rates, direct expenses all sub-consultant and contractor mark-ups, material costs, shipping, taxes and all other costs included in the request. Incomplete or incorrect invoices will not be approved.

**BASIS OF PAYMENT / INCLUSIONS:**

The General Contractor is allowed up to a 5% Mark-up on labor, professional service, technician, and other costs related to selective demolition and restoration west of the existing 5' stockade fence separating 89 Winslow Avenue and 91 Winslow Avenue shown on the Contract Drawings and as approved by the resident engineer.

The allowance for this item shall be reimbursement to the General Contractor to furnish all labor, professional services, technician, equipment, and incidentals for the Contractor to perform Private Property Selective Demolition and Restoration within the property limits of 89 Winslow Avenue. Under the allowance price for this item, the Contractor shall furnish all labor, materials, tools, equipment, and incidentals required for the Restoration of all Private Property Selective Demolition and Restoration at 89 Winslow Avenue as detailed and where indicated or required by the Owner or Engineer. The work includes, but is not limited to performing all operations in connection with restoration and reconstruction of private property site features to their original condition and location including landscape restoration: loam and seed of the impacted areas to match existing, storing and resetting existing site features and fencing, and the removal and replacement of any existing site features impacted by the work.

**SPECIAL NOTES ON INCLUSIONS/EXCLUSIONS:**

The following items are not included for payment under this item; preconstruction survey, sidewalks, walkways, Private Property selective demolition and restoration of 73, 91, 93, 95, 97 Winslow Avenue and 32 Clifton Street, and all other areas restored within the 89 Winslow Avenue property limits to replace areas damaged by the Contractor during construction. This item includes restoration related to the City's 24" Storm Drain rehabilitation.



**Item 2950.3 – Private Property Selective Demolition & Restoration – 91 Winslow Ave.**

**METHOD OF MEASUREMENT:**

Measurement for Private Property Selective Demolition and Restoration within the property limits of 91 Winslow Avenue shall be based on a percent of the Lump Sum bid based on the percentage of the work completed as determined or approved by the engineer for Private Property Restoration completed, within the payment limits all items west of the existing 5’ high stockade fence separating 91 Winslow Avenue and 93 Winslow Avenue and ending at the 5’ high stockade fence separating 91 and 89 Winslow avenue shown on the Contract Drawings or as required by the Engineer.

**BASIS OF PAYMENT / INCLUSIONS:**

Payment for Private Property Selective Demolition and Restoration within the property limits of 91 Winslow Avenue shall be based on the Lump Sum bid for Private Property Selective Demolition and Restoration. Under the Lump Sum price for this item, the Contractor shall furnish all labor, materials, tools, equipment, and incidentals required for the Restoration of all Private Property Selective Demolition and Restoration of 91 Winslow Avenue as detailed and where indicated or required by the Owner or Engineer. The work includes, but is not limited to; the furnishing of all labor, equipment, appliances and materials, and in performing all operations in connection with restoration and reconstruction of private property site features to their original condition and location including landscape restoration: loam and seed of the impacted areas to match existing, decorative planting replacement; removal, stacking and resetting existing site features; the removal and replacement of the garden planter box, and removal and reconstruction of concrete paver walks and patios matching the original patterns of walkways and patios.

**SPECIAL NOTES ON EXCLUSIONS:**

The following items are not included for payment under this item; preconstruction survey, sidewalks, walkways, Private Property selective demolition and restoration of 73, 89, 93, 95, 97 Winslow Avenue and 32 Clifton Street, and all other restoration within 91 Winslow Avenue property limits installed to replace areas damaged by the Contractor during construction. This item includes restoration related to the City’s 24” Storm Drain rehabilitation.

**Item 2950.4 – Private Property Selective Demolition & Restoration – 93 Winslow Ave.**

**METHOD OF MEASUREMENT:**

Measurement for Private Property Selective Demolition and Restoration within the property limits of 93 Winslow Avenue shall be based on a percent of the Lump Sum bid based on the percentage of the work completed as determined or approved by the engineer for Private Property Restoration completed, within the payment limits.

Bike Path Drainage Upgrades  
Willow Ave. to Grove St.  
Somerville, MA  
20163393.002A

PRIVATE PROPERTY  
RESTORATION  
02950-5

**BASIS OF PAYMENT / INCLUSIONS:**

Payment for Private Property Selective Demolition and Restoration of 93 Winslow Avenue shall be based on the Lump Sum bid for Private Property Selective Demolition and Restoration completed, within the payment limits, all items west of the existing 5’ high stockade fence separating 93 Winslow Avenue and 95 Winslow Avenue and ending at the 5’ high stockade fence separating 91 and 93 Winslow avenue shown on the Contract Drawings or as required by the Engineer. Under the Lump Sum price for this item, the Contractor shall furnish all labor, materials, tools, equipment, and incidentals required for the Restoration of all Private Property Selective Demolition and Restoration of 93 Winslow Avenue as detailed and where indicated or required by the Owner or Engineer. The work includes, but is not limited to; the furnishing of all labor, equipment, appliances and materials, and in performing all operations in connection with restoration and reconstruction of private property site features to their original condition and location including landscape restoration: loam and seed of the impacted areas to match existing, storing and resetting existing site features, the removal and disposal of the existing wood deck, concrete paver installation, and the removal and replacement of the existing 5 foot high stockade fence, garden planter box, and lattice gate.

**SPECIAL NOTES ON INCLUSIONS/EXCLUSIONS:**

The following items are not included for payment under this item; preconstruction survey, sidewalks, Private Property selective demolition and restoration of 73, 91 ,95, 97 Winslow Avenue and 32 Clifton Street, and all other areas within 93 Winslow Avenue property limits installed to replace areas damaged by the Contractor during construction. This item includes restoration related to the City’s 24” Storm Drain rehabilitation.

**Item 2950.5 – Private Property Selective Demolition & Restoration – 95 Winslow Ave.**

**METHOD OF MEASUREMENT:**

Measurement for Private Property Selective Demolition and Restoration within the property limits of 95 Winslow Avenue shall be based on a percent of the Lump Sum bid based on the percentage of the work completed as determined or approved by the engineer for Private Property Restoration completed, within the payment limits.

**BASIS OF PAYMENT / INCLUSIONS:**

Payment for Private Property Selective Demolition and Restoration of 95 Winslow Avenue shall be based on the Lump Sum of for Private Property Selective Demolition and Restoration completed for this item within the payment limits, all items west of the existing 5’ high stockade fence separating 95 Winslow Avenue and 97 Winslow Avenue and ending at the 5’ high stockade fence separating 95 and 93 Winslow avenue shown on the Contract Drawings or as required by the Engineer. Under the Lump Sum price for this item, the Contractor shall furnish all labor, materials, tools, equipment, and incidentals required for the Restoration of all Private Property Selective Demolition and

Bike Path Drainage Upgrades  
Willow Ave. to Grove St.  
Somerville, MA  
20163393.002A

PRIVATE PROPERTY  
RESTORATION  
02950-6

Restoration of 95 Winslow Avenue as detailed and where indicated or required by the Owner or Engineer. The work includes, but is not limited to; the furnishing of all labor, equipment, appliances and materials, and in performing all operations in connection with restoration and reconstruction of private property site features to their original condition and location including landscape restoration: loam and seed of the impacted areas to match existing, storing and resetting existing site features, and the removal and replacement of the 5 foot high stockade fence, two 3” diameter trees, and garden planter box.

**SPECIAL NOTES ON INCLUSIONS/EXCLUSIONS:**

The following items are not included for payment under this item; preconstruction survey, sidewalks, walkways, Private Property selective demolition and restoration of 73, 89, 91, 93, 97 Winslow Avenue and 32 Clifton Street, and all other areas within 95 Winslow Avenue property limits installed to replace areas damaged by the Contractor during construction. This item includes restoration related to the City’s 24” Storm Drain rehabilitation.

**Item 2950.6 – Private Property Selective Demolition & Restoration – 97 Winslow Ave.**

**METHOD OF MEASUREMENT:**

Measurement for Private Property Selective Demolition and Restoration within the property limits of 97 Winslow Avenue shall be based on a percent of the Lump Sum bid based on the percentage of the work completed as determined or approved by the engineer for Private Property Restoration completed, within the payment limits.

**BASIS OF PAYMENT / INCLUSIONS:**

Payment for Private Property Selective Demolition and Restoration of 97 Winslow Avenue shall be based on the Lump Sum of for Private Property Selective Demolition and Restoration completed for this item in the proposal within the payment limits, all items west of the existing 8’ high stockade fence separating 97 Winslow Avenue and Clifton St. and ending at the 5’ high stockade fence separating 95 and 97 Winslow avenue shown on the Contract Drawings or as required by the Engineer. Under the Lump Sum price for this item, the Contractor shall furnish all labor, materials, tools, equipment, and incidentals required for the Restoration of all Private Property Selective Demolition and Restoration of 97 Winslow Avenue as detailed and where indicated or required by the Owner or Engineer. The work includes, but is not limited to; the furnishing of all labor, equipment, appliances and materials, and in performing all operations in connection with restoration and reconstruction of private property site features to their original condition and location including landscape restoration: loam and seed of the impacted areas to match existing, storing and resetting existing site features, and the selective removal and replacement of the 8 foot high stockade fence and the 2 foot high timber retaining wall.

Bike Path Drainage Upgrades  
Willow Ave. to Grove St.  
Somerville, MA  
20163393.002A

PRIVATE PROPERTY  
RESTORATION  
02950-7

**SPECIAL NOTES ON INCLUSIONS/EXCLUSIONS:**

The following items are not included for payment under this item; preconstruction survey, sidewalks, walkways, Private Property selective demolition and restoration of 71, 73, 89, 91 ,93, 95 Winslow Avenue and 32 Clifton Street, and all other areas within 97 Winslow Avenue property limits installed to replace areas damaged by the Contractor during construction. This item includes restoration related to the City's 24" Storm Drain rehabilitation.

**Item 2950.7 – Private Property Selective Demolition & Restoration – 32 Clifton St.**

**METHOD OF MEASUREMENT:**

Measurement for Private Property Selective Demolition and Restoration within the property limits of 32 Clifton Street shall be based on a percent of the Lump Sum bid based on the percentage of the work completed as determined or approved by the engineer for Private Property Restoration completed, within the payment limits, as shown on the Contract Drawings or as required by the Engineer.

**BASIS OF PAYMENT / INCLUSIONS:**

Payment for Private Property Selective Demolition and Restoration within the property limits of 32 Clifton Street shall be based on the Lump Sum of for Private Property Selective Demolition and Restoration completed for this item in the proposal. Under the Lump Sum price for this item, the Contractor shall furnish all labor, materials, tools, equipment, and incidentals required for the Restoration of all Private Property Selective Demolition and Restoration of 32 Clifton Street as detailed and where indicated or required by the Owner or Engineer. The work includes, but is not limited to; the furnishing of all labor, equipment, appliances and materials, and in performing all operations in connection with restoration and reconstruction of private property site features to their original condition and location including landscape restoration: loam and seed of the impacted areas to match existing, storing and resetting existing site features, and the selective removal and replacement of the 4 foot high rubble retaining wall, 6 foot high chain link fence, stone staircase, and existing brick walk matching the original pattern.

**SPECIAL NOTES ON INCLUSIONS/EXCLUSIONS:**

The following items are not included for payment under this item; preconstruction survey, sidewalks, walkways, Private Property selective demolition and restoration of 71, 73, 89, 91 ,93, 95 and 97 Winslow Avenue, and all other areas within 32 Clifton Street property limits installed to replace areas damaged by the Contractor during construction. This item includes restoration related to the City's 24" Storm Drain rehabilitation.

END OF SECTION 02950

Bike Path Drainage Upgrades  
Willow Ave. to Grove St.  
Somerville, MA  
20163393.002A

PRIVATE PROPERTY  
RESTORATION  
02950-8

SECTION 03303  
GRAVITY BLOCK RETAINING WALL

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.
- B. Section 02210 - Earth Excavation, Backfill, Fill, And Grading
- C. Section 02950 - Private Property Restoration
- D. Refer to Soil Boring Log B-1 in the attached Appendices.

1.2 SUMMARY

- A. Work includes furnishing and installing concrete retaining wall units to the existing lines and grades designated on the construction drawings and as specified herein for replacement of a portion of an existing stone and concrete retaining wall on the #32 Clifton Street property.
- B. Contract drawings and specified herein are provided for a Redi-Rock® Block Retaining Wall System designed by the Contractor; however, an equivalent wall system, approved by the Engineer, may be used.

1.3 DEFINITIONS

- A. Retaining Wall – system of segmental concrete block units and drainage elements.
- B. Segmental concrete block units – Concrete retaining wall units machined from Portland cement, water, and aggregates.
- C. Drainage backfill – material used within, between, and behind the concrete retaining wall unit.
- D. Geotextile – material used for separation and filtration of dissimilar materials.
- E. Foundation Soil – soil mass supporting the leveling pad of the retaining wall system.
- F. Retained Zone – Natural soils or structural fill immediately behind the drainage backfill and wall infill.
- G. Leveling pad – A level, compacted gravel pad upon which the bottom course of the segmental concrete retaining wall units are placed.

- H. Wall Infill – the fill material placed and compacted between the drainage aggregate and the excavated soil face in retaining wall sections.
- I. Engineer – Kleinfelder.
- J. Owner – City of Somerville.
- K. Contractor – The company employed by the owner to construct the retaining wall.

#### 1.4 REFERENCED STANDARDS

- A. ASTM C94 – Ready Mixed Concrete
- B. ASTM C140 – Sample and Testing Concrete Masonry Units
- C. ASTM C1262 – Evaluating the Freeze thaw durability of manufactured CMU’s and Related concrete units
- D. ASTM C1372 – Segmental Retaining Wall Units
- E. ASTM D422 – Gradation of Soils
- F. ASTM D488 – Standard classification for sizes of aggregate for road and bridge construction
- G. ASTM D1557 – Modified Proctor Compaction Test
- H. ASTM D2487 – Standard Classification of soils for engineering purposes (USCS)
- I. ASTM D3080 – Standard Test Method for Direct Shear test of soils under consolidated drained conditions
- J. ASTM D4318 – Standard test method for liquid limit, plastic limit, and plasticity index of soils
- K. ASTM D6938 – Standard test method for in-place density and water content of soil and soil-aggregate by nuclear methods (shallow depth)
- L. AASHTO M 288 – Geotextile Specification for Highway Applications

#### 1.5 WALL DESIGN

- A. The Contractor is to submit a design for the replacement retaining wall. The stationing is shown relative to the proposed Storm Drain alignment. The retaining wall work limits is defined by the stationing of the storm drain alignment. The bottom of the wall will be located at a 1.2° batter in front of the top of the wall.
- B. A minimum live load surcharge of 250 PSF shall be used.
- C. A minimum of 1-ft of passive force shall be neglected.

## 1.6 SUBMITTALS

- A. Contractor shall submit the following items for the Engineer's review and approval at least 2 weeks before starting Gravity Block Wall Work. The Contractor will not be allowed to begin Gravity Block Wall Work until all submittal requirements are satisfied and found acceptable to the engineer. Changes or deviations from the approved submittals must be re-submitted for approval. No adjustments in contract time will be allowed due to incomplete submittals.
1. Shop drawings and calculations: prepared and stamped by a qualified professional engineer registered in the Commonwealth of Massachusetts for the proposed retaining wall system. Include engineering calculations and design assumptions, considering all intermediate construction stages as well as final conditions, and including global slope stability calculations.
  2. Product data: Material description and installation instructions for each manufactured product specified
  3. Samples: Furnish 1 unit in the color and face pattern, if requested, for approval by the Engineer.
  4. Test reports: Independent laboratory reports stating moisture absorption and compressive strength properties of the concrete retaining wall units meet the project specifications when tested in accordance with ASTM C140, sections 6, 8, and 9.
- B. Backfill Materials: Refer to section 02210 for backfill material requirements.
- C. Certification of construction in accordance with design: refer to subsection 3.9.A below.

## 1.7 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, and handle the materials in accordance with manufacturer's recommendations. Store manufactured materials above ground on wood pallets or blocking.
- B. Contractor shall check the materials upon delivery to assure proper material has been received.
- C. Contractor shall prevent excessive mud, wet cement, and like materials from coming in contact with materials.
- D. Contractor shall protect the materials from damage. Damaged materials shall not be incorporated into the project.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURER

- A. The Wall units shall be produced by the licensed manufacturers of the following product to establish a minimum standard of quality and process capability:

Bike Path Drainage Upgrades  
Willow Ave. to Grove St.  
Somerville, MA  
20163393.002A

Gravity Block Retaining Wall  
03303-3

1. Redi-Rock
  2. Or approved equal.
- B. Products shall be considered and equal if:
1. It is at least equal in quality, durability, appearance, strength and design.
  2. It will perform at least equally the function imposed by the general design.
  3. If conforms substantially, even with deviations, to the detailed requirements for the item specified.
- C. The Contract Documents represent the minimum acceptable standards for the gravity block retaining wall for this project. All materials shall conform fully in every respect to the requirements of the respective parts and sections of the drawings and specifications. Material which is "standard" for the manufacturer shall be modified, redesigned from the standard mode, and shall be furnished with special features, accessories, materials of construction or finishes as may be necessary to conform to the quality mandated by the technical and performance requirements of the specification.
- D. If material other than that shown on the Drawings and specified here is submitted to the Engineer for consideration as an equal, it shall be the responsibility of the Contractor to submit with the request a revised design and layout of the gravity block wall for approval by the Engineer. Changes in civil and geotechnical requirements for the alternate shall be the responsibility of the Contractor. Contractor is responsible for all costs associated with the modification of existing and proposed conditions in order to accommodate proposed material, at no additional cost to the Owner.

## 2.2 WALL BLOCK UNITS

- A. Concrete wall units shall meet requirements of ASTM C1372
- B. Modular concrete retaining wall units shall conform to the structural and unit measurement tolerances in accordance with the Manufacturer's specifications.
- C. Exterior block dimensions shall be uniform and consistent. Maximum dimensional deviations shall be 1% excluding the architectural surface. Maximum width (face to back) deviation including the architectural surface shall be 1.0 inch.
- D. Exposed face shall be finished as specified. Other surfaces to be smooth form type. Dime-size bug holes on the block face may be patched and/or shake-on color stain can be used to blend into the remainder of the block face.
- E. The color and face options of the wall units are to be approved by the Owner. Alternate wall units must be approved by the Engineer prior to delivery or construction.



## 2.3 LEVELING PAD

- A. Leveling pad shall be constructed with clean, angular, crushed stone or granular fill as defined in specification section 02210.
- B. Leveling pad shall be 8 inches minimum compacted thickness.

## 2.4 DRAINAGE AGGREGATE AND WALL INFILL

- A. Drainage Aggregate and wall infill shall be clean, angular, crushed stone or granular fill as defined in specification section 02210.

## 2.5 GRAVEL BORROW

- A. Gravel Borrow shall consist of hard, durable stone and coarse sand as defined in specification section 02210..

## 2.6 ORDINARY BORROW

- A. Ordinary Borrow may be used to restore original grade in front of the retaining wall. Ordinary Borrow shall meet the requirements defined in specification section 02210.

## 2.7 DRAINAGE PIPE

- A. 2-inch diameter, perforated or slotted PVC or corrugated HDPE pipe manufactured in accordance with ASTM D3034 and/or ASTM F405. The pipe shall be covered with a geotextile to function as a filter.

## PART 3 - EXECUTION

### 3.1 GENERAL

- A. The Contractor shall ensure that safe excavations and embankments are maintained throughout the course of the project.

### 3.2 EXAMINATION

- A. Examine the areas and conditions under which the retaining wall system is to be erected, and notify the Owner and Engineer in writing of conditions detrimental to the proper and timely completion of the work. Do not proceed with the work until unsatisfactory conditions have been corrected.
- B. Promptly notify the wall design engineer of site conditions which may affect wall performance, soil conditions observed other than those assumed, or other conditions that may require a re-evaluation of the wall design.
- C. Verify the location of existing structures and utilities prior to excavation.

### 3.3 PREPARATION

- A. Ensure surrounding structures are protected from the effects of wall excavation.
- B. Excavation support, if required, is the responsibility of the Contractor, including the stability of the excavation and its influence on adjacent properties and structures.

### 3.4 EXCAVATION

- A. Excavate to the lines and grades detailed in the Contract Drawings. Over-excavation not approved by the Owner (or Owner's Representative) will not be paid for by the Owner. Replacement of these soils with compacted fill and/or wall system components will be required at the Contractor's expense. Use care in excavating to prevent disturbance of the base beyond the lines shown.

### 3.5 FOUNDATION PREPARATION

- A. Excavate foundation bearing material as required for leveling pad or base dimension as shown on the drawings or as directed by the Contractor's wall design engineer.
- B. Subgrade soils shall be proof-compacted in the presence of the Engineer. Remove bearing material not meeting the required strength. Oversize resulting space sufficiently from the front of the block to the back of the leveling pad, and backfill with suitable compacted backfill soils.
- C. Fill over-excavated areas with suitable compacted backfill.

### 3.6 LEVELING PAD INSTALLATION

- A. Place base materials to the depths and widths shown upon foundation soils prepared in accordance with these notes.
  - 1. Extend the leveling pad laterally at least 12 inches in front and 12 inches behind the lowermost concrete retaining wall unit.
  - 2. Provide aggregate base compacted to 8 inches thick (minimum). The aggregate shall be placed and compacted in loose lifts no greater than 6 inches in thickness.
- B. Compact aggregate base material to provide a level, hard surface on which to place the bottom course of retaining wall units. The aggregate shall be compacted by a minimum of 3 passes of a vibratory compactor capable of exerting 2,000 lb of centrifugal force and to the satisfaction of the inspection engineer.
- C. Prepare base materials to ensure complete contact with retaining wall units. Gaps are not allowed.

### 3.7 WALL CONSTRUCTION

- A. Erect units in accordance with manufacturer's instruction and recommendations, and as specified herein.

- B. Place base course of concrete wall units on the prepared base material. Check units for level and alignment. Maintain the same elevation at the top of each wall unit within each section of the base course.
- C. Ensure that foundation units are in full contact with compacted leveling pad.
- D. Place concrete wall units side-by-side for full length of wall alignment. Alignment may be done using a string line measured from the back of the block. Gaps are not allowed between the foundation concrete units.
- E. Backfill shall be placed in front of the bottom course of blocks prior to the placement of subsequent block courses. Nonwoven geotextile filter fabric shall be placed in the V-shaped joints between adjacent blocks.
- F. Place drainage aggregate between, and directly behind the concrete wall units. Fill voids in retaining wall units with drainage aggregate. Place drainage aggregate to the lines and grades shown on the plans.
- G. Install the toe drains at the lowest elevation possible, to maintain gravity flow of water to away from the wall. Slope the main collection drainage pipe, located just behind the concrete retaining wall units, 2 percent (minimum) to provide gravity flow to the daylighted areas. The perforated pipe shall be connected to a solid collector pipe and daylighted from wall system at each low point or at 25 foot (maximum) intervals along the wall. Solid collector pipe shall be sloped to provide gravity flow away from the wall.
- H. Remove excess fill from top of units and install next course. Ensure backfill in front of the wall and drainage aggregate are compacted before installation of next course.
- I. The drainage aggregate shall be placed in 9 inch maximum loose lifts and compacted by a minimum of 3 passes of a vibratory compactor capable of exerting 2,000 lb of centrifugal force and to the satisfaction of the inspection engineer.
- J. Geotextile filter fabric shall be placed between the drainage aggregate materials and the adjacent retained soils to the extent shown on the plans. Place filter fabric in accordance with the manufacturer's recommendations.
- K. Check each course for level and alignment. Adjust units as necessary with reinforcement shims to maintain level, alignment, and setback prior to proceeding with each additional course.
- L. Install each succeeding course. Backfill as each course is completed. Pull the units forward until the locating surface of the unit contacts the locating surface of the units in the preceding course.
- M. At the end of each days operations, slope the adjacent ground behind the backfill zone away from the wall area. Temporary soils berms shall be installed as necessary to prevent surface runoff from adjacent areas from entering the wall construction site.
- N. The Contractor is responsible for ensuring that site runoff from adjacent construction areas is directed away from the retaining wall during construction.

### 3.8 SITE CONSTRUCTION TOLERANCES

- A. Vertical alignment: Plus or minus 1-1/4 inches over any 10 feet distance, with a maximum differential of 3 inches over the length of the wall.
- B. Horizontal location control from grading plan
  - 1. Straight lines: Plus or minus 1-1/4 inches over any 10 feet distance, with a maximum differential of 3 inches over the length of the wall
  - 2. Corner and radius locations: Plus or minus 12 inches.
- C. Immediate post construction wall batter: within 2 degrees of the design batter of the concrete retaining wall units
- D. Bulging: Plus or minus 1-1/4 inches over any 10 feet distance.

### 3.9 FIELD QUALITY CONTROL

- A. Contractor is responsible for quality control of installation of system components. Contractor shall certify after construction of the wall is complete that the wall was constructed in accordance with their design.
- B. Work which does not meet these specifications or the requirements shown on the drawings shall be corrected and brought into conformance at the Contractor's expense.
- C. Testing frequency
  - 1. Perform gradation testing prior to construction and at regular intervals during construction (but not less than 3 of each test) per ASTM D422 and ASTM D4318 to verify backfill types meet minimum project requirements.
  - 2. The Testing Agency shall test degree of compaction of backfill in place according to ASTM D1556, ASTM D6938, and ASTM 2937, as applicable. Testing shall be performed for each compacted backfill layer, at least 1 test for each 50 feet of wall length.
- D. Testing and inspection reports will be submitted by the Contractor on a weekly basis at a minimum. Reports will address not only test results but verification of material types and construction details.

### 3.10 ADJUSTING AND CLEANING

- A. Replace damaged units with new units as the work progresses.
- B. Remove debris caused by wall construction and leave adjacent areas clean.

## PART 4 - COMPENSATION

Bike Path Drainage Upgrades  
Willow Ave. to Grove St.  
Somerville, MA  
20163393.002A

Gravity Block Retaining Wall  
03303-8

4.1 Refer to bid item 02950.8.

Bike Path Drainage Upgrades  
Willow Ave. to Grove St.  
Somerville, MA  
20163393.002A

Gravity Block Retaining Wall  
03303-9

[THIS PAGE INTENTIONALLY LEFT BLANK]

## SECTION 07160

### BITUMINOUS DAMPPROOFING

#### PART 1 – GENERAL

##### 1.1 SUMMARY

- A. This Section includes the following:
  - 1. Cold-applied, cut-back (asbestos-free) bituminous dampproofing applied to the following surfaces:
    - a. Apply dampproofing to exterior below grade surfaces of new concrete walls and slabs.
    - b. Exterior, below-grade surfaces of all new manholes and drain structures.
    - c. Exterior, below-grade surfaces of other concrete items specified.
- B. Bituminous dampproofing can be factory applied, providing the application meets coating manufacturer's requirements. Additional field coatings must be applied, as directed by Engineer, to repair any coating imperfections, and chipped or damaged areas.

##### 1.2 SUBMITTALS

- A. Submit the following in accordance with Section 01300 – SUBMITTALS.
  - 1. Product Data: For each type of product indicated.
  - 2. For informational purposes only, submit recommendations for method of application, primer, number of coats, coverage or thickness, and protection course.
  - 3. Material Certificates signed by manufacturers.

##### 1.3 QUALITY CONTROL

- A. Provide in accordance with Section 01400 – QUALITY CONTROL and as specified.
- B. Source Limitations: Obtain primary dampproofing materials and primers through one source from a single manufacturer. Provide secondary materials recommended by manufacturer of primary materials.

#### 1.4 DELIVERY, STORAGE AND HANDLING

- A. Provide in accordance with Section 01600 – PRODUCTS, MATERIALS AND EQUIPMENT.

#### 1.5 PROJECT CONDITIONS

- A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit asphalt dampproofing to be performed according to manufacturers' written instructions.
- B. Ventilation: Provide adequate ventilation during application of dampproofing in enclosed spaces. Maintain ventilation until dampproofing has thoroughly cured.
- C. Allow a minimum of 48 hours for drying before backfilling, unless a greater drying period is recommended by manufacturer.

### PART 2 – PRODUCTS

#### 2.1 MANUFACTURERS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
  - 1. Cold-Applied, Cut-Back (Solvent-Based) Bituminous Dampproofing shall be:
    - a. Karnak 83 AF by Karnak Corporation,
    - b. Sealmastic by Meadows, W. R., Inc.,
    - c. Waterban 50 by Lambert Corporation,
    - d. or equal.

#### 2.2 BITUMINOUS DAMPPROOFING (ASBESTOS-FREE)

- A. Cold-Applied, Cut-Back (Solvent-Based) Bituminous Dampproofing:
  - 1. Brush and Spray Coats: ASTM D 4479, Type I.
  - 2. Trowel Coats: ASTM D 4586, Type I.



## PART 3 – EXECUTION

### 3.1 EXAMINATION

- A. Examine substrates, with Applicator present, for compliance with requirements for surface smoothness and other conditions affecting performance of work.
  - 1. Begin dampproofing application only after substrate construction and penetrating work have been completed and unsatisfactory conditions have been corrected.

### 3.2 PREPARATION

- A. Protection of Other Work: Mask or otherwise protect adjoining exposed surfaces from being stained, spotted, or coated with dampproofing. Prevent dampproofing materials from entering and clogging weep holes and drains.
- B. Clean substrates of projections and substances detrimental to work; fill voids, seal joints, and apply bond breakers if any, as recommended by prime material manufacturer.

### 3.3 APPLICATION, GENERAL

- A. Comply with manufacturer's written recommendations unless more stringent requirements are indicated or required by Project conditions to ensure satisfactory performance of dampproofing.
  - 1. Apply additional coats if recommended by manufacturer or required to achieve coverages indicated and shall be applied to subsequent coat(s).
  - 2. Allow each coat of dampproofing to cure 24 hours before applying subsequent coat(s).
- B. Apply dampproofing to all exterior below grade concrete surfaces.
  - 1. For application on structures extending above grade, apply from finished-grade line down.

### 3.4 COLD-APPLIED, CUT-BACK ASPHALT DAMPPROOFING

- A. On all dampproofing applications: Apply two brush or spray coats at not less than 1.25 gallons/100 feet<sup>2</sup>. for first coat and 1 gallons/100 feet<sup>2</sup>. for second coat, or one trowel coat at not less than 4 gallons/100 feet<sup>2</sup>.

### 3.5 CLEANING

- A. Remove dampproofing materials from surfaces not intended to receive dampproofing.

PART 4 – COMPENSATION (Not Used)

-END OF SECTION 07160-

# **APPENDIX A**

## **OIL AND HAZARDOUS MATERIALS FINDINGS, SOIL MANAGEMENT RECOMMENDATIONS**

Bike Path Drainage Upgrades  
Willow Ave. to Grove St.  
Somerville, MA  
20163393.002A



## MEMORANDUM

TO: Michael Cunningham, PE  
Gus O'Leary, PE

FROM: Richard Quateman, LSP, CHMM

DATE : 05/25/2017

SUBJECT: Somerville Bike Path Drainage Improvements: Environmental Conditions  
(Clifton Street)

Project No. 20163393.002A

CC: File

---

This memorandum summarizes soil conditions, and recommendations for soil and groundwater management, in the area of the proposed drainage improvements in the Somerville Community Path in the area adjacent to Clifton Street in Somerville, Massachusetts. As of the date of this memorandum, the project consists of the following:

- Cleaning and CIPP lining of approximately 935 linear feet (LF) of storm drain between Sta 0+00 and Sta 3+54 (MH1 and MH2), between Sta 4+40 (MH5) and approximate Sta 5+40, and between approximate Station 6+80 and Sta 11+55 (MH8).
- Open cut replacement of 120 linear feet of 24" diameter vitrified clay drain pipe between approximate Stations 5+40 and 6+15 and between approximate Stations 6+38 and 6+81 (in the vicinity of MH 6) with 24" diameter PVC pipe, to remove a blockage and repair collapsed pipe segments in this section.

Additional details regarding the Site and Project conditions may be found in the Kleinfelder May 24, 2017 geotechnical memo (Summary of Subsurface Conditions – Bike Path Drain Repairs- Grove Street to Willow Avenue).

Data in support of this memorandum includes observations and analytical results from a soil boring and monitoring well installed by Kleinfelder, as well as information presented in publicly available reports associated with adjacent Massachusetts Contingency Plan (MCP) Sites.



## Soil Observations & Analytical Results

Between January 30, 2016 and February 2, 2017, Kleinfelder observed advancement of one soil boring, designated B-1, within the roadway at the southern end of Clifton Street. The purpose of this boring was to evaluate environmental and geotechnical conditions in the area of the proposed open-cut drainage replacement. The boring could not be drilled from the earthen slope between Clifton Street and the bike path due to ongoing construction. The approximate boring location is shown on Figure 1.

New England Boring Contractors (NEBC) advanced the boring to a depth of 26.5 feet. The explorations took place between January 30 and February 2, 2017. NEBC obtained soil samples using a vacuum-truck with hand auger to a depth of 6 feet. Below 6-feet, the boring was advanced using drive and wash drilling techniques, and samples were collected using the Standard Penetration Test (SPT) method. The SPT method was performed in general accordance with ASTM D1586. A Kleinfelder environmental professional maintained logs of the boring and classified the soils in general accordance with the visual manual procedure described in ASTM D2488 during drilling operations. Descriptions of the soil strata encountered in the boring are included in the boring logs presented in Appendix A. A monitoring well was installed to a depth of 25 feet upon completion of drilling.

Approximately one-inch (1") of asphalt was encountered at the surface. Underlying this road base was approximately four-feet (4') feet of historic fill composed of brown to dark brown sandy silt with varying amount of gravel. Pieces of brick, bituminous pavement and coal were encountered throughout. Underlying the fill materials to a depth of approximately 9.5 feet below ground surface (bgs), a layer of dark brown, very soft peat with trace amounts of sand and/or gravel was encountered. Below the peat, the boring encountered a layer of soft to firm, bluish gray lean clay with varying amount of sand and gravel. The boring terminated within the clay at a depth of 26.5 feet.

Depth to groundwater was not measured during drilling due to the drilling method which introduces water into the borehole. A monitoring well was installed in boring B-1 to a depth of 25 feet. The water level was measured at 6.4 feet below ground surface on February 17, 2017. Kleinfelder notes that this water level is above the screened interval of 10 – 25' bgs. Groundwater is known to fluctuate due to local and regional factors including, but not limited to precipitation events, periods of wet or dry weather, site topography, well pumping, precipitation events, and seasonal changes.

Two composite soil samples were collected from boring B-1 at 0 – 4 feet bgs (fill) and 8.5 – 22 feet bgs (natural). Grab samples, for volatile organic compound (VOC) analysis, were collected from 2 – 3' bgs and 15 – 17' bgs.



The samples were submitted to Con-Test Analytical of East Longmeadow, MA for analysis of disposal characterization parameters, including total petroleum hydrocarbons (TPH) by U.S. EPA Method 8015C; Massachusetts Contingency Plan (MCP) 14 metals; volatile organic compounds (VOCs) by U.S. EPA Method 8260C; semi-volatile organic compounds (SVOCs) by U.S. EPA Method 8270D; polychlorinated biphenyls by U.S. EPA Method 8082A, conductivity by Method 2510B, pH, flashpoint, and reactivity. Toxicity characteristic leaching procedure (TCLP) analysis was performed for Lead in the fill sample as lead was detected above 100 ppm, the RCRA "Rule of 20" limit. Soil sample analytical results are tabulated on Table 1.

VOCs, and PCBs were not detected at or above laboratory reporting limits in either the fill or natural soil samples. SVOCs (acenaphthene, acenaphthylene, anthracene, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(g,h,i)perylene, benzo(k)fluoranthene, chrysene, dibenz(a,h)anthracene, fluoranthene, fluorene, indeno(1,2,3-cd)pyrene, naphthalene, phenanthrene, and pyrene was detected in the fill sample; SVOCs were not detected in the natural soil sample. Of these SVOCs, only benzo(a)pyrene was detected above the MCP RCS-1 Reportable Concentration, at 3.6 mg/kg as compared to the RCS-1 threshold of 2 mg/kg.

The metals antimony, arsenic, barium, beryllium, chromium, lead, mercury, nickel, silver, vanadium, and/or zinc were detected at concentrations above laboratory reporting limits, but below RCS-1 thresholds. TPH was detected at 630 mg/kg in the fill sample (compared with the RCS-1 threshold of 1,000 mg/kg) but was not detected in the natural soil sample.

Lead was detected at 550 mg/kg in the fill (0-4') sample, exceeding the RCS-1 limit of 200 mg/kg. As this detection also exceeded the TCLP threshold (100 mg/kg), TCLP analysis was conducted. The sample was reported to contain lead at 0.23 mg/L, below the threshold of 5 milligrams/liter (mg/L), at which the soil would be considered characteristically hazardous.

## **Groundwater Analytical Results**

Soil boring B-1 was completed as a groundwater monitoring well, designated MW-1. Well construction is detailed on the attached boring log. No evidence of odors was identified during well gauging.

## **Adjacent Documented Releases**

A review of the Massachusetts Department of Environmental Protection (MassDEP) Searchable Sites Database identified one reported releases of Oil or Hazardous Materials (OHM) to the environment in the vicinity of the project area.



RTN 3-017086 is associated with a release of miscellaneous OHM, including oil, following a fire at the former Beacon Printing Ink Company at 84 Winslow Street. According to Site files, a fire occurred at the facility in July 1998, releasing in OHM impacting soil in the area. No impacts to groundwater were identified. Firefighting water runoff was generally contained to within the MWRA sewers in the area. PAHs detected in the soil were identified as originating from either pre-existing fill or incomplete combustion during the fire. Remedial responses included removal of an underground storage tank (UST) and 167 55-gallon drums from the facility property. A Class A-2 RAO was filed for this release in 1999, indicating that while residual contaminants remained in the environment, no significant risk to public health, welfare and the environment existed following the implementation of remedial activities. No impact to the project area is anticipated from this release due to both its status and the location of the release relative to the project area.

## **Discussion and Recommendations**

### ***Community Path Area Soil***

The Community Path area in which drainage improvements are to be conducted is the location of a former railroad right-of-way (ROW). Rail ROW soils are often impacted by OHM related to historic railroad operations, including polycyclic aromatic hydrocarbons (PAHs), petroleum hydrocarbons, lead, arsenic (from pesticides/herbicides) and other contaminants. Soils excavated within the community path should be reused on-site to the maximum extent feasible. If surplus soils are generated, they should be stockpiled in a secure location and subsequently sampled for the parameters indicated above to determine the appropriate off-site disposal location.

If analytes at or exceeding a Reportable Concentration (RC) are detected in the stockpiled soil, management of that soil would be conducted under a Utility Related Abatement Measure (URAM). Submittal of a Release Notification Form could be also required, dependent upon the nature of contaminants identified and if their presence was exempted from notification pursuant to 310 CMR 40.0317 (Releases and Threats of Release Which Do Not Require Notification).

The work area is owned by two entities: Massachusetts Bay Transportation Authority (MBTA) and a private party. Soils from the two separate ownership parcels should not be mixed. Soil from each area should be reused within the ownership parcel. Surplus soils from each ownership area should be kept separate for disposal characterization.

### ***Off-Site Stockpile Requirements***

The Massachusetts Contingency Plan (MCP) in 310 CMR 40.0034(4) indicates that off-site temporary stockpiling of soil identified as Remediation Waste, i.e., impacted by one



or more OHM at or above an applicable RC, must be located on a property owned or operated by the “same [Responsible Party] RP, [Potentially Responsible Party] PRP, or Other Person conducting response actions.” In the instance of this work, the stockpiling would have to be conducted on property owned by either MBTA, the private party, or the City of Somerville.

Based on the data obtained from Clifton Street outside the work area, and given the historic use of the work area as a railroad right-of-way, the potential exists for this soil to be classified after analysis as a Remediation Waste. However, at this time there is no analytical data classifying soils within the planned work area. Accordingly, the soils are not classified as a Remediation Waste and may be stored off-site at a contractor-controlled property (on behalf of the City) for subsequent sampling and analysis. Note that if overt evidence of contamination is present in excavated soil, the project LSP should be informed of this observation; the LSP will then provide direction as to how this soil must be managed. Prior that time, or unless otherwise directed by the LSP, overtly impacted material should not be removed from the work area prior to sampling and analysis.

If classification as a Remediation Waste is confirmed at an off-site temporary storage area, the soil must be transported to a permanent disposal facility(ies) within 120-days of the initial excavation. Should soil fail TCLP analysis, any soil removed from the work area would require off-site disposal as a hazardous waste and could not be treated in that location or replaced in the work area. As noted above, soils should, to the maximum extent feasible be reused within the work area on the property from which it was excavated.

### ***Community Path Area Groundwater***

Groundwater may be managed by recharge at the point of excavation, or by permitted discharge to the Somerville stormwater drainage system. If dewatering is required, and recharge is not feasible, Kleinfelder anticipates that dewatering could be implemented under a National Pollution Discharge Elimination System (NPDES) Construction General Permit or Construction Dewatering Permit.

Kleinfelder anticipates that sediment filtration, only, will be required for pre-treatment. It will be the contractor’s responsibility to obtain the NPDES permit, determine if additional sampling is required, design any necessary pretreatment, and ensure compliance with the permit. Alternatively, recovered groundwater may be stored in a fractionation (“frac”) tank or tanker truck and disposed of at a licensed treatment facility.



**Table 1  
Drainage Improvements**

**Summary Soil Analytical Results**

Parameter	Reportable Concentrations (RCs)		SAMPLING LOCATION	
	RCS-1	RCS-2	B-1 FILL	B-1 NATIVE
Sampling Date			1/30/2017 9:30:00 AM	2/2/2017 9:50:00 AM
Sample Depth			0-4 Feet	8.5-22 Feet
<b>SM 2540G (% Wt)</b>				
% Solids	~	~	80.4	72.3
<b>SM21-22 2510B Modified (µmhos/cm)</b>				
SPECIFIC CONDUCTANCE	~	~	37	6.0
<b>SW-846 1030 (present/absent)</b>				
IGNITABILITY	~	~	Absent	Absent
<b>SW-846 6010C-D (mg/Kg dry) Metals Digestion</b>				
ANTIMONY	20	30	<b>3.5</b>	ND (3.2)
ARSENIC	20	20	<b>9.0</b>	<b>5.7</b>
BARIUM	1000	3000	<b>150</b>	<b>120</b>
BERYLLIUM	90	200	<b>0.60</b>	<b>1.1</b>
CADMIUM	70	100	<b>2.0</b>	<b>0.93</b>
CHROMIUM	100	200	<b>31</b>	<b>51</b>
LEAD	200	600	<b>550</b>	<b>12</b>
NICKEL	600	1000	<b>17</b>	<b>32</b>
SELENIUM	400	700	ND (6.1)	ND (6.4)
SILVER	100	200	<b>0.70</b>	ND (0.64)
THALLIUM	8	60	ND (3.0)	ND (3.2)
VANADIUM	400	700	<b>34</b>	<b>63</b>
ZINC	1000	3000	<b>400</b>	<b>81</b>
<b>SW-846 7471B (mg/Kg dry) Metals Digestion</b>				
MERCURY	20	30	<b>0.51</b>	ND (0.034)
<b>SW-846 6010C-D (mg/L) 1311 TCLP EXT</b>				
LEAD (mg/L)			<b>0.23</b>	
<b>SW-846 8082A (mg/Kg dry)</b>				
Total PCBs	1	4	ND (0.12)	ND (0.14)
<b>SW-846 8100 Modified (mg/Kg dry)</b>				
TPH	1000	3000	<b>630</b>	ND (12)
<b>SW-846 8260C (mg/Kg dry)</b>				
All VOCs	6	50	ND	ND
<b>SW-846 8270D (mg/Kg dry)</b>				
ACENAPHTHENE	4	3000	<b>0.38</b>	ND (0.24)
ACENAPHTHYLENE	1	10	<b>0.26</b>	ND (0.24)
ANTHRACENE	1000	3000	<b>1.1</b>	ND (0.24)
BENZO(A)ANTHRACENE	7	40	<b>3.9</b>	ND (0.24)
BENZO(A)PYRENE	2	7	<b>3.6</b>	ND (0.24)
BENZO(B)FLUORANTHENE	7	40	<b>4.2</b>	ND (0.24)
BENZO(G,H,I)PERYLENE	1000	3000	<b>2.3</b>	ND (0.24)
BENZO(K)FLUORANTHENE	70	400	<b>1.6</b>	ND (0.24)
CHRYSENE	70	400	<b>4.0</b>	ND (0.24)
DIBENZ(A,H)ANTHRACENE	0.7	4	<b>0.60</b>	ND (0.24)
FLUORANTHENE	1000	3000	<b>6.8</b>	ND (0.24)
FLUORENE	1000	3000	<b>0.46</b>	ND (0.24)
INDENO(1,2,3-CD)PYRENE	7	40	<b>2.4</b>	ND (0.24)
NAPHTHALENE	4	20	<b>0.26</b>	ND (0.24)
PHENANTHRENE	10	1000	<b>4.7</b>	ND (0.24)
PYRENE	1000	3000	<b>6.3</b>	ND (0.24)
<b>SW-846 9014 (mg/Kg)</b>				
REACTIVE CYANIDE	~	~	ND (4.0)	ND (4.0)
<b>SW-846 9030A (mg/Kg)</b>				
REACTIVE SULFIDE	~	~	ND (20)	ND (20)

NOTES:

1. An asterisk (\*) following a detection limit indicates that the minimum laboratory reporting limit exceeds one or more of the regulatory criteria.
2. ND = Not detected above the lab reporting limits shown in parenthesis.
3. NT = Not tested.
4. ~ = No Method 1 Standard or UCL available
5. Shaded values exceed the MCP Reportable Concentrations (RCs).
6. Bolded values exceed the Method 1 Cleanup Standards.
7. Con-Test Laboratory is not responsible for the regulatory content, data comparisons with regulations, or decisions made based on data comparisons shown in this deliverable. Please notify us should you be aware of any regulatory information that may not be correct or that has changed.

[THIS PAGE INTENTIONALLY LEFT BLANK]

# **APPENDIX B**

## **BORING LOG**

Bike Path Drainage Upgrades  
Willow Ave. to Grove St.  
Somerville, MA  
20163393.002A

**SAMPLER AND DRILLING METHOD GRAPHICS**

	BULK / GRAB / BAG SAMPLE
	GEO-PROBE SAMPLER
	CALIFORNIA SAMPLER (3 in. (76.2 mm.) outer diameter)
	STANDARD PENETRATION SPLIT SPOON SAMPLER (2 in. (50.8 mm.) outer diameter and 1-3/8 in. (34.9 mm.) inner diameter)
	SHELBY TUBE SAMPLER
	CORE SAMPLE
	HOLLOW STEM AUGER
	SOLID STEM AUGER
	HAND AUGER
	MUD ROTARY

**GROUND WATER GRAPHICS**

	WATER LEVEL (level where first observed)
	WATER LEVEL (level after exploration completion)
	WATER LEVEL (additional levels after exploration)
	OBSERVED SEEPAGE

**NOTES**

- The report and graphics key are an integral part of these logs. All data and interpretations in this log are subject to the explanations and limitations stated in the report.
- Lines separating strata on the logs represent approximate boundaries only. Actual transitions may be gradual or differ from those shown.
- No warranty is provided as to the continuity of soil or rock conditions between individual sample locations.
- Logs represent general soil or rock conditions observed at the point of exploration on the date indicated.
- In general, Unified Soil Classification System designations presented on the logs were based on visual classification in the field and were modified where appropriate based on gradation and index property testing.
- Fine grained soils that plot within the hatched area on the Plasticity Chart, and coarse grained soils with between 5% and 12% passing the No. 200 sieve require dual USCS symbols, i.e., GW-GM, GP-GM, GW-GC, GP-GC, GC-GM, SW-SM, SP-SM, SW-SC, SP-SC, SC-SM.
- If sampler is not able to be driven at least 6 inches then 50/X indicates number of blows required to drive the identified sampler X inches with a 140 pound hammer falling 30 inches.

**ABBREVIATIONS**

WOH - Weight of Hammer  
WOR - Weight of Rod

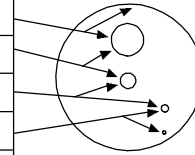
**UNIFIED SOIL CLASSIFICATION SYSTEM (ASTM D 2487)**

<b>GRAVELS</b> (More than half of material is larger than the #200 sieve)	CLEAN GRAVEL WITH <5% FINES	Cu ≥ 4 and 1 ≤ Cc ≤ 3		GW	WELL-GRADED GRAVELS, GRAVEL-SAND MIXTURES WITH LITTLE OR NO FINES	
		Cu < 4 and/or 1 > Cc > 3		GP	POORLY GRADED GRAVELS, GRAVEL-SAND MIXTURES WITH LITTLE OR NO FINES	
	GRAVELS WITH 5% TO 12% FINES	Cu ≥ 4 and 1 ≤ Cc ≤ 3		GW-GM	WELL-GRADED GRAVELS, GRAVEL-SAND MIXTURES WITH LITTLE FINES	
				GW-GC	WELL-GRADED GRAVELS, GRAVEL-SAND MIXTURES WITH LITTLE CLAY FINES	
		Cu < 4 and/or 1 > Cc > 3		GP-GM	POORLY GRADED GRAVELS, GRAVEL-SAND MIXTURES WITH LITTLE FINES	
				GP-GC	POORLY GRADED GRAVELS, GRAVEL-SAND MIXTURES WITH LITTLE CLAY FINES	
	GRAVELS WITH > 12% FINES			GM	SILTY GRAVELS, GRAVEL-SILT-SAND MIXTURES	
				GC	CLAYEY GRAVELS, GRAVEL-SAND-CLAY MIXTURES	
				GC-GM	CLAYEY GRAVELS, GRAVEL-SAND-CLAY-SILT MIXTURES	
	<b>SANDS</b> (More than half of coarse fraction is smaller than the #4 sieve)	CLEAN SANDS WITH <5% FINES	Cu ≥ 6 and 1 ≤ Cc ≤ 3		SW	WELL-GRADED SANDS, SAND-GRAVEL MIXTURES WITH LITTLE OR NO FINES
			Cu < 6 and/or 1 > Cc > 3		SP	POORLY GRADED SANDS, SAND-GRAVEL MIXTURES WITH LITTLE OR NO FINES
		SANDS WITH 5% TO 12% FINES	Cu ≥ 6 and 1 ≤ Cc ≤ 3		SW-SM	WELL-GRADED SANDS, SAND-GRAVEL MIXTURES WITH LITTLE FINES
				SW-SC	WELL-GRADED SANDS, SAND-GRAVEL MIXTURES WITH LITTLE CLAY FINES	
Cu < 6 and/or 1 > Cc > 3				SP-SM	POORLY GRADED SANDS, SAND-GRAVEL MIXTURES WITH LITTLE FINES	
				SP-SC	POORLY GRADED SANDS, SAND-GRAVEL MIXTURES WITH LITTLE CLAY FINES	
SANDS WITH > 12% FINES				SM	SILTY SANDS, SAND-GRAVEL-SILT MIXTURES	
				SC	CLAYEY SANDS, SAND-GRAVEL-CLAY MIXTURES	
				SC-SM	CLAYEY SANDS, SAND-SILT-CLAY MIXTURES	
<b>FINE GRAINED SOILS</b> (More than half of material is smaller than the #200 sieve)		SILTS AND CLAYS (Liquid Limit less than 50)		ML	INORGANIC SILTS AND VERY FINE SANDS, SILTY OR CLAYEY FINE SANDS, SILTS WITH SLIGHT PLASTICITY	
				CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS	
				CL-ML	INORGANIC CLAYS-SILTS OF LOW PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS	
	SILTS AND CLAYS (Liquid Limit greater than 50)		OL	ORGANIC SILTS & ORGANIC SILTY CLAYS OF LOW PLASTICITY		
			MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SAND OR SILT		
			CH	INORGANIC CLAYS OF HIGH PLASTICITY, FAT CLAYS		
		OH	ORGANIC CLAYS & ORGANIC SILTS OF MEDIUM-TO-HIGH PLASTICITY			

 Bright People. Right Solutions.	PROJECT NO.: 20163393	<b>GRAPHICS KEY</b>  Somerville Bike Path Drain Design Willow to Grove St Somerville, MA	1
	DRAWN BY: CHECKED BY: DATE: REVISED: -		

**GRAIN SIZE**

DESCRIPTION	SIEVE SIZE	GRAIN SIZE	APPROXIMATE SIZE
Boulders	>12 in. (304.8 mm.)	>12 in. (304.8 mm.)	Larger than basketball-sized
Cobbles	3 - 12 in. (76.2 - 304.8 mm.)	3 - 12 in. (76.2 - 304.8 mm.)	Fist-sized to basketball-sized
Gravel	coarse 3/4 - 3 in. (19 - 76.2 mm.)	3/4 - 3 in. (19 - 76.2 mm.)	Thumb-sized to fist-sized
	fine #4 - 3/4 in. (#4 - 19 mm.)	0.19 - 0.75 in. (4.8 - 19 mm.)	Pea-sized to thumb-sized
Sand	coarse #10 - #4	0.079 - 0.19 in. (2 - 4.9 mm.)	Rock salt-sized to pea-sized
	medium #40 - #10	0.017 - 0.079 in. (0.43 - 2 mm.)	Sugar-sized to rock salt-sized
	fine #200 - #40	0.0029 - 0.017 in. (0.07 - 0.43 mm.)	Flour-sized to sugar-sized
Fines	Passing #200	<0.0029 in. (<0.07 mm.)	Flour-sized and smaller



**SECONDARY CONSTITUENT**

Term of Use	AMOUNT	
	Secondary Constituent is Fine Grained	Secondary Constituent is Coarse Grained
Trace	<5%	<15%
With	≥5 to <15%	≥15 to <30%
Modifier	≥15%	≥30%

**MOISTURE CONTENT**

DESCRIPTION	FIELD TEST
Dry	Absence of moisture, dusty, dry to the touch
Moist	Damp but no visible water
Wet	Visible free water, usually soil is below water table

**CEMENTATION**

DESCRIPTION	FIELD TEST
Weakly	Crumbles or breaks with handling or slight finger pressure
Moderately	Crumbles or breaks with considerable finger pressure
Strongly	Will not crumble or break with finger pressure

**CONSISTENCY - FINE-GRAINED SOIL**

CONSISTENCY	SPT - N <sub>60</sub> (# blows / ft)	Pocket Pen (tsf)	UNCONFINED COMPRESSIVE STRENGTH (Q <sub>u</sub> )(psf)	VISUAL / MANUAL CRITERIA
Very Soft	<2	PP < 0.25	<500	Thumb will penetrate more than 1 inch (25 mm). Extrudes between fingers when squeezed.
Soft	2 - 4	0.25 ≤ PP <0.5	500 - 1000	Thumb will penetrate soil about 1 inch (25 mm). Remolded by light finger pressure.
Medium Stiff	4 - 8	0.5 ≤ PP <1	1000 - 2000	Thumb will penetrate soil about 1/4 inch (6 mm). Remolded by strong finger pressure.
Stiff	8 - 15	1 ≤ PP <2	2000 - 4000	Can be imprinted with considerable pressure from thumb.
Very Stiff	15 - 30	2 ≤ PP <4	4000 - 8000	Thumb will not indent soil but readily indented with thumbnail.
Hard	>30	4 ≤ PP	>8000	Thumbnail will not indent soil.

**REACTION WITH HYDROCHLORIC ACID**

DESCRIPTION	FIELD TEST
None	No visible reaction
Weak	Some reaction, with bubbles forming slowly
Strong	Violent reaction, with bubbles forming immediately

FROM TERZAGHI AND PECK, 1948; LAMBE AND WHITMAN, 1969; FHWA, 2002; AND ASTM D2488

**APPARENT / RELATIVE DENSITY - COARSE-GRAINED SOIL**

APPARENT DENSITY	SPT-N <sub>60</sub> (# blows/ft)	MODIFIED CA SAMPLER (# blows/ft)	CALIFORNIA SAMPLER (# blows/ft)	RELATIVE DENSITY (%)
Very Loose	<4	<4	<5	0 - 15
Loose	4 - 10	5 - 12	5 - 15	15 - 35
Medium Dense	10 - 30	12 - 35	15 - 40	35 - 65
Dense	30 - 50	35 - 60	40 - 70	65 - 85
Very Dense	>50	>60	>70	85 - 100

FROM TERZAGHI AND PECK, 1948

**STRUCTURE**

DESCRIPTION	CRITERIA
Stratified	Alternating layers of varying material or color with layers at least 1/4-in. thick, note thickness.
Laminated	Alternating layers of varying material or color with the layer less than 1/4-in. thick, note thickness.
Fissured	Breaks along definite planes of fracture with little resistance to fracturing.
Slickensided	Fracture planes appear polished or glossy, sometimes striated.
Blocky	Cohesive soil that can be broken down into small angular lumps which resist further breakdown.
Lensed	Inclusion of small pockets of different soils, such as small lenses of sand scattered through a mass of clay, note thickness.

**PLASTICITY**

DESCRIPTION	LL	FIELD TEST
Non-plastic	NP	A 1/8-in. (3 mm.) thread cannot be rolled at any water content.
Low (L)	< 30	The thread can barely be rolled and the lump or thread cannot be formed when drier than the plastic limit.
Medium (M)	30 - 50	The thread is easy to roll and not much time is required to reach the plastic limit. The thread cannot be rerolled after reaching the plastic limit. The lump or thread crumbles when drier than the plastic limit.
High (H)	> 50	It takes considerable time rolling and kneading to reach the plastic limit. The thread can be rerolled several times after reaching the plastic limit. The lump or thread can be formed without crumbling when drier than the plastic limit.

**ANGULARITY**

DESCRIPTION	CRITERIA
Angular	Particles have sharp edges and relatively plane sides with unpolished surfaces.
Subangular	Particles are similar to angular description but have rounded edges.
Subrounded	Particles have nearly plane sides but have well-rounded corners and edges.
Rounded	Particles have smoothly curved sides and no edges.



PROJECT NO.: 20163393  
DRAWN BY:  
CHECKED BY:  
DATE:  
REVISED: -


**SOIL DESCRIPTION KEY**

Somerville Bike Path Drain Design  
Willow to Grove St  
Somerville, MA

PLOTTED: 05/19/2017 12:53 PM BY: SBridges

<b>Date Begin - End:</b> 1/30/2017 - 2/02/2017	<b>Drilling Company:</b> NEBC	<b>BORING LOG B-1</b>
<b>Logged By:</b> T. Bernier	<b>Drill Crew:</b> B. Walsh / M. D'Ambrosio	
<b>Hor.-Vert. Datum:</b> Not Available	<b>Drilling Equipment:</b> Acker AD-II	<b>Hammer Type - Drop:</b> 140 lb. Donut/winch - 30 in.
<b>Plunge:</b> -90 degrees	<b>Drilling Method:</b> Drive and Wash	
<b>Weather:</b> 40s, Sunny	<b>Casing Diameter:</b> 4 in. I.D.	

Surveyed Elevation (feet)	Depth (feet)	Graphical Log	FIELD EXPLORATION				LABORATORY RESULTS							MONITORING WELL CONSTRUCTION*				
			Lithologic Description	Sample Number	Sample Type	Blow Counts(BC)= Uncorr. Blows/6 in.	Recovery (NR=No Recovery)	USCS Symbol	Water Content (%)	Dry Unit Wt. (pcf)	Passing #4 (%)	Passing #200 (%)	Liquid Limit		Plasticity Index (NP=NonPlastic)			
			2-inches Bituminous Pavement	G1														
			G1: <b>Fill</b> <b>Sandy SILT with Gravel (ML):</b> dark brown, moist, fine to coarse grained sand, subangular to subrounded fine gravel, contains bituminous pavement and metal. PID = 0.0ppm.	G2														
			G2: <b>Fill</b> <b>Sandy SILT (ML):</b> dark brown, moist, fine to coarse grained sand, trace fine subangular to subrounded gravel, pieces of brick and bituminous pavement. PID = 0.0ppm.	G3														
			G3: <b>Fill</b> <b>Sandy SILT with Gravel (ML):</b> brown, moist, fine to coarse grained sand, fine gravel, abundant brick and coal. PID = 0.0ppm.	G4														
			G4: Similar to G3 except wet (likely perched water).	G5														
			G5: <b>PEAT (PT):</b> dark brown, moist, fibrous, woody material, trace gravel. PID = 0.4ppm.	G6														
			G6: Similar to G5 except no gravel. PID = 0.2ppm.	S1			BC=2 2 2 2	14"										
			S1a: (top 11 inches) Similar to G5 except trace fine sand and moist to wet. Very soft. PID = 0.0ppm.	S2			BC=6 4 3 5	15"					19	8				
			S1b: (bottom 3 inches) <b>Lean CLAY (CL):</b> low plasticity, bluish gray, moist to wet, medium stiff, trace fine sand. PID = 0.0ppm.	S3			BC=6 6 7 9	11"										
			S2: Similar to S1b except wet. PID = 0.0ppm.															
			S3: Similar to S1b except stiff and no sand. PID = 0.0ppm.															

 <p><b>KLEINFELDER</b> Bright People. Right Solutions.</p>	PROJECT NO.: 20163393	<b>BORING LOG B-1</b>	PLATE
	DRAWN BY: SJB	Somerville Bike Path Drain Design Willow to Grove St Somerville, MA	<b>B-1</b>
CHECKED BY: JM	DATE: 5/19/2017		
REvised: 5/19/2017			PAGE: 1 of 2

GINT FILE: KLF\_gint\_master\_2017  
 GINT TEMPLATE: E:KLF\_STANDARD\_GINT\_LIBRARY\_2017.GLB [ KLF\_BORING/TEST PIT SOIL LOG]  
 PROJECT NUMBER: 20163393.002A  
 OFFICE FILTER: CAMBRIDGE

PLOTTED: 05/19/2017 12:53 PM BY: SBridges

<b>Date Begin - End:</b> 1/30/2017 - 2/02/2017	<b>Drilling Company:</b> NEBC	<b>BORING LOG B-1</b>	
<b>Logged By:</b> T. Bernier	<b>Drill Crew:</b> B. Walsh / M. D'Ambrosio		
<b>Hor.-Vert. Datum:</b> Not Available	<b>Drilling Equipment:</b> Acker AD-II		<b>Hammer Type - Drop:</b> 140 lb. Donut/winch - 30 in.
<b>Plunge:</b> -90 degrees	<b>Drilling Method:</b> Drive and Wash		
<b>Weather:</b> 40s, Sunny	<b>Casing Diameter:</b> 4 in. I.D.		

Surveyed Elevation (feet)	Depth (feet)	Graphical Log	FIELD EXPLORATION				LABORATORY RESULTS						MONITORING WELL CONSTRUCTION*					
			Lithologic Description	Sample Number	Sample Type	Recovery (NR=No Recovery)	USCS Symbol	Water Content (%)	Dry Unit Wt. (pcf)	Passing #4 (%)	Passing #200 (%)	Liquid Limit		Plasticity Index (NP=NonPlastic)				
			S4: Similar to S1b except stiff and no sand. PID = 0.0ppm.	S4		16"												
			S5: <b>Lean CLAY with Sand and Gravel (CL):</b> low plasticity, bluish gray, wet, very stiff, fine to coarse sand, fine angular to subangular gravel.	S5		7"												

The boring was terminated at approximately 26.5 ft. below ground surface. Monitoring Well installed to a depth of 25 ft

**GROUNDWATER LEVEL INFORMATION:**  
 ☒ Groundwater was observed at approximately 6.4 ft. below ground surface during drilling.

**GENERAL NOTES:**  
 The exploration location and elevation were surveyed by SMC.

GINT FILE: KLF\_gint\_master\_2017 PROJECT NUMBER: 20163393.002A OFFICE FILTER: CAMBRIDGE  
 GINT TEMPLATE: E:KLF\_STANDARD\_GINT\_LIBRARY\_2017.GLB [ KLF\_BORING/TEST PIT SOIL LOG ]

	PROJECT NO.: 20163393	<b>BORING LOG B-1</b>  Somerville Bike Path Drain Design Willow to Grove St Somerville, MA	PLATE
	DRAWN BY: SJB		B-1
CHECKED BY: JM	DATE: 5/19/2017		
REvised: 5/19/2017			PAGE: 2 of 2

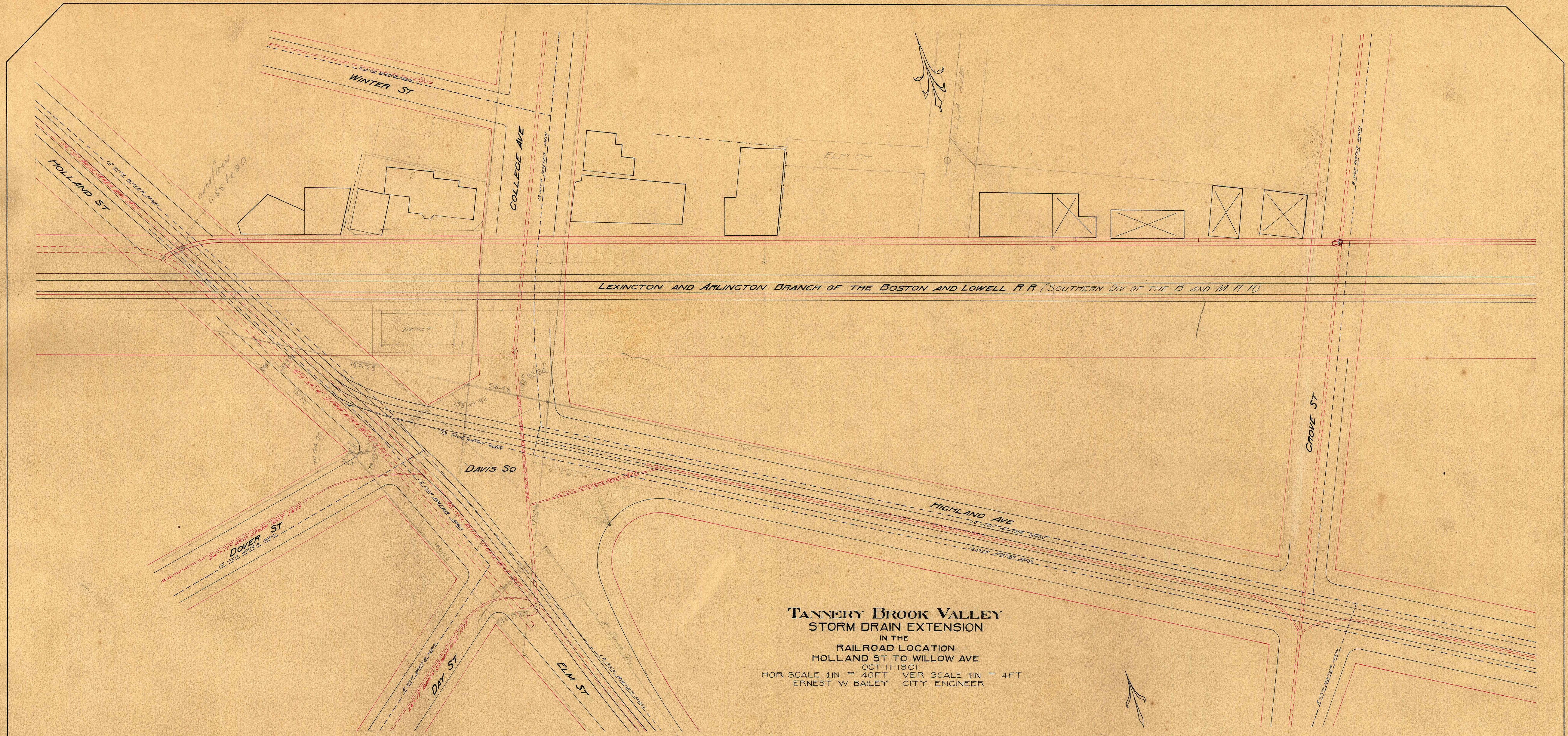
[THIS PAGE INTENTIONALLY LEFT BLANK]



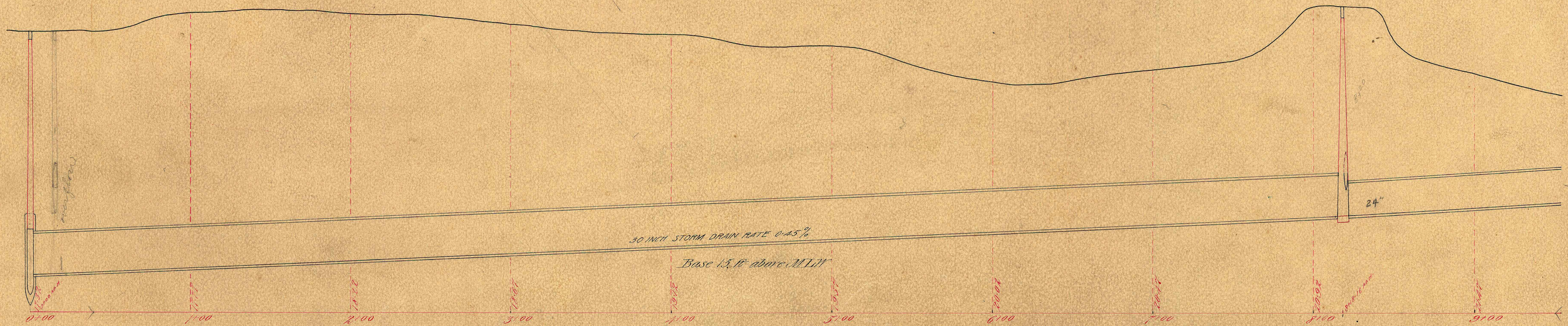
# **APPENDIX C**

## **RECORD DRAWINGS**

Bike Path Drainage Upgrades  
Willow Ave. to Grove St.  
Somerville, MA  
20163393.002A

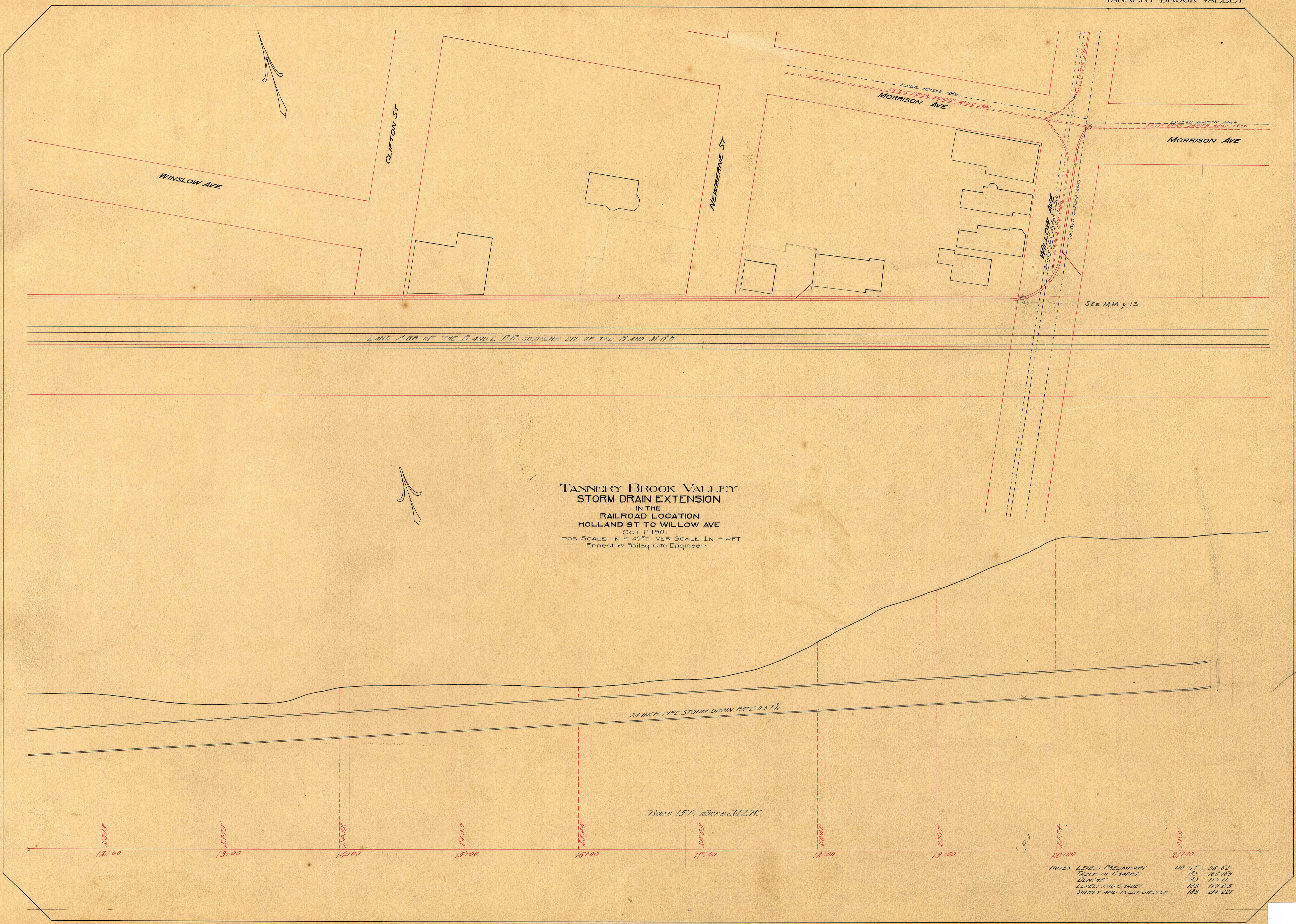


**TANNERY BROOK VALLEY**  
**STORM DRAIN EXTENSION**  
 IN THE  
 RAILROAD LOCATION  
 HOLLAND ST TO WILLOW AVE  
 OCT 11 1901  
 HOR SCALE 1 IN = 40 FT VER SCALE 1 IN = 4 FT  
 ERNEST W BAILEY CITY ENGINEER



NOTES

LEVELS PRELIMINARY	NB 125 & 58-62
TABLE OF GRADES	183 184-169
BENCHES	183 170-171
LEVELS AND GRADES	183 170-215
SURVEY AND INLET SKETCH	183 218-227



[THIS PAGE INTENTIONALLY LEFT BLANK]

# **APPENDIX D**

**32 Clifton St. (Mixit Studios Foundation Support) dated October 31, 2003**

Bike Path Drainage Upgrades  
Willow Ave. to Grove St.  
Somerville, MA  
20163393.002A

# Mixit Studios Foundation Support

Plans, Reports and Specifications  
October 31, 2003

**Architect/Owner:**

Richard Graf  
Fort Point Consulting, Inc.  
32 Clifton Street  
Somerville, MA 02144  
617 776 7964  
617 776 3892 (fax)

**Geotechnical Engineer:**

Michael Geiser  
Alliance Environmental Group, Inc.  
100 Jefferson Blvd  
Warwick, RI 02888  
401 732 7600  
401 732 7670 (fax)

**Structural Engineer:**

Peter Wheelock  
Weidlinger Associates, Inc.  
One Broadway  
Cambridge, MA 02142



*Alliance Environmental Group, Inc.*

COPY

100 Jefferson Boulevard, Warwick, Rhode Island 02888  
Telephone: 401.732.7600; Fax: 401.732.7670

April 30, 2003

Mr. Richard Graf  
Mixit Studios Cooperative Corp.  
32 Clifton Street  
Somerville, MA 02144

Re: Geotechnical Investigation and Letter Report  
32 Clifton Street  
Somerville, Massachusetts

Dear Richard:

Alliance Environmental Group, Inc. (AEG) is pleased to provide you with this geotechnical letter report for your above-referenced project. This report was prepared in accordance with our standard protocols for medium-load bearing structures in general urban geology. The primary objective of the study reported on herein was to provide an interpretation of subsurface information relative to performance of the existing 3-story residential/light industry structure. The recommendations presented herein are subject to the Limitations below.

The property ("Site") sits at approximately 20 meters in elevation (NGVD, 1929), is located in a residential neighborhood, and adjoins Clifton Street, a local access road, to the WNW, and a bicycle path on the bed of an old Boston and Maine Railroad track, to the SSW.

As part of this study, nine modified soil borings were performed within the confines of the basement level, which has a finished floor elevation approximately 2 feet below outside surface. There was insufficient overhead room to conduct the borings using standard procedures. The boring, designated B-1 through B-9, were advanced on April 10, 2003 by Able Soils, Inc. of Lincoln, Rhode Island, under the direction of AEG. The borings were conducted with a 1- " I.D. split spoon sampler advanced with a 30 lb. two-man slide hammer with a 24-inch stroke. The borings extended as deep as 9.0 feet below surface grade (BSG). The standard penetration value (N) is the number of blows required to drive a standard sampler (as used here) from 6 to 18 inches of penetration with a 140 lb. hammer freefalling from a height of 30 inches. For determination of the density of in-situ materials relative to N, the blow counts shown on the logs derived from using the non-standard hammer are reduced by 50% to account for the lower energy level used to

drive the sampler on this project. Logs of all 9 borings are attached. The locations of the borings are shown on Figure 1, Boring Location Plan.

The generalized subsurface profile consists of a concrete floor slab between 4-½ and 15 inches thick; over an approximately 1 foot thick layer of cinders and slag with some miscellaneous fill; over an approximately 3 feet thick layer of black fine loam and peat with silt; over an approximately 2 foot layer of fibrous brown peat; over a gray silty plastic clay with some sand down to the extent of the deepest boring at approximately 9 feet BSG. Bedrock was not encountered in any of the borings.

In 1999, soil borings were conducted by Cyn Environmental Services approximately 100 feet NNW of the Site as part of development at 84 Winslow Avenue. Copies of boring logs for borings B-1 through B-5 were reviewed by AEG as part of this study. None of the organic materials encountered at the Site were reportedly found at 84 Winslow Avenue. However, the clay encountered at the Site was also reportedly found at 84 Winslow Avenue, down to what is reported as "auger refusal" at approximately 20 feet BSG in B-1.

Groundwater was observed at approximately 4 feet BSG in borings B-1 through B-3, and at approximately 2 feet BSG in boring B-4. All of the other borings met drive refusal on concrete footings or old floors before reaching beyond approximately 2 feet BSG and groundwater was not encountered in these borings. It should be noted that fluctuations of the groundwater levels are anticipated to occur in these soils due to variations in rainfall and other factors different than those prevailing at the time the explorations were performed.

The data generated from the subsurface exploration program suggests that the native strata encountered at approximately 2 feet BSG and below are likely the now-buried bed of a bog or pond, consisting of native organic strata over native clay. All of these native materials encountered (loam, peat, fibrous peat and plastic clay) down to the depth of exploration (approx. 9 feet BSG) were found to have limited bearing capacity. The organics (loam and peat) were found to be loose to very loose (N 4) and not suitable for bearing loads above 200 or 300 pounds per square foot (psf). The clay was found to be medium dense (N between 20 and 30) and suitable for bearing loads of approximately 1 ton per square foot (tsf). However, although all of the native materials have definable bearing capacities below shear failure, all of these materials are unsuitable for structural bearing because they are compressible: the peat compresses under a load as it degrades organically and dewateres, and the clay compresses as it dewateres slowly under a load. This explains why movement of the structure has been noticed through cracks in plaster and misalignment of doors and windows. Movement of the structure has likely been almost continuous since it was constructed, but very slow, and settlement of the structure will continue into the future for many years if remediation is not conducted.

The most common solution to the identified problem is to tie the current foundation to deep foundation members, such as mini-piles that extend down to competent materials. The design for such remediation will depend on data from deeper soil borings conducted





around the outside of the structure down into competent strata, excavations to determine the construction details of the present foundation elements, and an analysis of the basement walls which have a noticeable tilt. After a design has been accomplished and implemented, total future settlement should be less than ½ inch, most of which is expected to occur almost immediately upon completion of the remediation.

Interior slabs-on-grade will continue to settle slowly over time and will need to be leveled every several years if they are to remain useful.

AEG recommends that we be retained for the design and construction phases of the project. Such services would include preparation of specifications, review of foundation drawings, and the monitoring of earthwork and foundation construction to assess compliance with these recommendations.


### Limitations

The analyses and recommendations submitted in this report are based in part upon the data obtained from subsurface explorations. The nature and extent of variations in the subsurface not encountered in the subsurface explorations may not become evident until construction. If variations appear evident, it will be necessary to reevaluate the recommendations of this report.

The generalized soil profiles described in the text are intended to convey trends in subsurface conditions. The boundaries between strata are approximate and idealized and have been developed by interpretations of widely spaced explorations and samples; actual soil transitions are probably more erratic.

I trust that this report addresses the preliminary geotechnical issues for this project. Please do not hesitate to contact me if there are any questions.

Very truly yours,  
**Alliance Environmental Group, Inc.**



Michael F. Geisser, PE, RLS, LSP  
Principal

Attachments: Figure 1: Boring Location Plan (1 sheet)  
Appendix: Able Soils Subsurface Exploration Logs (9 sheets)  
Cyn Environmental Services Boring Logs (5 sheets)



PARKING AREA

LAUNDRY

MECHANICAL ROOM

STUDIOS

⊕ B-4

⊕ B-2

⊕ B-1

⊕ B-8

⊕ B-3

⊕ B-5

⊕ B-7

⊕ B-6

⊕ B-9

NOTES:



— TYPICAL BORING LOCATION  
(not to scale)



BORING LOCATION PLAN  
32 CLIFTON STREET  
SOMMERSVILLE, MASSACHUSETTS  
AEG PROJ. # 1274

FILE: 1274.SitePlan.dwg DRAWN BY: AES CHECKED BY: MFG

# ABLE SOILS INC.

TO ALLIANCE ENVIRONMENTAL ADDRESS 32 CLIFTON ST.  
 PROJECT NAME APARTMENT HOUSE LOCATION SOMERVILLE, MA.  
 REPORT SENT TO MICHAEL GEISSER PROJ. NO. FAX  
 SAMPLES SENT TO TAKEN BY INSPECTOR OUR JOB NO. A031459

SHEET 1 OF 1  
 HOLE NO. B-1  
 LINE & STA -----  
 OFFSET -----

GROUND WATER OBSERVATIONS	4.0' after --- Hours	CASING	SAMPLER	CORE BAR.	SURFACE ELEV.
		---	SS	---	4-10-2003
	Type	---	1.3/8	---	DATE
	Size ID	---	30	BIT	DRILLER
	Hammer Wt.	---	24	---	INSPECTOR
	Hammer Fall	---			STEVE PERRY
					MICHAEL GEISSER

## LOCATION OF BORING:

Casing Blows per foot	Sample Depths TO	Sample Type	Blows per 6" on Sampler				Strata Change	SOIL IDENTIFICATION IS FIELD CLASSIFICATION ONLY FOR EXACT GRADATION LABORATORY TESTING IS REQUIRED	SAMPLE		
			From 0-6	6-12	12-18	18-24			No	Pen	Rec
	1-2	SS	2	1			1.0	CONCRETE	1	1.0	1.0
	2-4	SS	1	2	3	4	2.0	CINDERS	2	1.0	1.0
	4-6.5	SS	2	3	4	5	3.0	ORGANIC MATERIAL & SILT	3	2.5	1.0
							4.0	PEAT			
	6.5-7.5	SS	5	8				ORGANIC MATERIAL	4	1.0	1.0
	7.5-9.0	SS	10	17	10		7.5		5	1.5	1.0
							9.0	GRAY SILTY CLAY			
								B.O.H.			
								9.0 FT.			

GROUND SURFACE TO BOTTOM	USED SAMPLER	AND SAMPLER	SUMMARY
ABREVIATIONS			Earth Boring 9.0'
F-C = FINE TO COARSE	C = CORED	Proportions Used	Rock Coring -----
M-F = MEDIUM TO FINE	TP = TEST PIT	trace 0 to 10%	Samples 5
S-S = SPLIT SPOON	B = BULK SAMPLE	little 11 to 20%	
A-S = AUGER SAMPLE	W = WASHED	some 21 to 35%	
U-T = UNDISTURBED THINWALL	U-P = UNDISTURBED PISTON	and 36 to 50%	
			HOLE NO B-1

# ABLE SOILS INC.

TO ALLIANCE ENVIRONMENTAL ADDRESS 32 CLIFTON ST.  
 PROJECT NAME APARTMENT HOUSE LOCATION SOMERVILLE, MA.  
 REPORT SENT TO MICHAEL GEISSER PROJ. NO. FAX  
 SAMPLES SENT TO TAKEN BY INSPECTOR OUR JOB NO. A031459

SHEET 1 OF 1  
 HOLE NO. B-3  
 LINE & STA -----  
 OFFSET -----

GROUND WATER OBSERVATIONS		CASING	SAMPLER	CORE BAR.	SURFACE ELEV.
At <u>4.0'</u> after <u>---</u> Hours	Type	<u>---</u>	<u>SS</u>	<u>---</u>	<u>4-10-2003</u>
	Size ID	<u>---</u>	<u>1.3/8</u>	<u>---</u>	DATE
At <u>-----</u> after <u>---</u> Hours	Hammer Wt.	<u>---</u>	<u>30</u>	<u>BIT</u>	DRILLER <u>STEVE PERRY</u>
	Hammer Fall	<u>---</u>	<u>24</u>	<u>---</u>	INSPECTOR <u>MICHAEL GEISSER</u>

## LOCATION OF BORING:

DEPTH	Casing Blows per foot	Sample Depths TO	Sample Type	Blows per 6" on Sampler				Strata Change	SOIL IDENTIFICATION IS FIELD CLASSIFICATION ONLY FOR EXACT GRADATION LABORATORY TESTING IS REQUIRED	SAMPLE		
				From 0-6	6-12	12-18	18-24			No	Pen	Rec
		1.5-3.5	SS	1	1	1	1	15"	CONCRETE	1	2.0	2.0
		3.5-6.0	SS	1	.5	1	.5	2.0	CINDERS MIXED W/ GRAY/BROWN M-F SAND	1A		
				2				5.0	ORGANIC MATERIAL (BLACK PEAT)	2	2.5	2.0
		6-8	SS	1	2	3	5	7.0	ORGANIC MATERIAL (BROWN PEAT)			
								7.8	GRAY SILTY CLAY	3	2.0	2.0
								8.0	GRAY CLAY w/ LITTLE M-F GRAVEL	3A		
									TRACE F-C SAND			
									B.O.H. 8.0 FT.			

GROUND SURFACE TO BOTTOM		USED	SAMPLER	AND	SAMPLER	SUMMARY	
ABREVIATIONS						Proportions Used	Earth Boring <u>8.0'</u>
F-C = FINE TO COARSE	C = CORED					trace 0 to 10%	Rock Coring <u>-----</u>
M-F = MEDIUM TO FINE	TP = TEST PIT					little 11 to 20%	Samples <u>3=5 JARS</u>
S-S = SPLIT SPOON	B = BULK SAMPLE					some 21 to 35%	
A-S = AUGER SAMPLE	W = WASHED					and 36 to 50%	
U-T = UNDISTURBED THINWALL	U-P = UNDISTURBED PISTON						HOLE NO <u>B-3</u>

# BLE SOILS INC.

ALLIANCE ENVIRONMENTAL ADDRESS 32 CLIFTON ST.  
 PROJECT NAME APARTMENT HOUSE LOCATION SOMERVILLE, MA.  
 REPORT SENT TO MICHAEL GEISSER PROJ. NO. FAX  
 SAMPLES SENT TO TAKEN BY INSPECTOR OUR JOB NO. A031459

SHEET 1 OF 1  
 HOLE NO. B-4  
 LINE & STA -----  
 OFFSET -----

GROUND WATER OBSERVATIONS  
 2.0' after --- Hours  
 --- after --- Hours  
 CASING --- SAMPLER SS CORE BAR. --- SURFACE ELEV. 4-10-2003  
 Type Size ID --- 1.3/8 --- DATE  
 Hammer Wt. --- 30 --- DRILLER STEVE PERRY  
 Hammer Fall --- 24 --- BIT --- INSPECTOR MICHAEL GEISSER

## LOCATION OF BORING:

Casing Blows per foot	Sample Depths TO	Sample Type	Blows per 6" on Sampler				Strata Change	SOIL IDENTIFICATION IS FIELD CLASSIFICATION ONLY FOR EXACT GRADATION LABORATORY TESTING IS REQUIRED	SAMPLE		
			From 0-6	6-12	12-18	18-24			No	Pen	Rec
1-4	SS	1	1	1	2	9"	CONCRETE	1	3.0	3.0	
		4				2.0	GRAY/BROWN F-C SAND & GRAVEL FILL	1A			
5-7.5	SS	3	2	3	9	4.0	GRAY SILT & ORGANIC MATERIAL	2	2.5	2.5	
		9				6.0	PEAT	2A			
						7.3	GRAY CLAYEY SILT	2B			
						7.5	GRAY SILT & F-C SAND				
							B.O.H. 7.5 FT.				

GROUND SURFACE TO BOTTOM

USED SAMPLER AND SAMPLER

### SUMMARY

- ABBREVIATIONS**
- F-C = FINE TO COARSE
  - M-F = MEDIUM TO FINE
  - S-S = SPLIT SPOON
  - A-S = AUGER SAMPLE
  - U-T = UNDISTURBED THINWALL

- C = CORED
- TP = TEST PIT
- B = BULK SAMPLE
- W = WASHED
- U-P = UNDISTURBED PISTON

Proportions Used  
 trace 0 to 10%  
 little 11 to 20%  
 some 21 to 35%  
 and 36 to 50%

Earth Boring 7.5'  
 Rock Coring -----  
 Samples 3=5 JARS

HOLE NO B-4

# ABLE SOILS INC.

TO ALLIANCE ENVIRONMENTAL ADDRESS 32 CLIFTON ST.  
 PROJECT NAME APARTMENT HOUSE LOCATION SOMERVILLE, MA.  
 REPORT SENT TO MICHAEL GEISSER PROJ. NO. FAX  
 SAMPLES SENT TO TAKEN BY INSPECTOR OUR JOB NO. A031459

SHEET 1 OF 1  
 HOLE NO. B-5  
 LINE & STA -----  
 OFFSET -----

**GROUND WATER OBSERVATIONS**  
 At ----- after --- Hours  
 At ----- after --- Hours

CASING --- SAMPLER SS CORE BAR. ---  
 Type --- 1.3/8 ---  
 Size ID --- 30 ---  
 Hammer Wt. --- 24 ---  
 Hammer Fall --- --- ---

SURFACE ELEV. -----  
 DATE 4-10-2003  
 DRILLER STEVE PERRY  
 INSPECTOR MICHAEL GEISSER

### LOCATION OF BORING:

DEPTH	Casing Blows per foot	Sample Depths TO	Sample Type	Blows per 6" on Sampler				Strata Change	SOIL IDENTIFICATION IS FIELD CLASSIFICATION ONLY FOR EXACT GRADATION LABORATORY TESTING IS REQUIRED	SAMPLE		
				From	to		No			Pen	Rec	
				0-6	6-12	12-18						18-24
		9"-1'7"	SS	6				4 1/2"	CONCRETE	1	1/2	1/2
								1.2	ASH & COKE SLAG			
									REFUSAL ON FOOTING			

<p>GROUND SURFACE TO BOTTOM                  ABBREVIATIONS</p> <p>F-C = FINE TO COARSE                  M-F = MEDIUM TO FINE                  S-S = SPLIT SPOON                  A-S = AUGER SAMPLE                  U-T = UNDISTURBED THINWALL</p>	<p>USED SAMPLER AND SAMPLER</p> <p>C = CORED                  TP = TEST PIT                  B = BULK SAMPLE                  W = WASHED                  U-P = UNDISTURBED PISTON</p>	<p>SUMMARY</p> <p>Proportions Used                  trace 0 to 10%                  little 11 to 20%                  some 21 to 35%                  and 36 to 50%</p>	<p>Earth Boring <u>1'2"</u>                  Rock Coring <u>-----</u>                  Samples <u>1</u></p>
---	--	---	---

HOLE NO B-5

# ABLE SOILS INC.

ALLIANCE ENVIRONMENTAL ADDRESS 32 CLIFTON ST.  
 PROJECT NAME APARTMENT HOUSE LOCATION SOMERVILLE, MA.  
 REPORT SENT TO MICHAEL GEISSER PROJ. NO. FAX  
 SAMPLES SENT TO TAKEN BY INSPECTOR OUR JOB NO. A031459

SHEET 1 OF 1  
 HOLE NO. B-6  
 LINE & STA -----  
 OFFSET -----

GROUND WATER OBSERVATIONS  
 after --- Hours  
 after --- Hours

CASING	SAMPLER	CORE BAR.	SURFACE ELEV.
---	SS	---	4-10-2003
Type	1.3/8	---	DATE
Size ID	30	BIT	DRILLER STEVE PERRY
Hammer Wt.	24	---	INSPECTOR MICHAEL GEISSER
Hammer Fall			

## LOCATION OF BORING:

Casing Blows per foot	Sample Depths TO	Sample Type	Blows per 6" on Sampler				Strata Change	SOIL IDENTIFICATION IS FIELD CLASSIFICATION ONLY FOR EXACT GRADATION LABORATORY TESTING IS REQUIRED	SAMPLE		
			From 0-6	6-12	12-18	18-24			No	Pen	Rec
1-1.7		SS	7				9"	CONCRETE	1	0.7	0.7
							1.7	GRAY F-C SAND SOME F-C GRAVEL & CINDERS			
								REFUSAL ON FOOTING			

GROUND SURFACE TO BOTTOM	USED SAMPLER	AND SAMPLER	SUMMARY
<b>ABBREVIATIONS</b>			
F-C = FINE TO COARSE	C = CORED	Proportions Used	Earth Boring 1.7'
M-F = MEDIUM TO FINE	TP = TEST PIT	trace 0 to 10%	Rock Coring -----
S-S = SPLIT SPOON	B = BULK SAMPLE	little 11 to 20%	Samples 1
A-S = AUGER SAMPLE	W = WASHED	some 21 to 35%	
U-T = UNDISTURBED THINWALL	U-P = UNDISTURBED PISTON	and 36 to 50%	
			HOLE NO B-6

# ABLE SOILS INC.

TO ALLIANCE ENVIRONMENTAL ADDRESS 32 CLIFTON ST.  
 PROJECT NAME APARTMENT HOUSE LOCATION SOMERVILLE, MA.  
 REPORT SENT TO MICHAEL GEISSER PROJ. NO. FAX  
 SAMPLES SENT TO TAKEN BY INSPECTOR OUR JOB NO. A031459

SHEET 1 OF 1  
 HOLE NO. B-7  
 LINE & STA -----  
 OFFSET -----

GROUND WATER OBSERVATIONS		CASING	SAMPLER	CORE BAR.	SURFACE ELEV.
At <u>-----</u> after <u>---</u> Hours	Type <u>---</u>	---	SS	---	-----
	Size ID <u>---</u>	---	<u>1.3/8</u>	---	DATE <u>4-10-2003</u>
At <u>-----</u> after <u>---</u> Hours	Hammer Wt. <u>---</u>	---	<u>30</u>	BIT	DRILLER <u>STEVE PERRY</u>
	Hammer Fall <u>---</u>	---	<u>24</u>	---	INSPECTOR <u>MICHAEL GEISSE</u>

### LOCATION OF BORING:

DEPTH	Casing Blows per foot	Sample Depths TO	Sample Type	Blows per 6" on Sampler				Strata Change	SOIL IDENTIFICATION IS FIELD CLASSIFICATION ONLY FOR EXACT GRADATION LABORATORY TESTING IS REQUIRED	SAMPLE		
				From 0-6	6-12	12-18	18-24			No	Pen	Rec
		6"-13"	SS	15				6"	CONCRETE	1	7"	7"
								13"	BROWN F-C SAND & MISC.FILL			
									REFUSAL ON FOOTING			

GROUND SURFACE TO BOTTOM USED SAMPLER AND SAMPLER SUMMARY

**ABREVIATIONS**  
 F-C = FINE TO COARSE      C = CORED  
 M-F = MEDIUM TO FINE    TP = TEST PIT  
 S-S = SPLIT SPOON        B = BULK SAMPLE  
 A-S = AUGER SAMPLE       W = WASHED  
 U-T = UNDISTURBED THINWALL    U-P = UNDISTURBED PISTON

Proportions Used  
 trace 0 to 10%  
 little 11 to 20%  
 some 21 to 35%  
 and 36 to 50%

Earth Boring 13"  
 Rock Coring -----  
 Samples 1





# ABLE SOILS INC.

TO ALLIANCE ENVIRONMENTAL ADDRESS 32 CLIFTON ST.  
 PROJECT NAME APARTMENT HOUSE LOCATION SOMERVILLE, MA.  
 REPORT SENT TO MICHAEL GEISSER PROJ. NO. FAX  
 SAMPLES SENT TO TAKEN BY INSPECTOR OUR JOB NO. A031459

SHEET 1 OF 1  
 HOLE NO. B-9  
 LINE & STA -----  
 OFFSET -----

## GROUND WATER OBSERVATIONS

At ----- after --- Hours  
 At ----- after --- Hours

	CASING	SAMPLER	CORE BAR.
Type	---	SS	---
Size ID	---	<u>1.3/8</u>	---
Hammer Wt.	---	<u>30</u>	BIT
Hammer Fall	---	<u>24</u>	---

SURFACE ELEV. -----  
 DATE 4-10-2003  
 DRILLER STEVE PERRY  
 INSPECTOR MICHAEL GEISSER

## LOCATION OF BORING:

DEPTH	Casing Blows per foot	Sample Depths TO	Sample Type	Blows per 6" on Sampler				Strata Change	SOIL IDENTIFICATION IS FIELD CLASSIFICATION ONLY FOR EXACT GRADATION LABORATORY TESTING IS REQUIRED	SAMPLE		
				From 0-6	6-12	12-18	18-24			No	Pen	Rec
		<u>1.5-2.1</u>	<u>SS</u>	<u>50</u>				<u>15"</u>	<u>CONCRETE</u>	<u>1</u>	<u>0.6</u>	<u>0.6</u>
								<u>2.1</u>	<u>CINDERS &amp; MISC.FILL</u>			
									<u>REFUSAL ON FOOTING</u>			

GROUND SURFACE TO BOTTOM      USED SAMPLER AND SAMPLER      SUMMARY

ABREVIATIONS      Proportions Used

F-C = FINE TO COARSE	C = CORED	trace 0 to 10%	Earth Boring <u>2.1'</u>
M-F = MEDIUM TO FINE	TP = TEST PIT	little 11 to 20%	Rock Coring <u>-----</u>
S-S = SPLIT SPOON	B = BULK SAMPLE	some 21 to 35%	Samples <u>1</u>
A-S = AUGER SAMPLE	W = WASHED	and 36 to 50%	
U-T = UNDISTURBED THINWALL	U-P = UNDISTURBED PISTON		HOLE NO B-9

CYN Environmental Services  
 100 Tosca Drive  
 Stoughton, MA 02071

Project Name: Beacon Ink  
 Project Location: 84 Winslow Avenue  
 Project Number: 184L

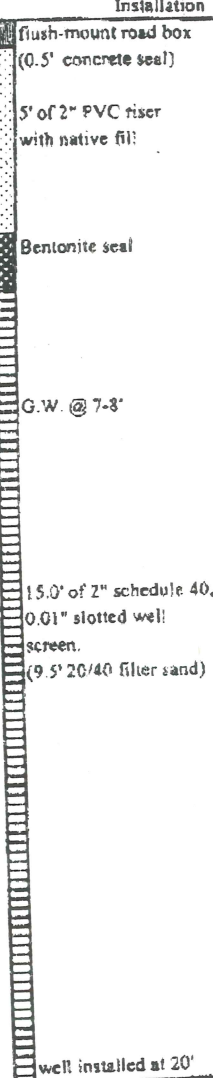
Sheet 1 of 1  
 Boring No. MW-1/B-1  
 Location See Plan  
 G.W. elevation N/A

Groundwater Readings	
Date	Depth to G.W.
3/26/99	7.69'

Type	Casing	Sampler	Core
Size I.D.	4-1/4"	SS	N/A
Hammer Wt.	N/A	140 lb.	N/A
Hammer Fall	N/A	24"	N/A

Start Date 3/26/99  
 Finish Date 3/26/99  
 Driller A.M.  
 Inspector Jason Pollender

Depth	Sample type-No.	Sampling Depth (ft)	Inches		Blow Count 6"				TOV Reading	SPT N-Value	Soil Description	Well Installation
			Pen	Rec	7	9	13	12				
5-ft											Concrete	flush-mount road box (0.5' concrete seal)
												5' of 2" PVC riser with native fill
												Bentonite seal
		5-7'	24"	8"	7	9	13	12	BDL		Olive Gray Fine to Coarse SAND some Silt, trace clay	
		7-9'	24"	22"	10	19	20	22	BDL		Olive Gray CLAY and Silt	G.W. @ 7-8'
10-ft												
15-ft												
			15-17'	24"	22"	5	7	7	11	BDL	Olive Gray CLAY and Silt	
20-ft												



Granular Soils	Cohesive Soils
< 4 = very loose	< 2 = very soft
5-10 = loose	2-4 = soft
11-30 = medium	4-8 = medium stiff
30-50 = dense	8-15 = stiff
> 50 = very dense	15-30 = very stiff
	> 30 = Hard

Sample Type
SS - split spoon
ST - shelly tube
AF - auger flights
RC - rock core
MA - Microliners

Notes: Samples not obtained at this location. TOV readings of drill cuttings are BDL.

CYN Environmental Services  
 100 Tosca Drive  
 Stoughton, MA 02071

Project Name: Beacon Ink  
 Project Location: 84 Winslow Avenue  
 Project Number: 184L

Sheet 1 of 1  
 Boring No. MW-2/B-2  
 Location See Plan  
 G.W. elevation N/A

Groundwater Readings	
Date	Depth to G.W.
1 3/26/99	4.95'
2	
3	

Type	Casing	Sampler	Core
Size I.D.	Augar	SS	N/A
Hammer Wt.	4-1/4"	2'	N/A
Hammer Fall	N/A	140 lb.	N/A
	N/A	24"	N/A

Start Date 3/26/99  
 Finish Date 3/26/99  
 Driller A.M.  
 Inspector Jason Pollender

Depth	Sample type-No.	Sampling Depth (ft)	Inches		Blow Count 6"	TOV Reading	SPT N-Value	Soil Description	Well Installation
			Pen	Rec					
									flush-mount road box (0.5' concrete seal)
						BDL	Brown SILT and Clay		3' of 2" PVC riser with native fill
									Bentonite seal
5-ft		5-7'	24"	16"	10 19 13 41	BDL	Olive Gray CLAY and Silt		G.W. @ 5-6'
10-ft		10-12'	24"	17"	10 19 20 22	BDL	Olive Gray CLAY and Silt		10.0' of 2" schedule 40, 0.01" slotted well screen.
									(9.5' 20/40 filter sand)
									well installed at 13'
									End of Boring 13'
									No augar refusal
15-ft									
20-ft									

**Granular Soils**  
 < 4 = very loose  
 5-10 = loose  
 11-30 = medium  
 30-50 = dense  
 > 50 = very dense

**Cohesive Soils**  
 < 2 = very soft  
 2-4 = soft  
 4-8 = medium stiff  
 8-15 = stiff  
 15-30 = very stiff  
 > 30 = Hard

**Sample Type**  
 SS - split spoon  
 ST - shelly tube  
 AF - auger flights  
 RC - rock core  
 MA - Microliners

**Notes:** Samples not obtained at this location.  
 TOV readings of drill cuttings are BDL.

CYN Environmental Services  
 100 Tosca Drive  
 Stoughton, MA 02071

Project Name: Beacon Ink  
 Project Location: 84 Winslow Avenue  
 Project Number: 184L

Sheet 1 of 1  
 Boring No. MW-3/B-3  
 Location See Plan  
 G.W. elevation N/A

Groundwater Readings	
Date	Depth to G.W.
1	
2	
3	

Type	Casing	Sampler	Core
Augar	4-1/4"	SS	N/A
Size I.D.	4-1/4"	2"	N/A
Hammer Wt.	N/A	140 lb.	N/A
Hammer Fall	N/A	24"	N/A

Start Date 3/26/99  
 Finish Date 3/26/99  
 Driller A.M.  
 Inspector Jason Pollender

Depth	Sample type-No.	Sampling Depth (ft)	Inches		Blow Count 5"				TOV Reading	SPT N-Value	Soil Description	Well Installation
			Pen	Rec								
5-ft		5-7'	24"	13"	8	7	20	34	BDL		Greenish Gray Clay and Silt	flush-mount road box (0.5' concrete seal) 3' of 2" PVC riser with native fill Bentonite seal  G.W. @ 7-8' 10.0' of 2" schedule 40, 0.01" slotted well screen. (9.5' 20/40 filter sand)  End of Boring 13' well installed at 13' No augar refusal
10-ft		10-12'	24"	12"	10	21	21	21	BDL		Greenish Gray CLAY and Silt	
15-ft												
20-ft												

**Granular Soils**  
 < 4 = very loose  
 5-10 = loose  
 11-30 = medium  
 30-50 = dense  
 > 50 = very dense

**Cohesive Soils**  
 < 2 = very soft  
 2-4 = soft  
 4-8 = medium stiff  
 8-15 = stiff  
 15-30 = very stiff  
 > 30 = Hard

**Sample Type**  
 SS - split spoon  
 ST - shelly tube  
 AF - auger flights  
 RC - rock core  
 MA - Microliners

**Notes:** Samples not obtained at this location. TOV reading of drill cutting is BDL.

CYN Environmental Services  
100 Tosca Drive  
Stoughton, MA 02071

Project Name: Beacon Ink  
Project Location: 84 Winslow Avenue  
Project Number: 184L

Sheet: 1 of 1  
Boring No.: MW-4/B-4  
Location: See Plan  
G.W. elevation: N/A  
Start Date: 3/26/99  
Finish Date: 3/26/99  
Driller: A.M.  
Inspector: Jason Pollender

Groundwater Readings	
Date	Depth to G.W.
1	
2	
3	

Type	Casing	Sampler	Core
Size I.D.	Auger	SS	N/A
Hammer Wt.	4-1/4"	2'	N/A
Hammer Fall	N/A	140 lb.	N/A
	N/A	24"	N/A

Depth	Sample type-No.	Sampling Depth (ft)	Inches		Blow Count 6"		TOV Reading	SPT N-Value	Soil Description	Well Installation
			Pen	Rec	8	7				
5-ft		5-7'	24"	13"	8	7	20	34	BDL	Greenish Gray CLAY and Silt
10-ft		10-12'	24"	12"	10	21	21	21	BDL	Greenish Gray CLAY and Silt
15-ft										End of Boring 13' No auger refusal
20-ft										

Well Installation:  
Flush-mount road box  
(0.5' concrete seal)  
3' of 2" PVC riser  
with native fill  
Bentonite seal  
  
G.W. @ 7-8'  
10.0' of 2" schedule 40,  
0.01" slotted well  
screen.  
(9.5' 20/40 filter sand)  
  
well installed at 13'

Granular Soils	Cohesive Soils	Sample Type
< 4 = very loose	< 2 = very soft	SS - split spoon
5-10 = loose	2-4 = soft	ST - Shelby tube
11-30 = medium	4-8 = medium stiff	AF - auger flights
30-50 = dense	8-15 = stiff	RC - rock core
> 50 = very dense	15-30 = very stiff	MA - Microliners
	> 30 = Hard	

Notes: Samples not obtained at this location.  
TCV readings of drill cuttings are BDL.

CYN Environmental Services  
 100 Tosca Drive  
 Stoughton, MA 02071

Project Name: Beacon Ink  
 Project Location: 84 Winslow Avenue  
 Project Number: 184L

Sheet 1 of 1  
 Boring No. B-5  
 Location See Plan  
 G.W. elevation N/A

Groundwater Readings	
Date	Depth to G.W.
1	
2	
3	

	Casing	Sampler	Core
Type	Auger	SS	N/A
Size I.D.	4-1/4"	2"	N/A
Hammer Wt.	N/A	140 lb.	N/A
Hammer Fall	N/A	24"	N/A

Start Date 3/26/99  
 Finish Date 3/26/99  
 Driller A.M.  
 Inspector Jason Pollender

Depth	Sample type-No.	Sampling Depth (ft)	Inches		Blow Count 6"				TOV Reading	SPT N-Value	Soil Description	Well Installation
			Pen	Rec								
												no well installed
5-ft		5-7'	24"	16"	12	17	14	14	BDL		Olive Gray F to C SAND. Some Silt trace Clay	
											Greenish Gray CLAY and Silt	G.W. @ 7-8'
10-ft		10-12'	24"	20"	39	7	7	10	BDL		Greenish Gray CLAY and Silt	
											End of Boring 13'	
15-ft												
20-ft												

**Granular Soils**  
 < 4 = very loose  
 5-10 = loose  
 11-30 = medium  
 30-50 dense  
 > 50 = very dense

**Cohesive Soils**  
 < 2 = very soft  
 2-4 = soft  
 4-8 = medium stiff  
 8-15 = stiff  
 15-30 = very stiff  
 > 30 = Hard

**Sample Type**  
 SS - split spoon  
 ST - Shelby tube  
 AF - auger flights  
 RC - rock core  
 MA - Microliners

Notes: Samples not obtained at this location.  
 TOV readings of drill cuttings are BDL.



*Alliance Environmental Group, Inc.*

COPY

100 Jefferson Boulevard, Warwick, Rhode Island 02888

Telephone: 401.732.7600; Fax: 401.732.7670

October 21, 2003

Mr. Richard Graf  
Mixit Studios Cooperative Corp.  
32 Clifton Street  
Somerville, MA 02144

Re: Supplemental Geotechnical Investigation and Letter Report  
32 Clifton Street  
Somerville, Massachusetts

Dear Richard:

Alliance Environmental Group, Inc. (AEG) is pleased to provide you with this geotechnical letter report for your above-referenced project. This report was prepared in accordance with our standard protocols for medium-load bearing structures in general urban geology. The primary objective of the study reported on herein was to provide an interpretation of subsurface information relative to performance of the existing 3-story residential/light industry structure. The recommendations presented herein are subject to the Limitations below.

The property ("Site") sits at approximately 20 meters in elevation (NGVD, 1929), is located in a residential neighborhood, and adjoins Clifton Street, a local access road, to the WNW, and a bicycle path on the bed of an old Boston and Maine Railroad track, to the SSW.

As part of this study, four (4) soil borings were performed around the northerly portion of the Site structure. The boring, designated B-101 through B-104, were advanced on October 15, 2003 by Able Soils, Inc. of Lincoln, Rhode Island, under the direction of AEG. The borings were conducted with a 1-3/8" I.D. split spoon sampler advanced with a 140 lb. hammer freefalling 30 inches. The borings extended as deep as 26.75 feet below surface grade (BSG). The standard penetration value (N) is the number of blows required to drive the standard sampler (as used here) from 6 to 18 inches of penetration with the hammer. Logs of all 4 borings are attached. The locations of the borings are shown on Figure 1, Boring Location Plan.

The generalized subsurface profile consists of a brown fine to coarse sand and gravel fill stratum down to approximately 5 feet BSG; over an approximately 5 feet thick stratum of organic peat in borings B-102, B-103 and B-104 (B-101 did not have any peat, a gray medium to fine sand and silt with some fine to coarse gravel extended from between



approximately 5 to 10 feet BSG); over an approximately 5 feet thick stratum of gray silty plastic clay or clayey silt; over a gray plastic silt. Bedrock was likely encountered in boring B-102 at approximately 27 feet BSG (drive refusal and rock fragments).

In 1999, soil borings were conducted by Cyn Environmental Services approximately 100 feet NNW of the Site as part of development at 84 Winslow Avenue. Copies of boring logs for borings B-1 through B-5 were reviewed by AEG as part of this study. None of the organic materials encountered at the Site were reportedly found at 84 Winslow Avenue. However, the clay encountered at the Site was also reportedly found at 84 Winslow Avenue, down to what is reported as "auger refusal" at approximately 20 feet BSG in B-1.

Groundwater was observed at approximately 8 feet BSG in borings B-101 and B-102, and at approximately 5 feet BSG in boring B-104. Groundwater was not encountered in boring B-103, likely due to the impervious clay. It should be noted that fluctuations of the groundwater levels are anticipated to occur in these soils due to variations in rainfall and other factors different than those prevailing at the time the explorations were performed.

The data generated from the subsurface exploration program suggests that the native stratum encountered at approximately 5 feet BSG and below in borings B-102 through B-104 is likely the now-buried bed of a bog or pond, consisting of native organic strata over native clay. The location of B-101 is likely outside of the boundary of the now-buried bog or pond. All of these native materials encountered (loam, peat, fibrous peat and plastic clay) down to the depth of exploration (approx. 26.75 feet BSG) were found to have limited bearing capacity. The organics (loam and peat) were found to be loose to very loose ( $N \leq 4$ ) and not suitable for bearing loads above 200 or 300 pounds per square foot (psf). The clay was found to be medium dense ( $N$  between 20 and 30) and suitable for bearing loads of approximately 1 ton per square foot (tsf). However, although all of these native materials have definable bearing capacities below shear failure, all of these materials are unsuitable for structural bearing because they are compressible: the peat compresses under a load as it degrades organically and dewateres, and the clay compresses as it dewateres slowly under a load. This explains why movement of the structure has been noticed through cracks in plaster and misalignment of doors and windows. Movement of the structure has likely been almost continuous since it was constructed, but very slow, and settlement of the structure will continue into the future for many years if remediation is not conducted.

The most common solution to the identified problem is to tie the current foundation to deep foundation members, such as mini-piles that extend down to bedrock, which appears to be located at around 27 feet BSG. After a design has been accomplished and implemented, total future settlement should be less than ½ inch, most of which is expected to occur almost immediately upon completion of the remediation.

Interior slabs-on-grade will continue to settle slowly over time and will need to be leveled every several years if they are to remain useful.

AEG recommends that we be retained for the design and construction phases of the project. Such services would include preparation of specifications, review of foundation drawings, and the monitoring of earthwork and foundation construction to assess compliance with these recommendations.

### **Limitations**

The analyses and recommendations submitted in this report are based in part upon the data obtained from subsurface explorations. The nature and extent of variations in the subsurface not encountered in the subsurface explorations may not become evident until construction. If variations appear evident, it will be necessary to reevaluate the recommendations of this report.

The generalized soil profiles described in the text are intended to convey trends in subsurface conditions. The boundaries between strata are approximate and idealized and have been developed by interpretations of widely spaced explorations and samples; actual soil transitions are probably more erratic.

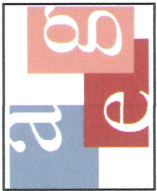
I trust that this report addresses the preliminary geotechnical issues for this project. Please do not hesitate to contact me if there are any questions.

Very truly yours,  
**Alliance Environmental Group, Inc.**



Michael F. Geisser, PE, RLS, LSP  
Principal

Attachments: Figure 1: Boring Location Plan (1 sheet)  
Appendix: Able Soils Subsurface Exploration Logs (4 sheets)



B-101

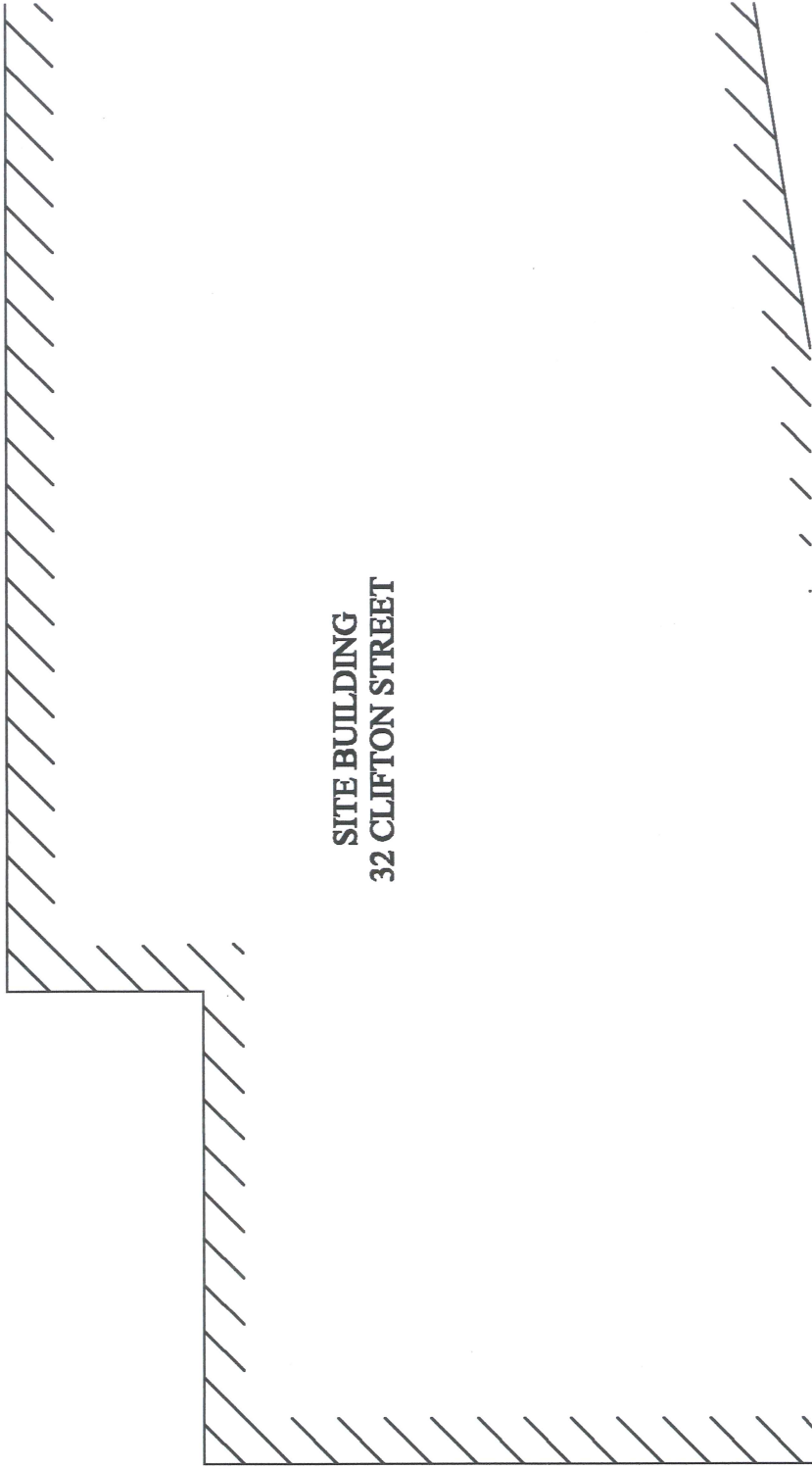


B-103



DRIVEWAY

B-104



SITE BUILDING  
32 CLIFTON STREET

PARKING  
AREA

B-102



BORING LOCATION PLAN  
32 CLIFTON STREET  
SOMMERVILLE, MASSACHUSETTS  
AEG PROJ. # 1274  
FILE: 1274.SitePlan2.dwg DRAWN BY: AES CHECKED BY: MRG



APPROXIMATE SCALE:



NOTES:

 TYPICAL BORING  
LOCATION

**ABLE SOILS INC.**

TO ALLIANCE ENVIRONMENTAL ADDRESS 32 CLIFTON ST.

PROJECT NAME APT.HOUSE & BUSINESS LOCATION SOMERVILLE, MA.

REPORT SENT TO MICHAEL GEISSER PROJ. NO.          FAX         

SAMPLES SENT TO TAKEN BY INSPECTOR OUR JOB NO. A031509 SHEET 1 OF 1

HOLE NO. B-101

LINE & STA         

OFFSET         

**GROUND WATER OBSERVATIONS**

At 8.0' after          Hours

At          after          Hours

CASING	SAMPLER	CORE BAR.	SURFACE ELEV.
HSA	SS	----	-----
Type	SS	----	DATE
Size ID	1.3/8	----	10-15-2003
Hammer Wt.	140	BIT	DRILLER
Hammer Fall	30	----	STEVE PERRY
			INSPECTOR
			ALEXANDRA

**LOCATION OF BORING:**

Casing Blows per foot	Sample Depths TO	Sample Type	Blows per 6" on Sampler				Strata Change	SOIL IDENTIFICATION IS FIELD CLASSIFICATION ONLY FOR EXACT GRADATION LABORATORY TESTING IS REQUIRED	SAMPLE		
			From 0-6	6-12	12-18	18-24			No	Pen	Rec
							5.0	BROWN/GRAY F-C SAND SOME GRAVEL LITTLE SILT			
	10-12	SS	5	7	10	10	10.0	GRAY M-F SAND & SILT SOME F-C GRAVEL	1	2.0	2.0
	15-17	SS	6	9	12	14	15.0	GRAY SILTY CLAY	2	2.0	2.0
	20-22	SS	8	9	10	14	20.0	GRAY CLAY TRACE SILT	3	2.0	2.0
	22-24	SS	6	7	6	8	24.0	GRAY CLAY LITTLE F-C SAND	4	2.0	2.0
								B.O.H. 24.0 FT.			

GROUND SURFACE TO BOTTOM USED HSA AND SAMPLER

**ABREVIATIONS**

F-C = FINE TO COARSE	C = CORED
M-F = MEDIUM TO FINE	TP = TEST PIT
S-S = SPLIT SPOON	B = BULK SAMPLE
A-S = AUGER SAMPLE	W = WASHED
U-T = UNDISTURBED THINWALL	U-P = UNDISTURBED PISTON

Proportions Used  
 trace 0 to 10%  
 little 11 to 20%  
 some 21 to 35%  
 and 36 to 50%

**SUMMARY**

Earth Boring 24.0'

Rock Coring         

Samples 4

HOLE NO B-101

# ABLE SOILS INC.

TO ALLIANCE ENVIRONMENTAL ADDRESS 32 CLIFTON ST.  
 PROJECT NAME APT. HOUSE & BUSINESS LOCATION SOMERVILLE, MA.  
 REPORT SENT TO MICHAEL GEISSER PROJ. NO. FAX  
 SAMPLES SENT TO TAKEN BY INSPECTOR OUR JOB NO. A031509

SHEET 1 OF 1  
 HOLE NO. B-102  
 LINE & STA -----  
 OFFSET -----

### GROUND WATER OBSERVATIONS

At 8.5' after ----- Hours  
 At ----- after ----- Hours

CASING HSA SAMPLER SS CORE BAR. -----  
 Type Size ID 3.3/4 1.3/8 -----  
 Hammer Wt. ----- 140 BIT -----  
 Hammer Fall ----- 30 -----

SURFACE ELEV. -----  
 DATE 10-15-2003  
 DRILLER STEVE PERRY  
 INSPECTOR ALEXANDRA

### LOCATION OF BORING:

DEPTH	Casing Blows per foot	Sample Depths TO	Sample Type	Blows per 6" on Sampler				Strata Change	SOIL IDENTIFICATION IS FIELD CLASSIFICATION ONLY FOR EXACT GRADATION LABORATORY TESTING IS REQUIRED	SAMPLE		
				From 0-6	6-12	12-18	18-24			No	Pen	Rec
		5-7	SS	WT. OF HAMMER				5.0	BROWN F-C SAND & GRAVEL	1	2.0	2.0
		10-12	SS	2	3	6	8	11.0	PEAT ORGANIC MATERIAL	2	2.0	1.5
		15-17	SS	3	4	5	6	15.0	GRAY SILT/CLAY MOSTLY CLAY	3	2.0	2.0
		20-22	SS	2	7	5	6		GRAY CLAY	4	2.0	2.0
		25-										
		26.75	SS	3	10	48	75	26.0		5	1.75	
								26.75	ROCK FRAGMENTS			1.75
									REFUSAL 26.75 FT.			

GROUND SURFACE TO BOTTOM USED HSA AND SAMPLER SUMMARY

**ABBREVIATIONS**

F-C = FINE TO COARSE	C = CORED	Proportions Used	Earth Boring <u>26.75'</u>
M-F = MEDIUM TO FINE	TP = TEST PIT	trace 0 to 10%	Rock Coring <u>-----</u>
S-S = SPLIT SPOON	B = BULK SAMPLE	little 11 to 20%	Samples <u>5</u>
A-S = AUGER SAMPLE	W = WASHED	some 21 to 35%	
U-T = UNDISTURBED THINWALL	U-P = UNDISTURBED PISTON	and 36 to 50%	

HOLE NO B-102

# ABLE SOILS INC.

TO ALLIANCE ENVIRONMENTAL ADDRESS 32 CLIFTON ST.  
 PROJECT NAME APT. HOUSE & BUSINESS LOCATION SOMERVILLE, MA.  
 REPORT SENT TO MICHAEL GEISSER PROJ. NO. FAX  
 SAMPLES SENT TO TAKEN BY INSPECTOR OUR JOB NO. A031509

SHEET 1 OF 1  
 HOLE NO. B-104  
 LINE & STA -----  
 OFFSET -----

GROUND WATER OBSERVATIONS		CASING	SAMPLER	CORE BAR.	SURFACE ELEV.
At <u>4.5'</u> after <u>-----</u> Hours	Type	HSA	SS	-----	DATE <u>10-15-2003</u>
At <u>-----</u> after <u>-----</u> Hours	Size ID	<u>3.3/4</u>	<u>1.3/8</u>	-----	DRILLER <u>STEVE PERRY</u>
	Hammer Wt.	-----	<u>140</u>	BIT	INSPECTOR <u>ALEXANDRA</u>
	Hammer Fall	-----	<u>30</u>	-----	

## LOCATION OF BORING:

DEPTH	Casing Blows per foot	Sample Depths TO	Sample Type	Blows per 6" on Sampler				Strata Change	SOIL IDENTIFICATION IS FIELD CLASSIFICATION ONLY FOR EXACT GRADATION LABORATORY TESTING IS REQUIRED	SAMPLE		
				From 0-6	6-12	12-18	18-24			No	Pen	Rec
									BROWN F-C SAND & GRAVEL			
		5-7	SS	2	2	2	2	5.0		1	2.0	2.0
									PEAT ORGANIC MATERIAL			
		10-12	SS	10	9	7	7	10.0		2	2.0	2.0
								11.0	GRAY F-C SAND & SILT			
									GRAY CLAY LITTLE SILT			
		15-17	SS	5	10	13	14			3	2.0	2.0
								17.0				
									B.O.H. 17.0 FT.			

GROUND SURFACE TO BOTTOM USED HSA AND SAMPLER SUMMARY

**ABREVIATIONS**

F-C = FINE TO COARSE	C = CORED	Proportions Used	Earth Boring <u>17.0'</u>
M-F = MEDIUM TO FINE	TP = TEST PIT	trace 0 to 10%	Rock Coring <u>-----</u>
S-S = SPLIT SPOON	B = BULK SAMPLE	little 11 to 20%	Samples <u>3</u>
A-S = AUGER SAMPLE	W = WASHED	some 21 to 35%	
U-T = UNDISTURBED THINWALL	U-P = UNDISTURBED PISTON	and 36 to 50%	

HOLE NO B-104



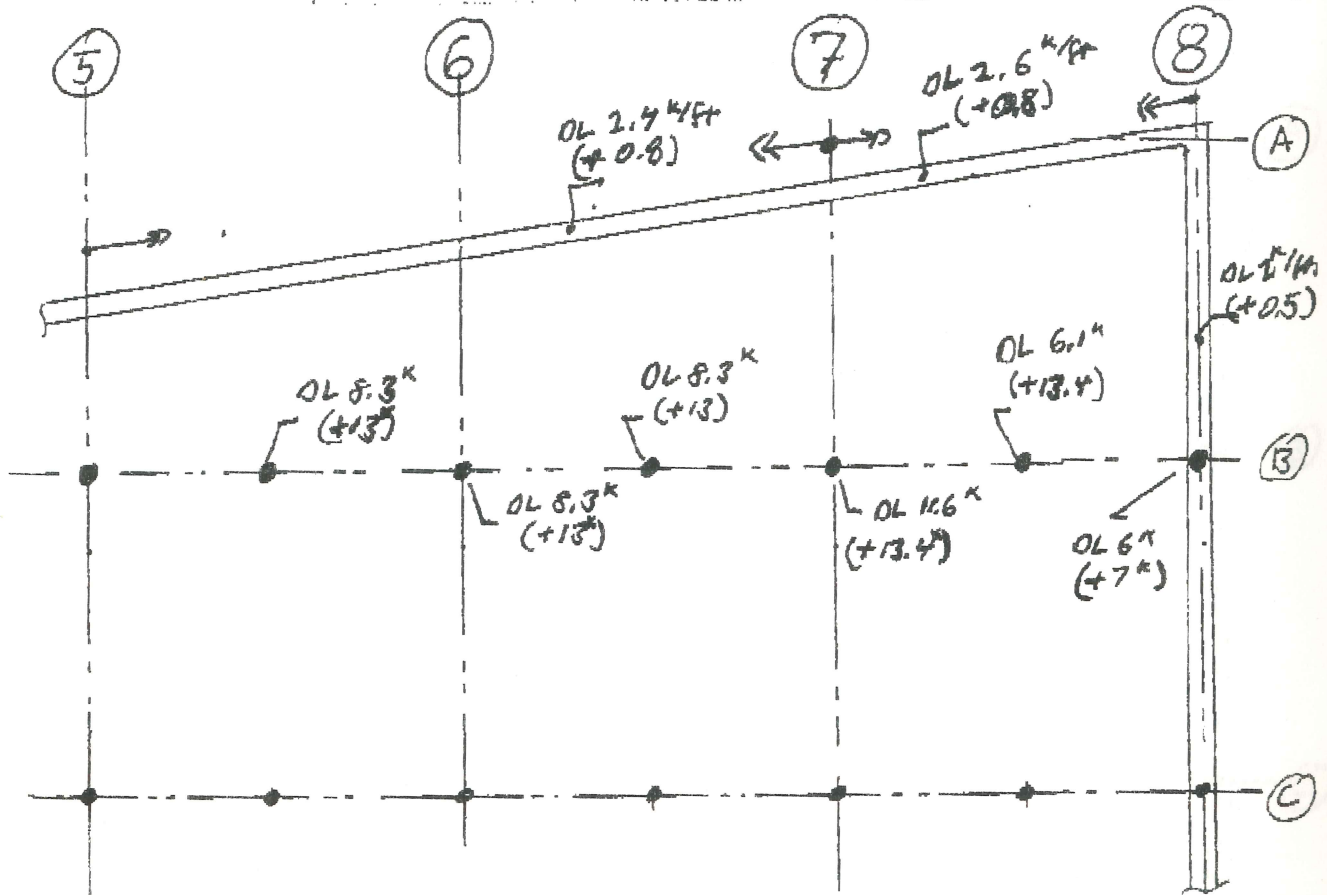
WEIDLINGER ASSOCIATES INC

FOUNDATION ENGINEERS

MEETING NO. \_\_\_\_\_  
 CLIENT REPRESENTATIVE \_\_\_\_\_  
 PROJECT NO. \_\_\_\_\_  
 PROJECT NAME \_\_\_\_\_  
 DESIGN TITLE \_\_\_\_\_

DATE \_\_\_\_\_  
 DRAWING NO. \_\_\_\_\_  
 SHEET NO. \_\_\_\_\_  
 TOTAL SHEETS \_\_\_\_\_  
 SCALE \_\_\_\_\_  
 PROJECT NO. \_\_\_\_\_

DATE \_\_\_\_\_  
 DRAWING NO. \_\_\_\_\_  
 SHEET NO. \_\_\_\_\_  
 TOTAL SHEETS \_\_\_\_\_  
 SCALE \_\_\_\_\_  
 PROJECT NO. \_\_\_\_\_



Dead loads (to be used for resistance jacking)

(+...) denotes possible effects of basement S.O.G., which may be supported by walls and columns.

10/7/03 SSK-2

32 Clifton Str.

Foundation Design Loads.

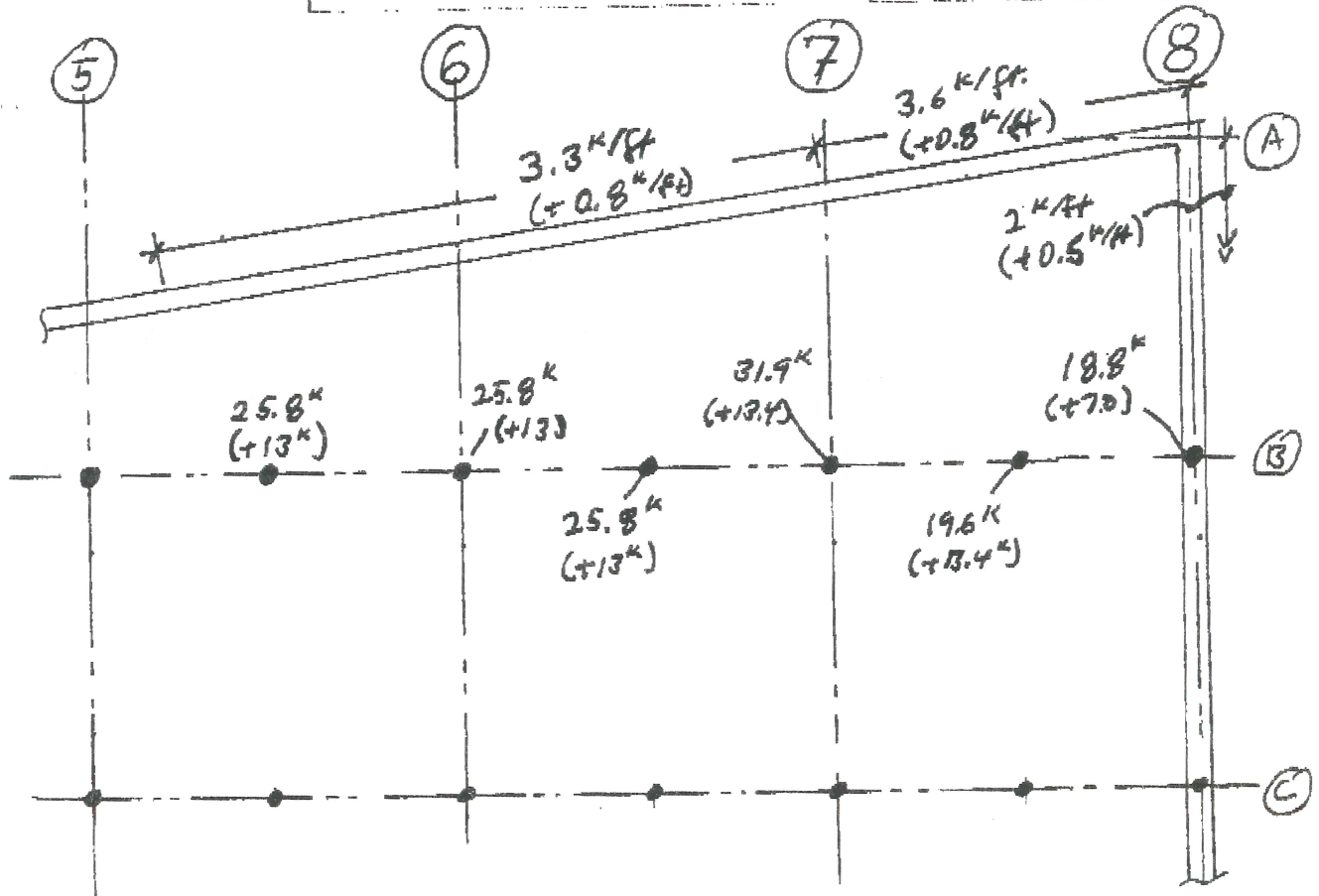


WEIDLINGER ASSOCIATES INC  
CONSULTING ENGINEERS

PROJECT NO. \_\_\_\_\_  
CLIENT OBSERVATION \_\_\_\_\_  
CLIENT NO. \_\_\_\_\_  
MEMORANDUM \_\_\_\_\_  
DESIGN NOTES \_\_\_\_\_

PROJECT	
CLIENT	
NO.	
DATE	
DESCRIPTION	

NO.	
DATE	
DESCRIPTION	
NO.	



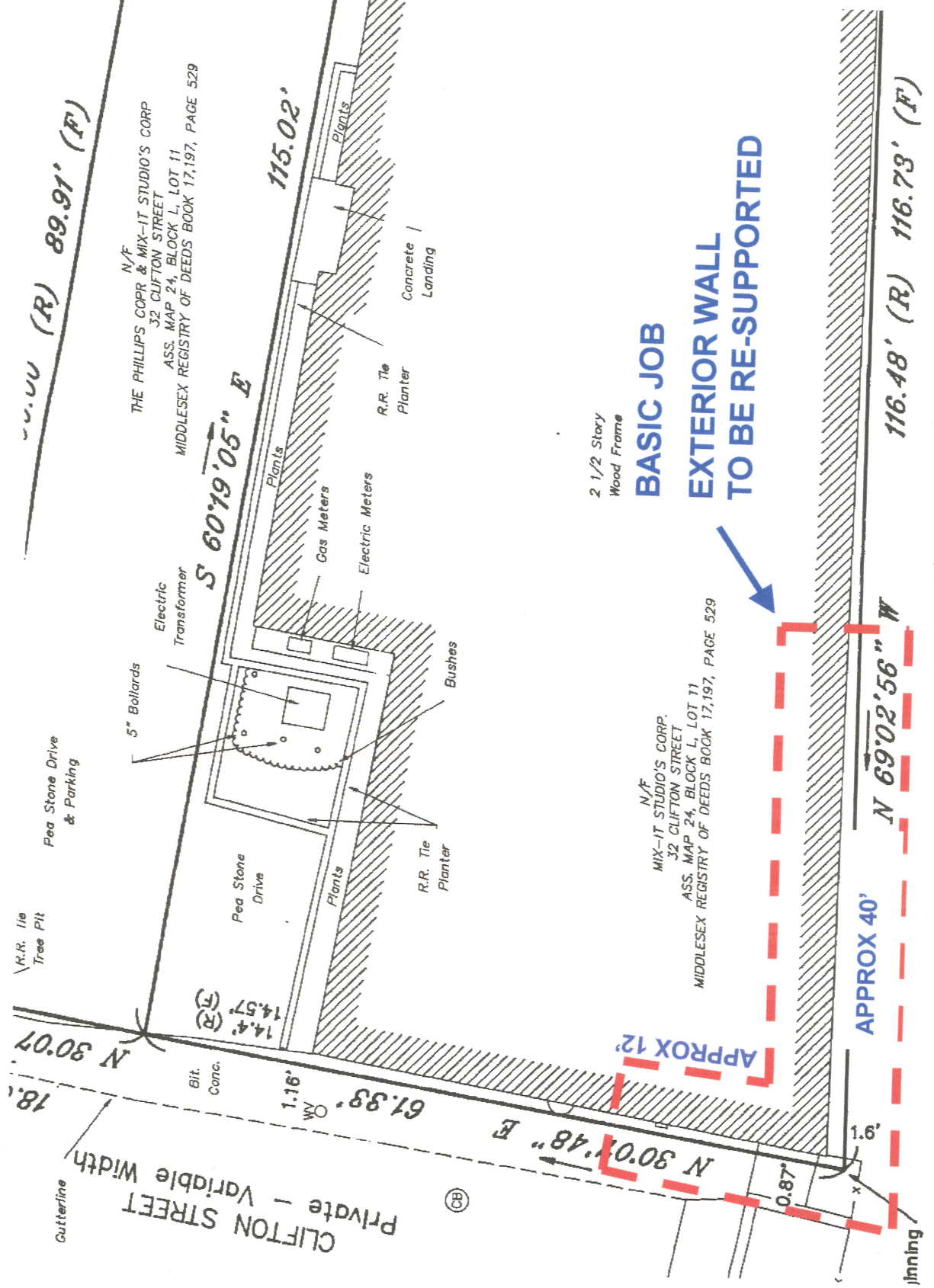
Total Loads (Dead + Live)  
on Columns and Walls.

(+...) denotes possible effects  
of Basement S.O.G., which may  
be supported by walls and columns.

10/7/03 SSK-1

32 Clifton Str. Foundation Design Loads.





89.91' (F) (R)

N/F  
THE PHILLIPS COPR & MIX-IT STUDIO'S CORP  
32 CLIFTON STREET  
ASS. MAP 24, BLOCK L, LOT 11  
MIDDLESEX REGISTRY OF DEEDS BOOK 17,197, PAGE 529

S 60'19"05" E

115.02'

2 1/2 Story  
Wood Frame

**BASIC JOB  
EXTERIOR WALL  
TO BE RE-SUPPORTED**

N/F  
MIX-IT STUDIO'S CORP.  
32 CLIFTON STREET  
ASS. MAP 24, BLOCK L, LOT 11  
MIDDLESEX REGISTRY OF DEEDS BOOK 17,197, PAGE 529

APPROX 40'

N 69'02"56" W

116.48' (R) 116.73' (F)

N/F  
22 CLIFTON REAL ESTATE CORP.  
ASS. MAP 24, BLOCK M, LOT 5  
MIDDLESEX SOUTH REGISTRY OF DEEDS BOOK 14,381, PAGE 415

R.R. Tie  
Tree Pit

Pea Stone Drive  
& Parking

Electric  
Transformer

5" Bollards

Pea Stone  
Drive

Gas Meters

Electric Meters

Concrete  
Landing

R.R. Tie  
Planter

Plants

Bushes

R.R. Tie  
Planter

Plants

N 30'07"

14.4' (F)  
14.57' (R)

Bit.  
Conc.

1.16' OM

61.98'

N 30'07"48" E

APPROX 12'

0.87'

1.91'

Gutterline

CLIFTON STREET  
Private - Variable Width

(CB)

gutterline

ADD ALTERNATE #1 SUPPORT INT. FLOOR

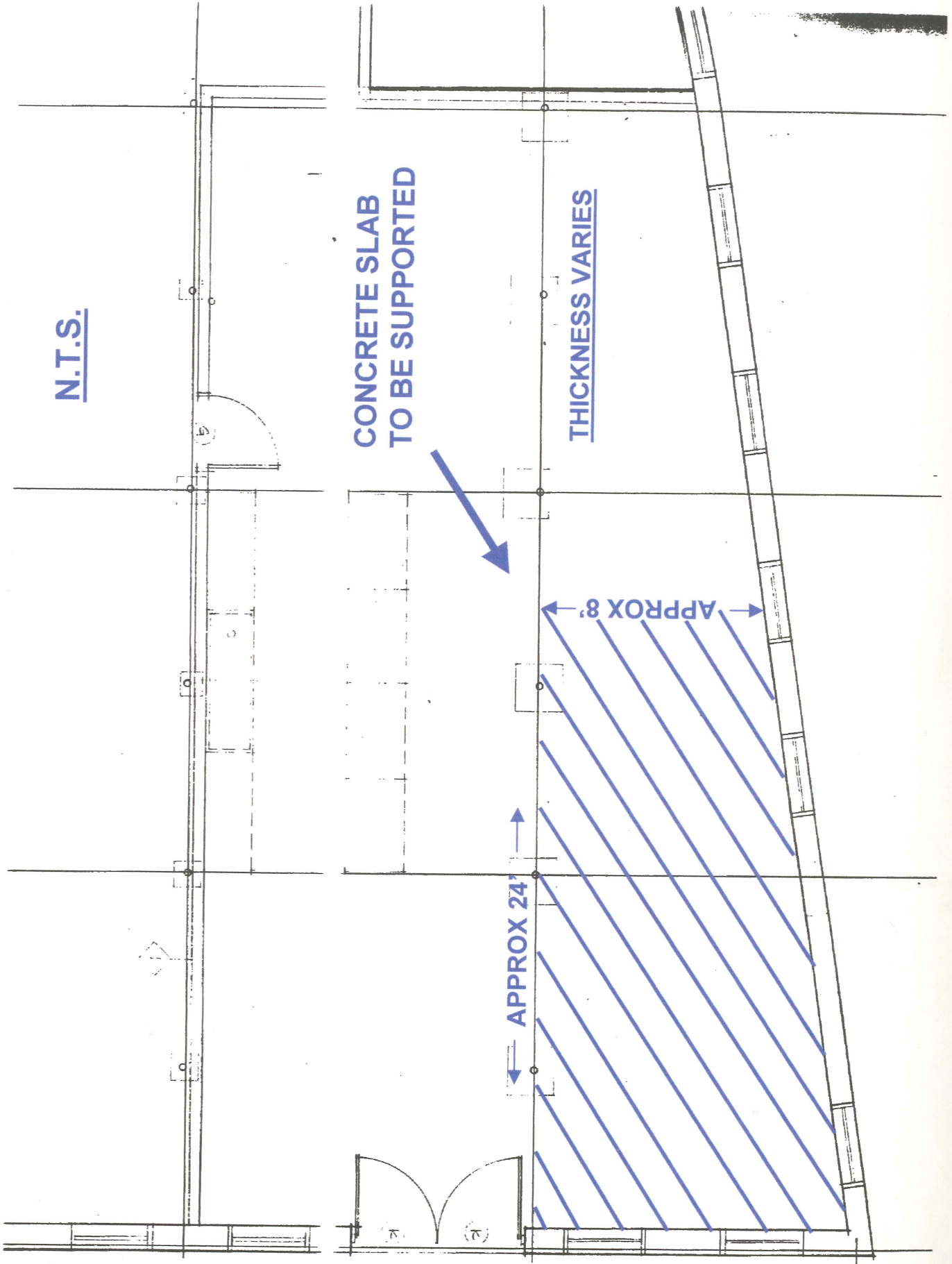
N.T.S.

CONCRETE SLAB  
TO BE SUPPORTED

THICKNESS VARIES

APPROX 24'

APPROX 8'



# Mixit Studios Foundation Support General Conditions Specification

October 31, 2003

## Scope of this specification:

This brief document outlines the general conditions items which Mixit Studios requires as part of the bidding and execution of the foundation re-support job.

## Insurance:

Present certificate of insurance with the following parties listed as additional insureds;

1. Mixit Studios Cooperative Corporation
2. 22 Clifton Real Estate Corporation (owner of garden area – leases garden to Mixit)

Insurance should include coverage for liability, worker's compensation, property damage, and professional errors and omissions.

## Permits:

Contractor shall obtain building permit from Somerville Building Department, if necessary. Cost of permit shall be refunded by Owner.

Contractor to call Dig Safe before commencing any excavation.

## Engineering Drawings/Shop Drawings:

Drawings and other supporting material shall show, at minimum, the following:

1. Location of new supports, including calculations of reactions, etc.
2. Diameters of pilings used
3. Brand names, spec data sheets, manufacturer's name and location of all proprietary materials
4. Name and address of actual engineer responsible for the design
5. Design of interface with existing foundation wall, including method to install angles, dimensions of angles, types of grout, etc.
6. Staging of trenching to prevent excessive unsupported conditions.
7. Any temporary support structures and/or shoring
8. Method to prevent corrosion of metallic components

## Galvanizing:

All sub-surface metallic components shall be hot dip galvanized, regardless of other cathodic protections installed.

## Site Access:

Contractor shall determine best access to site for machinery. If access is required from the bicycle path, Contractor and Owner shall coordinate effort to use the path for access.

Contractor to minimize tracking of mud onto the bike path and city streets. Contractor to shovel and sweep up any mud tracked onto the streets and bike path.

## Facilities:

Owner to provide water and restroom facilities.

## Job Fence:

If fence is opened to provide access, Contractor is responsible for securing site at the conclusion of each work day. Provide sketch showing points of access required.

Contractor to re-install chain link fence where temporarily removed.

## Landscape Materials

Owner to remove and relocate all landscape and paving materials to be salvaged.

Owner to re-install all landscape materials.

## Trenching and Digging:

Contractor to remove all soil and subsurface materials

Contractor to replace all below grade materials  
Contractor to provide crushed rock along foundation wall  
Owner responsible for fine-grading and reinstalling pavements  
Contractor responsible for re-installing below grade drainage lines.

Schedule:

Basic Job to be complete before the ground freezes  
Interior Slab work may be performed simultaneously or later, at contractor's option.

Bid Form:

Price to perform Basic Job \$ \_\_\_\_\_

Add Alternate for Interior Slab \$ \_\_\_\_\_

Add price for additional piling locations, per location if obstructions cause abandonment of a piling

\$ \_\_\_\_\_

December 7, 2003

Dear Mixit Residents:

## Foundation Update:

After showing up to work on the Clifton Street wall on Tuesday, Nov. 25, Dennis Geiser of Atlas Systems became concerned about the condition of the masonry wall below grade and stated that the foundation wall needs to be reinforced with concrete before new piles can be attached to it. \* John Dooley, a concrete contractor, worked with Dennis and me to come up with a design for a reinforced concrete beam bonded to the exiting brick wall. It's cost is quoted by Dooley at \$14,625. The original price was also adjusted upward slightly to \$23,075. The total is now \$37,700. We also owe the final \$4020 for the engineering work from Alliance Environmental and Weidlinger Structural Engineering.

\*When Atlas arrived last Tuesday to begin work, they discovered that the brick foundation wall might deform under the upward pressure exerted by the new pilings as they were hydraulically rammed into the ground. Feel free to ask me for more details.

There is pressure to get going on repairs, although we have obviously not gotten them done before winter commenced. So, perhaps we should use the fact that we already missed out on the good weather to think this through carefully to see if there is some way to reduce the extent of reinforcement required.

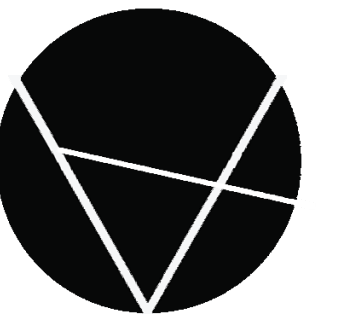
Richard

[THIS PAGE INTENTIONALLY LEFT BLANK]

# **APPENDIX E**

**93 Winslow Avenue Rear Yard Renovation by Vanko Studio Architects**

Bike Path Drainage Upgrades  
Willow Ave. to Grove St.  
Somerville, MA  
20163393.002A



**VANKO STUDIO  
ARCHITECTS**  
407 DUDLEY STREET, SUITE 4  
BOSTON, MA 02119 |  
617.502.1120

# 93 WINSLOW AVENUE REAR YARD RENOVATION

## ABBREVIATIONS

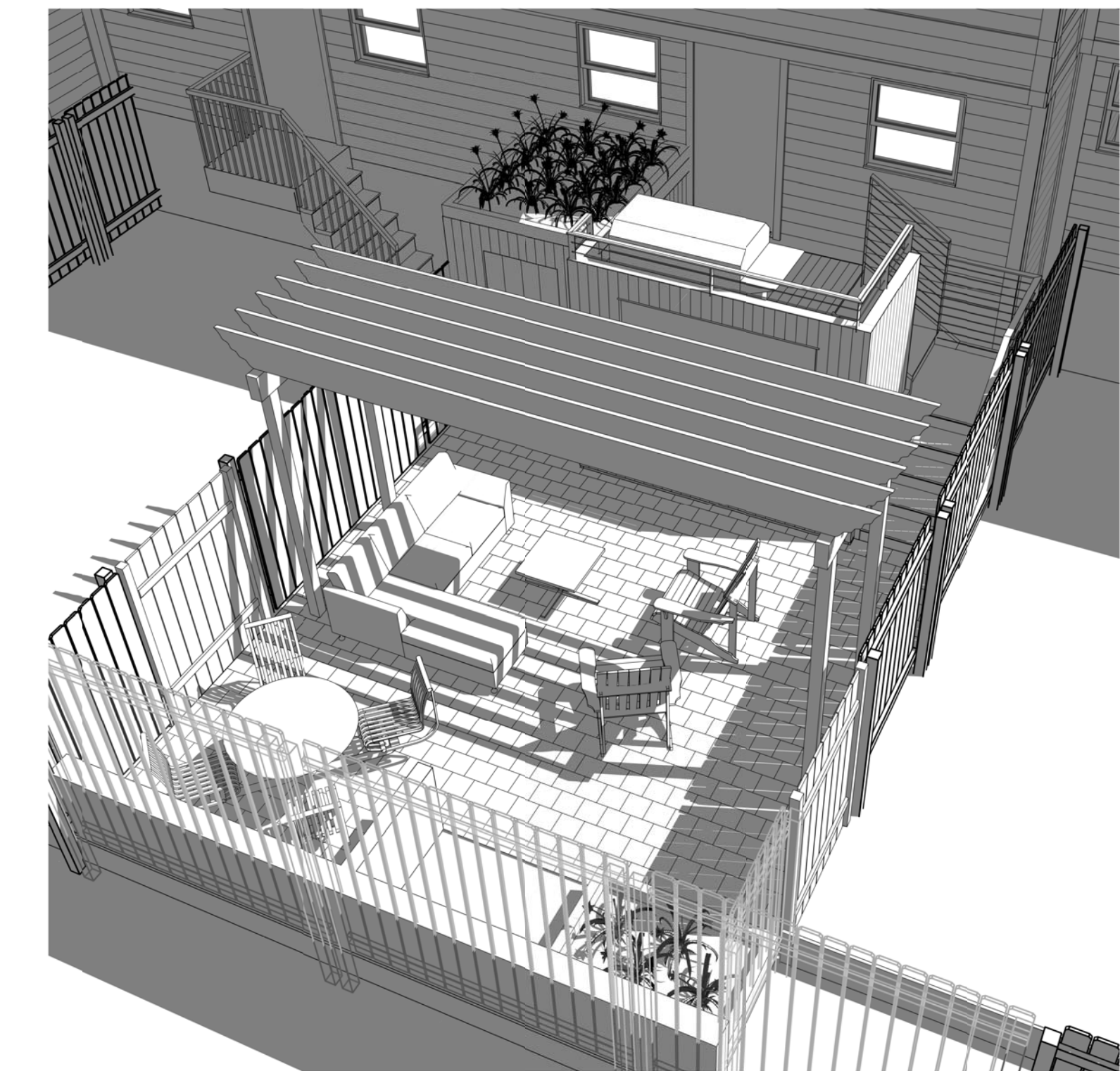
AC	AIR CONDITIONING	CT	CERAMIC TILE	GD	GRADE, GRADING	N	NORTH	SPEC	SPECIFICATION
AB	ANCHOR BOLT	CTR	COUNTER	GKT	GASKET (ED)	NAT	NATURAL	SO	SQUARE
ABV	ABOVE	CUH	CABINET UNIT HEATER	GL	GLASS, GLAZING	NIC	NOT IN CONTRACT	SST	STAINLESS STEEL
AC	ACOUSTICAL	CW	COLD WATER	GLB	GLASS BLOCK	N#	NUMBER	STD	STANDARD
ACC	ACCESS	CY	CUBIC YARD	GLOOM	GLAZING COMPOUND	NMI	NOMINAL	STL	STEEL
ACFL	ACCESS FLOOR			GLF	GLASS FIBER	NRC	NOISE REDUCTION COEFFICIENT	STR	STRUCTURAL
ACPL	ACOUSTICAL PLASTER	D	DRAIN	GLV	GALVANIZED	NTS	NOT TO SCALE	SURF	SURFACE
ACT	ACOUSTIC CEILING TILE	DA	DOUBLE-ACTING	GRL	GRILLE	OA	OVERALL	SUSP	SUSPENDED
AD	AREA DRAIN	DEM	DEMOLISH, DEMOLITION	GRN	GRANITE	OC	ON CENTER (S)	SYW	SYMMETRIC (ICAL)
ADD	ADDENDUM	DEP	DEPRESSED	GSS	GALVANIZED STEEL SHEET	OD	OUTSIDE DIAMETER	SYN	SYNTHETIC
ADJ	ADJACENT	DHA	DOUBLE HUNG	GST	GLAZED STRUCTURAL TILE	OFF	OFFICE	SYS	SYSTEM
ADJT	ADJUSTABLE	DIAM	DIAMETER	GT	GROUT	OPNG	OPENING	T	TREAD
AIE	ARCHITECT/ENGINEER	DIAG	DIAGONAL	GWB	GYPSTUM WALL BOARD	OPNG	OPPOSITE	T & B	TOP AND BOTTOM
AFF	ABOVE FINISHED FLOOR	DIFF	DIFFUSER	HARDN	HARDENED	OPNG	OPPOSITE	TC	TERRA COTTA
AGG	AGGREGATE	DIM	DIMENSION	HARDN	HARDENED	OPNG	OPPOSITE	TCS	TERRA COATED STAINLESS
AL	ALUMINUM	DR	DUPLEX RECEPTACLE	HB	HOSE BIBB	OPNG	OPPOSITE	TEL	TELEPHONE
ALT	ALTERNATE	DN	DOWN	HBD	HARDBOARD	OPNG	OPPOSITE	TEMP	TEMPORARY, TEMPERED
ANC	ANCHOR, ANCHORAGE	DTL	DETAIL	HC	HOLLOW CORE	OPNG	OPPOSITE	T&G	TONGUE AND GROOVE
ANLD	ANNEALED	DWG	DRAWING	HDW	HARDWARE	OPNG	OPPOSITE	THK	THICK (NESS)
ANOD	ANODIZED	E	EAST	HJT	HEAD JOINT	OPNG	OPPOSITE	THRSH	THRESHOLD
AP	ACCESS PANEL	EA	EACH	HM	HOLLOW METAL	OPNG	OPPOSITE	THRU	THROUGH
APPROX	APPROXIMATE	EF	ELECTRIC WATER COOLER	HOR	HORIZONTAL	OPNG	OPPOSITE	TO	TOP OF
ARCH	ARCHITECT (URAL)	ELEV	ELEVATION	HTG	HEATING, VENTILATING/	OPNG	OPPOSITE	TOC	TOP OF CONCRETE, CURB
ASPH	ASPHALT	EL	ELEVATION	HTG	HEATING, VENTILATING/	OPNG	OPPOSITE	TOES	TOP OF EXISTING SLAB
ASSEM	ASSEMBLY	ELAS	ELASTOMERIC	HTG	HEATING, VENTILATING/	OPNG	OPPOSITE	TOP	TOP OF FOOTING
ASTM	AMERICAN SOCIETY	ELEC	ELECTRIC (AL)	HVAC	HVAC	OPNG	OPPOSITE	TOL	TOLERANCE
	1st TESTING MATERIALS	ELEV	ELEVATION	EMER	EMERGENCY	OPNG	OPPOSITE	TOP	TOP OF PLANK
ATS	ABOVE TOP OF SLAB	ENC	ENCLOSE (URE)	EXP	EXPANSION, EXPOSED	OPNG	OPPOSITE	TOR	TOP OF ROOFING
AUTO	AUTOMATIC	ENC	ENCLOSE (URE)	EXP	EXPANSION, EXPOSED	OPNG	OPPOSITE	TOS	TOP OF STEEL/ TOP OF SLAB
AVE	AVENUE	ED	EQUAL	EXP	EXPANSION JOINT	OPNG	OPPOSITE	TOW	TOP OF WALL
		EQPT	EQUIPMENT	EXP	EXPANSION JOINT	OPNG	OPPOSITE	TPH	TOILET PAPER HOLDER
BC	BRICK COURSE	EST	ESTIMATE	EXP	EXPANSION JOINT	OPNG	OPPOSITE	TTD	TOILET TISSUE DISPENSER
BD	BOARD	EST	ESTIMATE	EXT	EXTERIOR	OPNG	OPPOSITE	TYP	TYPICAL
BEL	BELOW	EWFC	ELECTRIC WATER COOLER	EXT	EXTERIOR	OPNG	OPPOSITE	UC	UNDERCUT
BET	BETWEEN	EWFC	ELECTRIC WATER COOLER	EXT	EXTERIOR	OPNG	OPPOSITE	UNEX	UNEXCAVATED
BIT.BITUM	BITUMINOUS	EWFC	ELECTRIC WATER COOLER	EXT	EXTERIOR	OPNG	OPPOSITE	UNF	UNFINISHED
BKR	BACKER ROD	EWFC	ELECTRIC WATER COOLER	EXT	EXTERIOR	OPNG	OPPOSITE	UON	UNLESS OTHERWISE NOTED
BLDG	BUILDING	EWFC	ELECTRIC WATER COOLER	EXT	EXTERIOR	OPNG	OPPOSITE	VAC	VACUUM
BLK	BLOCK	EWFC	ELECTRIC WATER COOLER	EXT	EXTERIOR	OPNG	OPPOSITE	VAR	VARNISH
BLKG	BLOCKING	EWFC	ELECTRIC WATER COOLER	EXT	EXTERIOR	OPNG	OPPOSITE	VB	VAPOR BARRIER, VINYL
BM	BENCH MARK	EWFC	ELECTRIC WATER COOLER	EXT	EXTERIOR	OPNG	OPPOSITE	VB	VAPOR BARRIER, VINYL
BOC	BOTTOM OF CURB	EWFC	ELECTRIC WATER COOLER	EXT	EXTERIOR	OPNG	OPPOSITE	VC	VINYL COVE BASE
BOT	BOTTOM	EWFC	ELECTRIC WATER COOLER	EXT	EXTERIOR	OPNG	OPPOSITE	VCT	VINYL COMPOSITION TILE
BPL	BEARING PLATE	EWFC	ELECTRIC WATER COOLER	EXT	EXTERIOR	OPNG	OPPOSITE	VERT	VERTICAL
BRG	BEARING	EWFC	ELECTRIC WATER COOLER	EXT	EXTERIOR	OPNG	OPPOSITE	VEST	VESTIBULE
BRK	BRICK	EWFC	ELECTRIC WATER COOLER	EXT	EXTERIOR	OPNG	OPPOSITE	VJT	V-JOINT (ED)
BS	BOTH SIDES	EWFC	ELECTRIC WATER COOLER	EXT	EXTERIOR	OPNG	OPPOSITE	VNR	VENEER
BSMT	BASEMENT	EWFC	ELECTRIC WATER COOLER	EXT	EXTERIOR	OPNG	OPPOSITE	VR	VAPOR RETARDER
BTU	BRITISH THERMAL UNIT	EWFC	ELECTRIC WATER COOLER	EXT	EXTERIOR	OPNG	OPPOSITE	VRM	VERMICULITE
BUR	BUILT-UP ROOFING	EWFC	ELECTRIC WATER COOLER	EXT	EXTERIOR	OPNG	OPPOSITE	VT	VINYL TILE
BW	BOTH WAYS	EWFC	ELECTRIC WATER COOLER	EXT	EXTERIOR	OPNG	OPPOSITE	VWF	VINYL WALL FABRIC
		EWFC	ELECTRIC WATER COOLER	EXT	EXTERIOR	OPNG	OPPOSITE	W	WEST
C	COURSE	EWFC	ELECTRIC WATER COOLER	EXT	EXTERIOR	OPNG	OPPOSITE	W	WITH
CAB	CABINET	EWFC	ELECTRIC WATER COOLER	EXT	EXTERIOR	OPNG	OPPOSITE	WB	WOOD BASE
CB	CATCH BASIN, CORNER BEAD	EWFC	ELECTRIC WATER COOLER	EXT	EXTERIOR	OPNG	OPPOSITE	WC	WOOD CLOSET
CEM	CEMENT	EWFC	ELECTRIC WATER COOLER	EXT	EXTERIOR	OPNG	OPPOSITE	WD	WOOD
CF	CUBIC FOOT (FEET)	EWFC	ELECTRIC WATER COOLER	EXT	EXTERIOR	OPNG	OPPOSITE	WGL	WIRED GLASS
CFLG	COUNTERFLASHING	EWFC	ELECTRIC WATER COOLER	EXT	EXTERIOR	OPNG	OPPOSITE	WH	WALL HUNG
CFM	CUBIC FEET PER MINUTE	EWFC	ELECTRIC WATER COOLER	EXT	EXTERIOR	OPNG	OPPOSITE	WH	WALL HUNG
CG	CORNER GUARD	EWFC	ELECTRIC WATER COOLER	EXT	EXTERIOR	OPNG	OPPOSITE	WIN	WINDOW (S)
CH	COUNTERFLASHING	EWFC	ELECTRIC WATER COOLER	EXT	EXTERIOR	OPNG	OPPOSITE	WM	WIRE MESH
CI	CAST IRON	EWFC	ELECTRIC WATER COOLER	EXT	EXTERIOR	OPNG	OPPOSITE	W/O	WITHOUT
CIPC	CAST IN PLACE CONCRETE	EWFC	ELECTRIC WATER COOLER	EXT	EXTERIOR	OPNG	OPPOSITE	WP	WEATHERPROOF (ING)
CIR	CIRCLE	EWFC	ELECTRIC WATER COOLER	EXT	EXTERIOR	OPNG	OPPOSITE	WPT	WORKING POINT
CIRC	CIRCUMFERENCE	EWFC	ELECTRIC WATER COOLER	EXT	EXTERIOR	OPNG	OPPOSITE	WR	WATER REPELLANT
CJC	CONTROL JOINT	EWFC	ELECTRIC WATER COOLER	EXT	EXTERIOR	OPNG	OPPOSITE	WR	WATER REPELLANT
CL	CENTERLINE	EWFC	ELECTRIC WATER COOLER	EXT	EXTERIOR	OPNG	OPPOSITE	WSC	WATER-RESISTANT
CLG	CEILING	EWFC	ELECTRIC WATER COOLER	EXT	EXTERIOR	OPNG	OPPOSITE	WST	WEATHERSTRIPPING
CLL	CONTRACT LIMIT LINE	EWFC	ELECTRIC WATER COOLER	EXT	EXTERIOR	OPNG	OPPOSITE	WWF	WELDED WIRE FABRIC
CLN	CLEAN	EWFC	ELECTRIC WATER COOLER	EXT	EXTERIOR	OPNG	OPPOSITE	XTR	EXISTING TO REMAIN
CLR	CLEAR (ANCE)	EWFC	ELECTRIC WATER COOLER	EXT	EXTERIOR	OPNG	OPPOSITE		
CMLP	CEMENT PLASTER (PORTLAND)PFL	EWFC	ELECTRIC WATER COOLER	EXT	EXTERIOR	OPNG	OPPOSITE		
CMU	CONCRETE MASONRY UNIT	EWFC	ELECTRIC WATER COOLER	EXT	EXTERIOR	OPNG	OPPOSITE		
COL	CLEANOUT	EWFC	ELECTRIC WATER COOLER	EXT	EXTERIOR	OPNG	OPPOSITE		
COLM	COLUMN	EWFC	ELECTRIC WATER COOLER	EXT	EXTERIOR	OPNG	OPPOSITE		
COMB	COMBINATION	EWFC	ELECTRIC WATER COOLER	EXT	EXTERIOR	OPNG	OPPOSITE		
COMP	COMPRESS (ED,ION,IBLE)	EWFC	ELECTRIC WATER COOLER	EXT	EXTERIOR	OPNG	OPPOSITE		
CONC	CONCRETE	EWFC	ELECTRIC WATER COOLER	EXT	EXTERIOR	OPNG	OPPOSITE		
CONN	CONNECTION	EWFC	ELECTRIC WATER COOLER	EXT	EXTERIOR	OPNG	OPPOSITE		
CONST	CONSTRUCTION	EWFC	ELECTRIC WATER COOLER	EXT	EXTERIOR	OPNG	OPPOSITE		
CONT	CONTINUOUS or CONTINUE	EWFC	ELECTRIC WATER COOLER	EXT	EXTERIOR	OPNG	OPPOSITE		
CONTR	CONTRACT (OR)	EWFC	ELECTRIC WATER COOLER	EXT	EXTERIOR	OPNG	OPPOSITE		
COORD	COORDINATE	EWFC	ELECTRIC WATER COOLER	EXT	EXTERIOR	OPNG	OPPOSITE		
CORR	CORRIDOR	EWFC	ELECTRIC WATER COOLER	EXT	EXTERIOR	OPNG	OPPOSITE		
CPR	COPPER	EWFC	ELECTRIC WATER COOLER	EXT	EXTERIOR	OPNG	OPPOSITE		
CPT	CARPET	EWFC	ELECTRIC WATER COOLER	EXT	EXTERIOR	OPNG	OPPOSITE		
CPTT	CARPET TILE	EWFC	ELECTRIC WATER COOLER	EXT	EXTERIOR	OPNG	OPPOSITE		
CSK	COUNTER SINK(SUNK)	EWFC	ELECTRIC WATER COOLER	EXT	EXTERIOR	OPNG	OPPOSITE		
CS	CAST STONE	EWFC	ELECTRIC WATER COOLER	EXT	EXTERIOR	OPNG	OPPOSITE		
CSMT	CASEMENT	EWFC	ELECTRIC WATER COOLER	EXT	EXTERIOR	OPNG	OPPOSITE		

## MATERIALS LEGEND

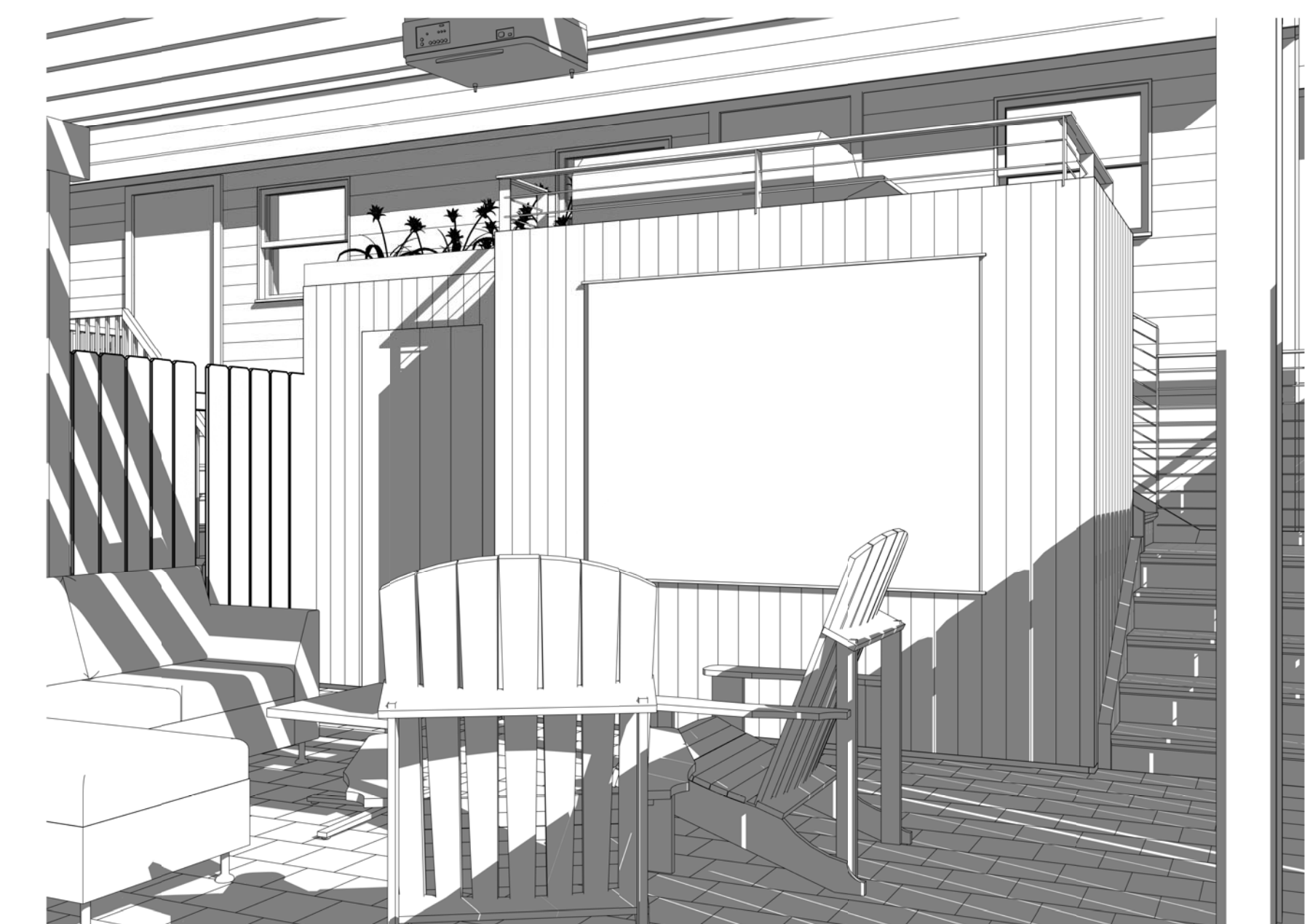
	ALUMINUM
	BATT INSULATION
	BRICK
	CMU
	CONCRETE
	CUT STONE
	EARTH
	GYPSUM WALLBOARD
	MARBLE, GRANITE
	PLYWOOD
	POROUS FILL, GRAVEL STONE
	RIGID INSULATION
	RUBBLE STONE
	SHIM / BLOCKING
	STEEL
	WOOD, FINISHED
	WOOD, ROUGH

## ARCHITECTURAL SYMBOLS LEGEND

	REVISION
	WINDOW TYPE
	Room name
	ROOM INFORMATION
	PARTITION TYPE
	DOOR TYPE
	DETAIL VIEW
	BUILDING SECTION
	INTERIOR ELEVATION
	EXTERIOR ELEVATION
	STORY MARKER
	COLUMN GRID



1 93 YARD AERIAL VIEW



2 93 YARD PERSPECTIVE VIEW

### 93 SHEET LIST

SHEET NUMBER	SHEET NAME
A00A	93 YARD COVER SHEET
A001	TYPICAL FINISHES
A100	SCOPING PLAN
A101	NEW YARD ENLARGED PLANS
A200	NEW YARD ELEVATIONS
A300	DECK DETAILS
A301	DECK STAIR DETAILS
A302	TRELLIS & DOOR DETAILS
S100	STRUCTURAL PLANS

**REAR YARD RENOVATION**  
 93 WINSLOW AVENUE, SOMERVILLE MA

REVISIONS		
No.	Description	Date

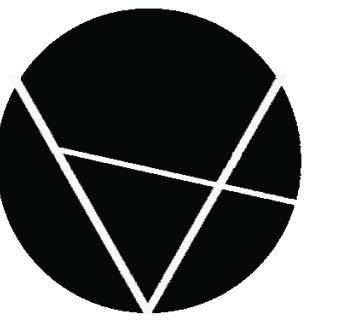
93 YARD  
COVER SHEET

Project Number	16.1526.00
Date	8/30/2017
Drawn By	MM
Checked By	JPV

**A00A**  
Scale 12" = 1'-0"



EXTERIOR FINISHES



VANKO STUDIO  
ARCHITECTS

407 DUDLEY STREET, SUITE 4  
BOSTON, MA 02119 |  
617.502.1120

DECK & PAVER FINISHES



YARD PAVERS - IDEAL PAVERS NEWPORT COBBLE "VINEYARD BLEND"



DECK BOARDS - TIMBER TECH "CYPRESS" DECKING

WALL FINISHES



EXTERIOR WALL COVERING - PT CEDAR BOARDS



REAR YARD RETAINING WALL - SALVAGED RAILROAD TIES STACKED AND SPIKED TOGETHER

RAIL FINISHES



STAIR TOP RAIL - TIMBER TECH "EVOLUTIONS" TOP RAILING (TRADITIONAL WALNUT)



STAIR RAIL - TIMBER TECH "EVOLUTIONS" CABLE RAIL

REAR YARD RENOVATION

93 WINSLOW AVENUE, SOMERVILLE MA

REVISIONS		
No.	Description	Date

TYPICAL FINISHES

Project Number 16.1526.00

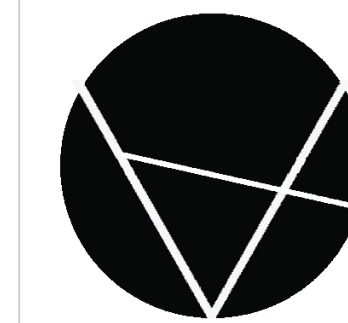
Date 8/30/2017

Drawn By MM

Checked By JPV

A001

Scale



VANKO STUDIO  
ARCHITECTS

407 DUDLEY STREET, SUITE 4  
BOSTON, MA 02119 |  
617.502.1120

# REAR YARD RENOVATION

93 WINSLOW AVENUE, SOMERVILLE MA

REVISIONS		
No.	Description	Date

## SCOPING PLAN

Project Number 16.1526.00

Date 8/30/2017

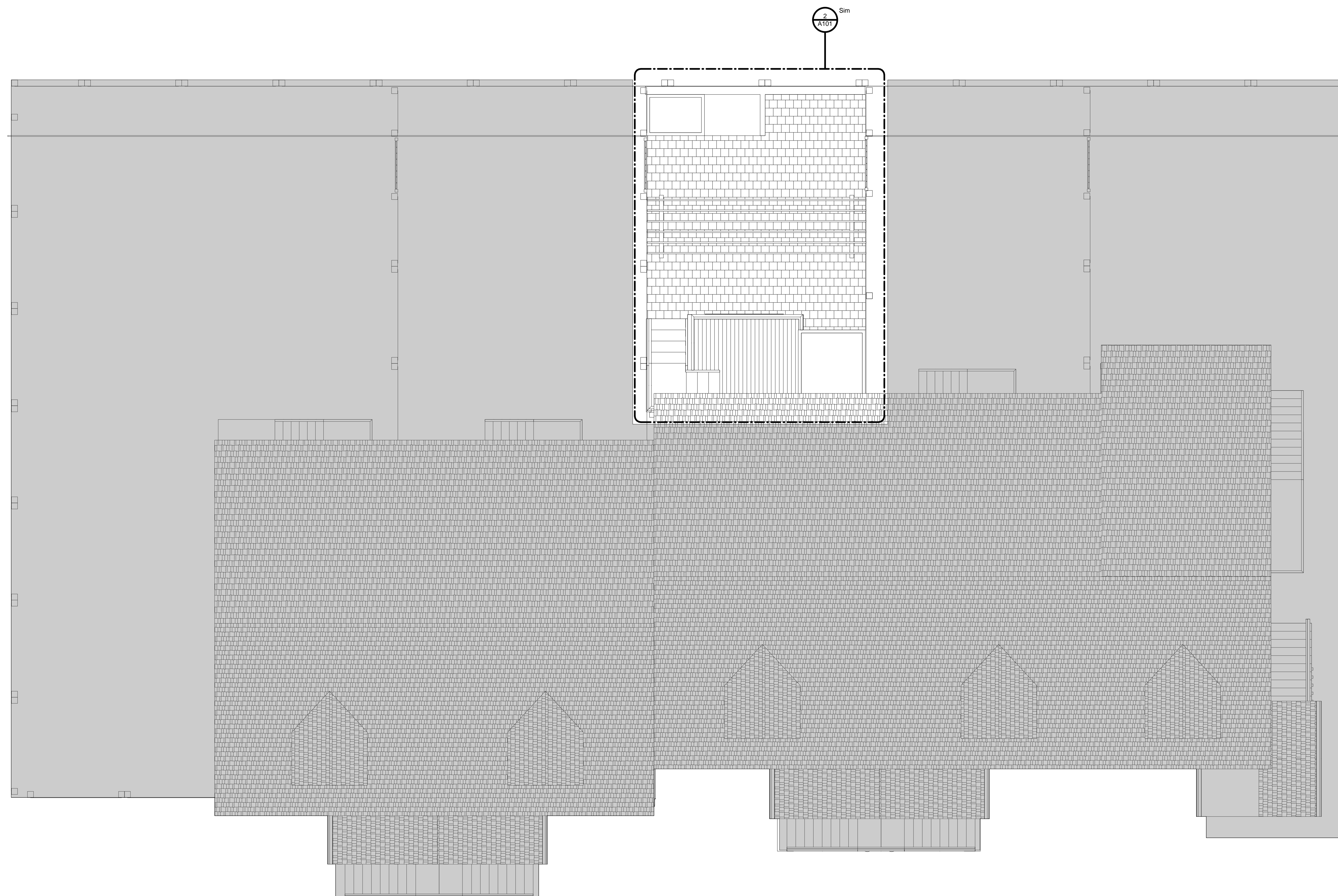
Drawn By MM

Checked By JPV

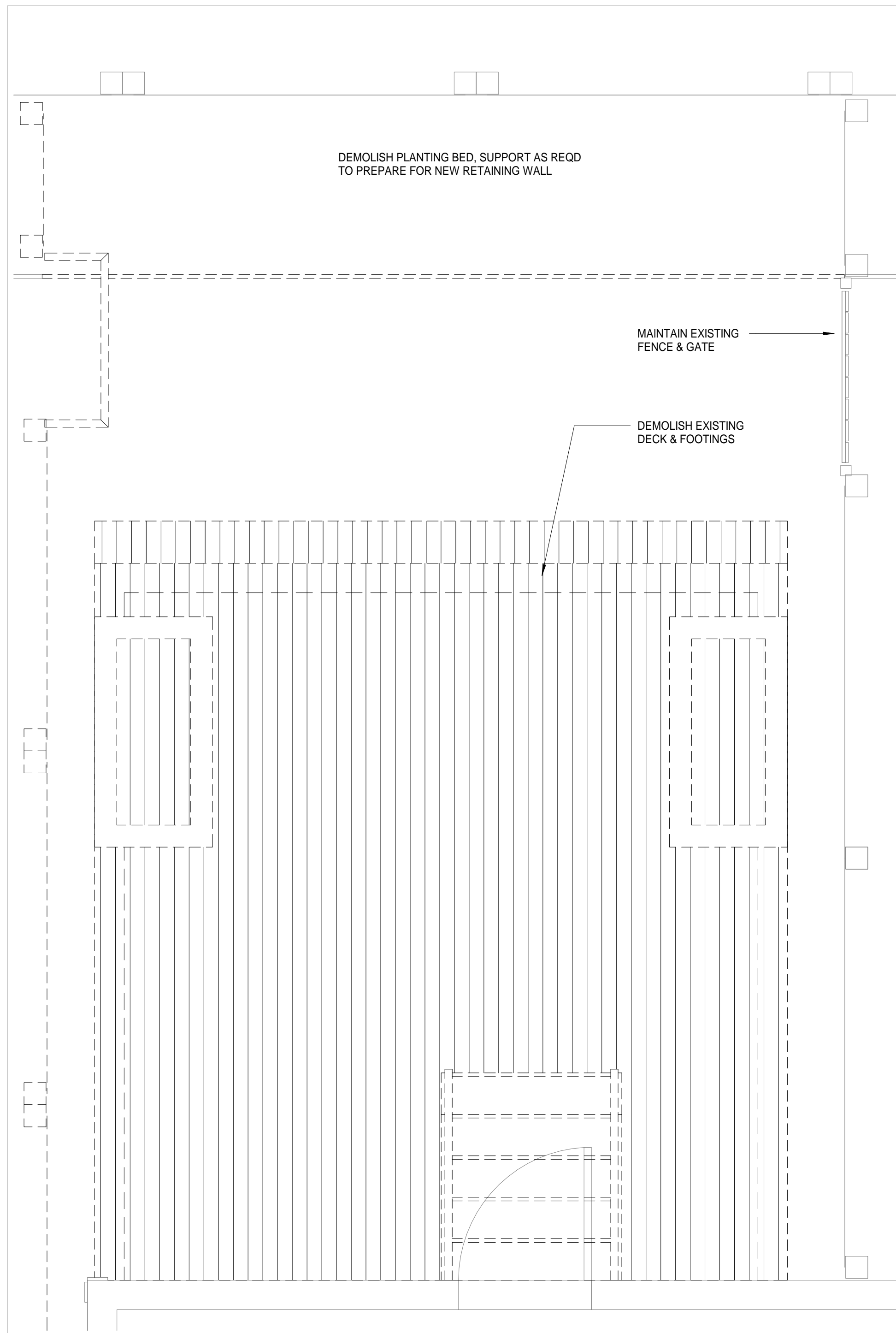
### A100

Scale 1/4" = 1'-0"

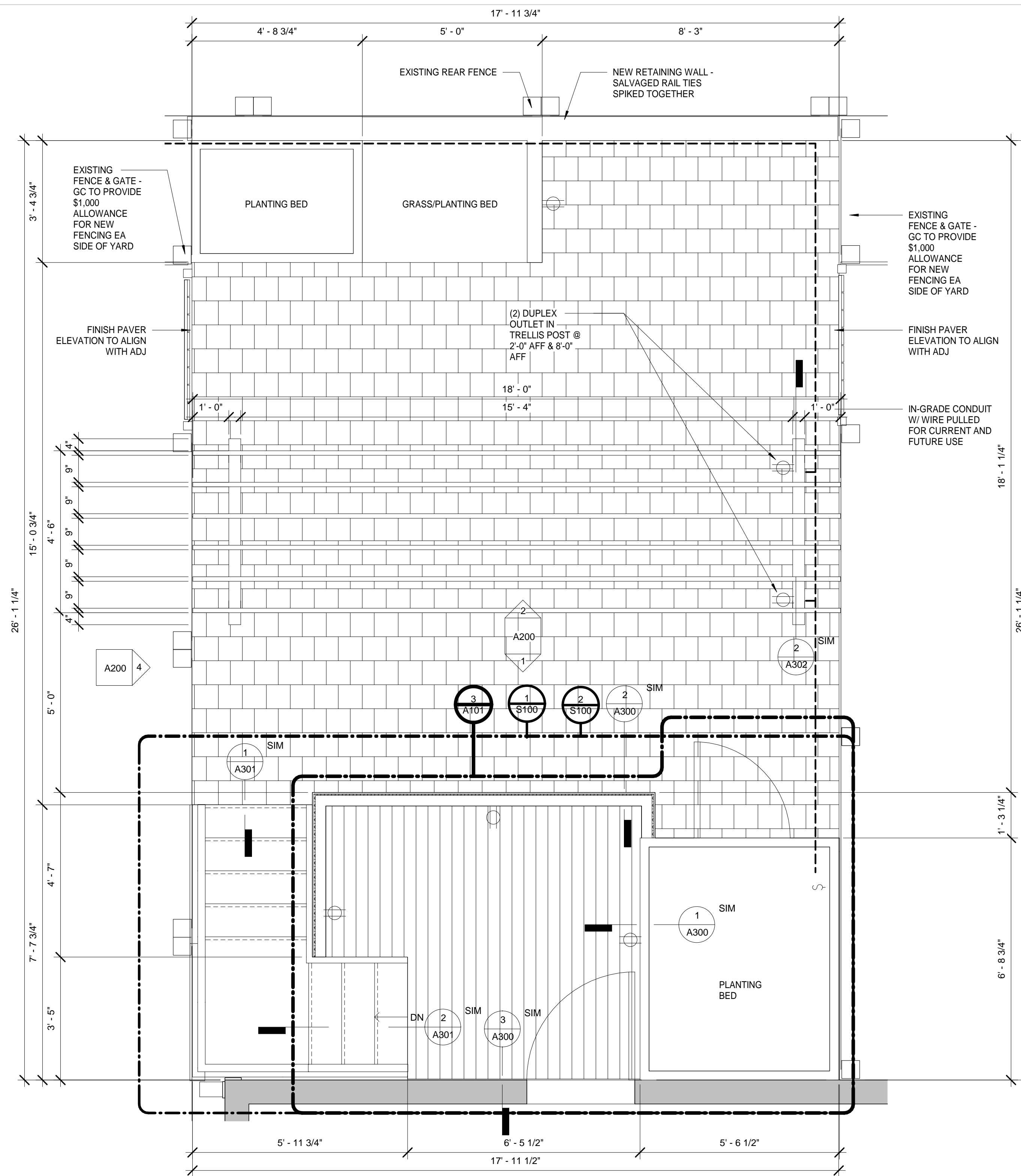
8/30/2017 1:40:42 PM



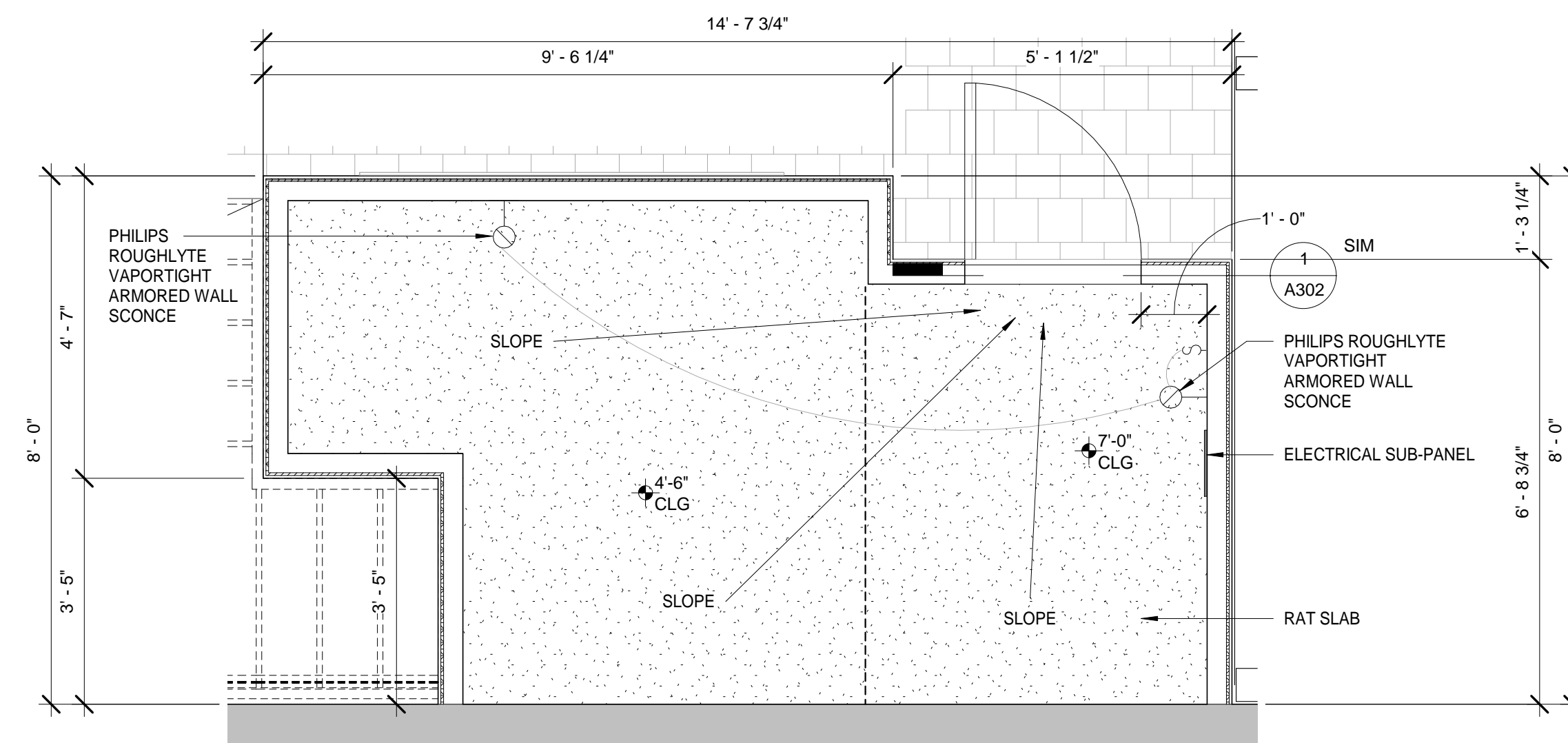
① 93 REAR YARD SCOPING PLAN  
1/4" = 1'-0"



1 ENLARGED 93 REAR YARD DEMO PLAN  
1/2" = 1'-0"



2 ENLARGED 93 REAR YARD PLAN  
1/2" = 1'-0"



3 93 REAR YARD UNDER DECK PLAN  
1/2" = 1'-0"

## GENERAL NOTES

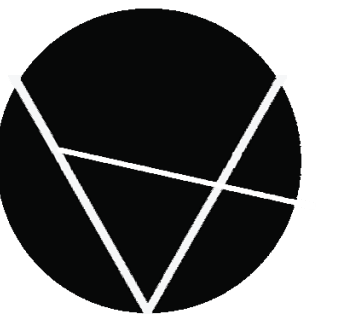
1. CONC TO BE 3000 PSI MIN
2. ALL CONCEALED LUMBER TO BE PRESSURE TREATED PINE WITH GALVANIZED OR STAINLESS STEEL FASTENERS
3. ALL FINISH LUMBER TO BE CLEAR CEDAR WITH STAINLESS STEEL FASTENERS
4. AZEK TO BE PAINTED (COLOR BY OWNER) WITH PLUGGED FASTENERS
5. ENTIRE STRUCTURE TO BE WRAPPED IN GRACE ICE AND WATER SHIELD (SEE 'SELF ASHERED WATERPROOF MEMBRANE)
6. ALL PLYWOODS TO BE PT EXTERIOR GRADE OR MARINE GRADE
7. ALL LEDGERS TO EXISTING BUILDING TO RECEIVE ALUM FLASHING, MIN 8' UPTURN
8. GC TO PROVIDE \$1,000 ALLOWANCE FOR NEW FENCING EA SIDE OF YARD

## DEMOLITION NOTES

1. COMPLETELY DEMOLISH DECK, FOOTINGS, PLANTERS, ETC. LEAVE REAR YARD FREE OF ANY BUILT ELEMENT. PROTECT AND RETAIN NEIGHBOR'S FENCES AND GATES
2. PREPARE SOIL FOR HARDSCAPE. REMOVE ANY AND ALL BIOLOGICAL MATTER. EXPOSE EXISTING SOIL
3. REMOVE SOIL AS REQD TO ACHIEVE FINAL PAVEMENT ELEVATIONS. REFER TO DETAILS FOR ASSEMBLY THICKNESS.
4. EXCAVATE FOR FOOTINGS. REMOVE ALL SOIL

## DEMOLITION LINETYPE

--- DEMOLISHED



VANKO STUDIO  
ARCHITECTS

407 DUDLEY STREET, SUITE 4  
BOSTON, MA 02119 |  
617.502.1120

# REAR YARD RENOVATION

93 WINSLOW AVENUE, SOMERVILLE MA

REVISIONS		
No.	Description	Date

## NEW YARD ENLARGED PLANS

Project Number 16.1526.00

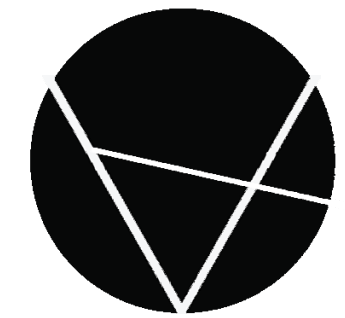
Date 8/30/2017

Drawn By MM

Checked By JPV

A101

Scale As indicated



VANKO STUDIO  
ARCHITECTS

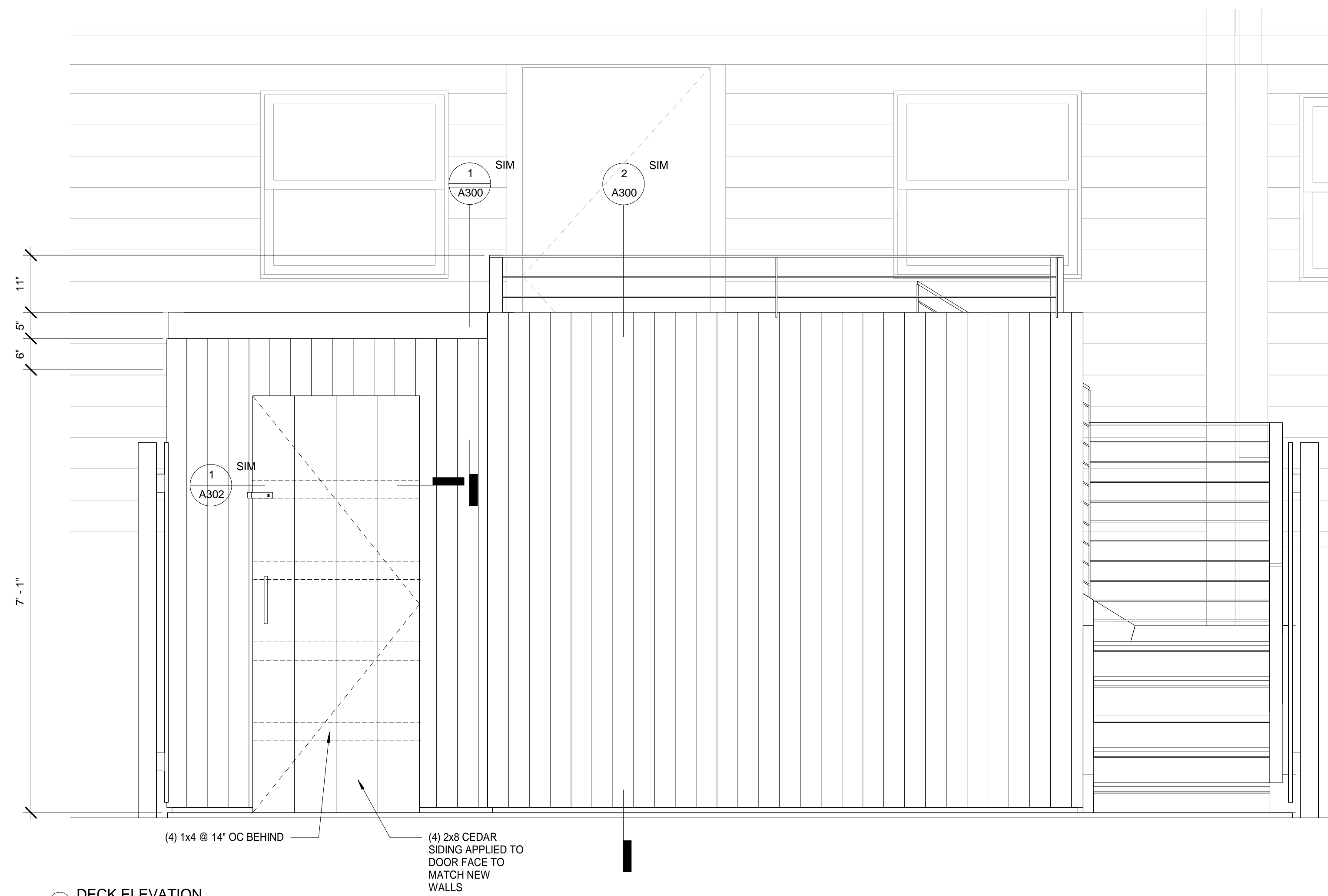
407 DUDLEY STREET, SUITE 4  
BOSTON, MA 02119 |  
617.502.1120

# REAR YARD RENOVATION

93 WINSLOW AVENUE, SOMERVILLE MA

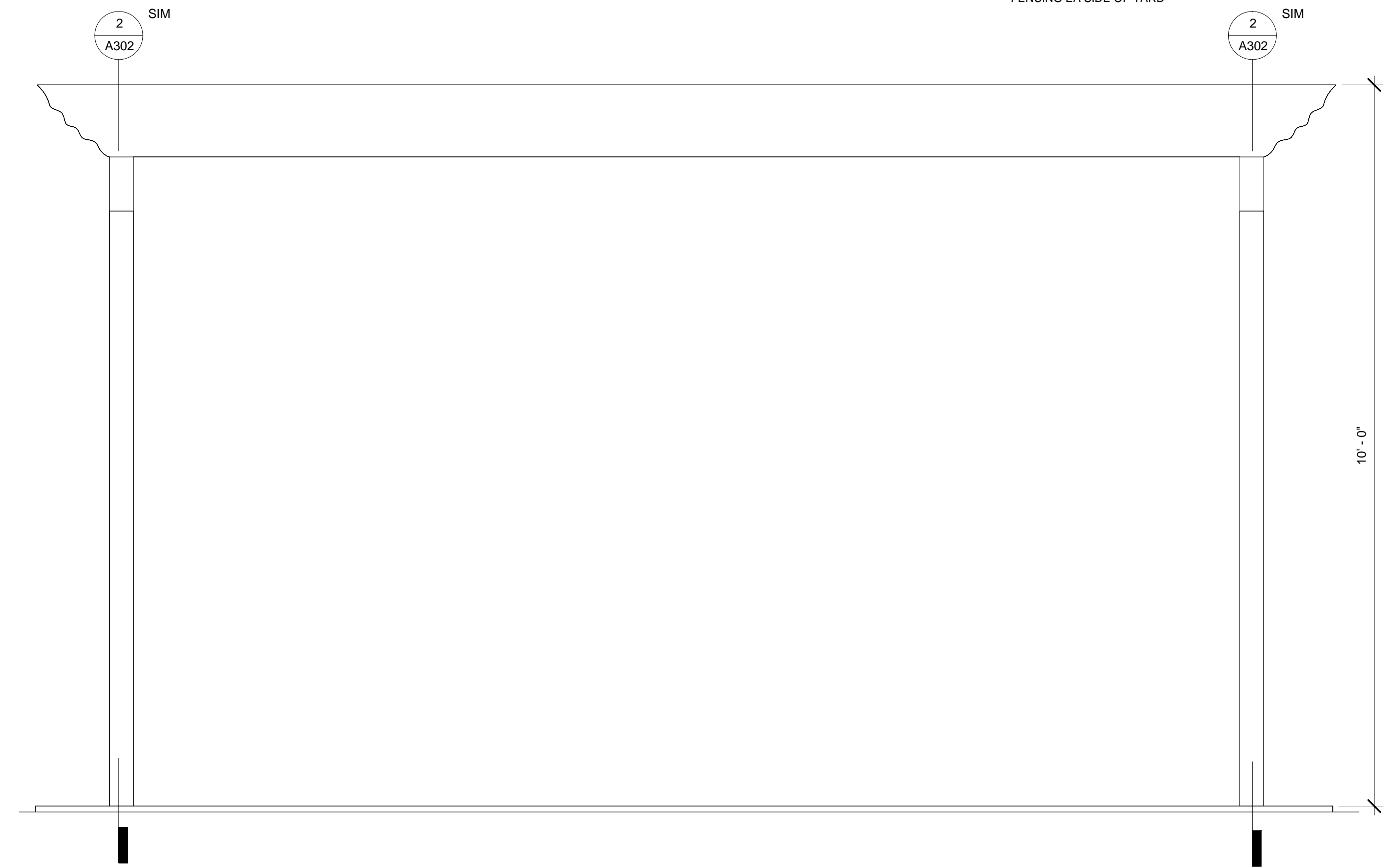
## GENERAL NOTES

1. CONC TO BE 3000 PSI MIN
2. ALL CONCEALED LUMBER TO BE PRESSURE TREATED PINE WITH GALVANIZED OR STAINLESS STEEL FASTENERS
3. ALL FINISH LUMBER TO BE CLEAR CEDAR WITH STAINLESS STEEL FASTENERS
4. AZEK TO BE PAINTED (COLOR BY OWNER) WITH PLUGGED FASTENERS
5. ENTIRE STRUCTURE TO BE WRAPPED IN GRACE ICE AND WATER SHIELD (SEE 'SELF ASHERED WATERPROOF MEMBRANE)
6. ALL PLYWOODS TO BE PT EXTERIOR GRADE OR MARINE GRADE
7. ALL LEDGERS TO EXISTING BUILDING TO RECEIVE ALUM FLASHING, MIN 8" UPTURN
8. GC TO PROVIDE \$1,000 ALLOWANCE FOR NEW FENCING EA SIDE OF YARD

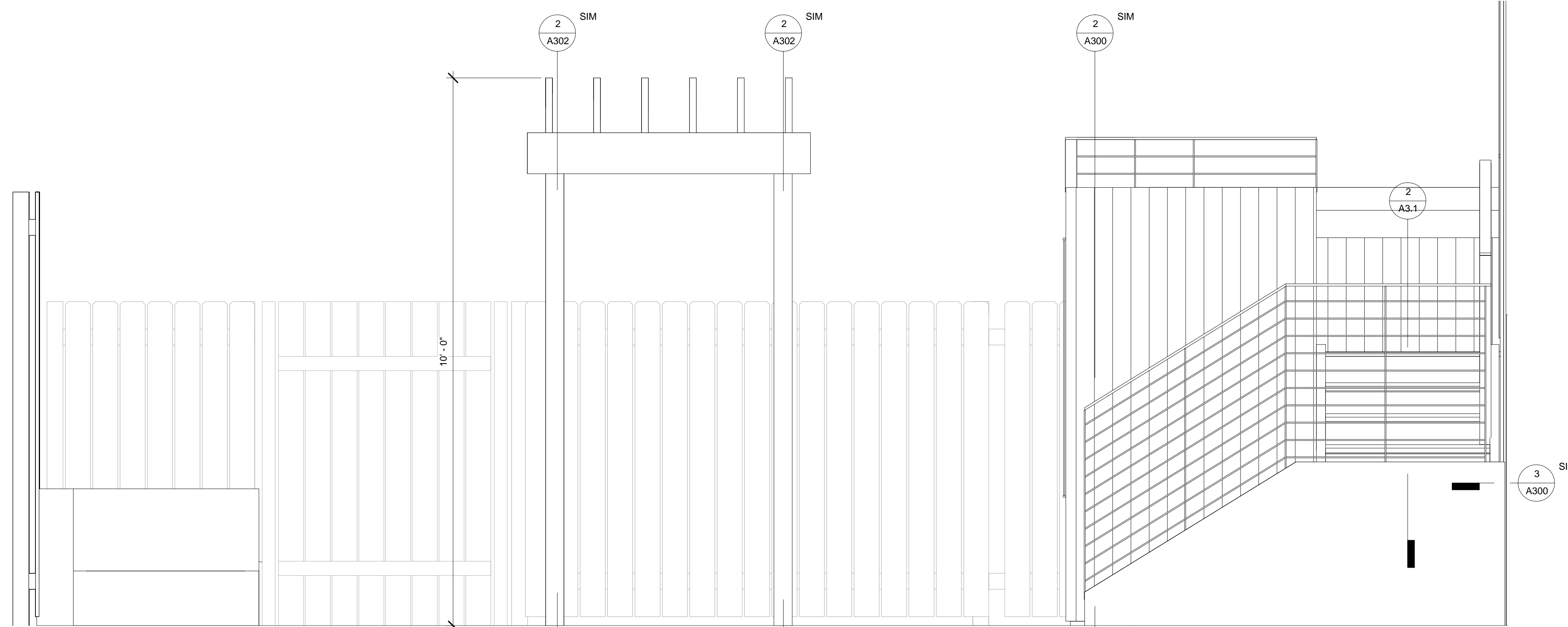


1 DECK ELEVATION  
3/4" = 1'-0"

(4) 1x4 @ 14" OC BEHIND  
(4) 2x8 CEDAR SIDING APPLIED TO DOOR FACE TO MATCH NEW WALLS



2 TRELLIS ELEVATION  
3/4" = 1'-0"



4 STAIR ELEVATION  
3/4" = 1'-0"

REVISIONS		
No.	Description	Date

## NEW YARD ELEVATIONS

Project Number 16.1526.00

Date 8/30/2017

Drawn By MM

Checked By JPV

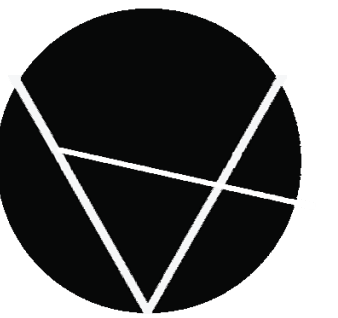
A200

Scale As indicated

8/30/2017 1:40:46 PM

# GENERAL NOTES

1. CONC TO BE 3000 PSI MIN
2. ALL CONCEALED LUMBER TO BE PRESSURE TREATED PINE WITH GALVANIZED OR STAINLESS STEEL FASTENERS
3. ALL FINISH LUMBER TO BE CLEAR CEDAR WITH STAINLESS STEEL FASTENERS
4. AZEK TO BE PAINTED (COLOR BY OWNER) WITH PLUGGED FASTENERS
5. ENTIRE STRUCTURE TO BE WRAPPED IN GRACE ICE AND WATER SHIELD (SEE 'SELF ADHERED WATERPROOF MEMBRANE')
6. ALL PLYWOODS TO BE PT EXTERIOR GRADE OR MARINE GRADE
7. ALL LEDGERS TO EXISTING BUILDING TO RECEIVE ALUM FLASHING, MIN 8" UPTURN
8. GC TO PROVIDE \$1,000 ALLOWANCE FOR NEW FENCING EA SIDE OF YARD

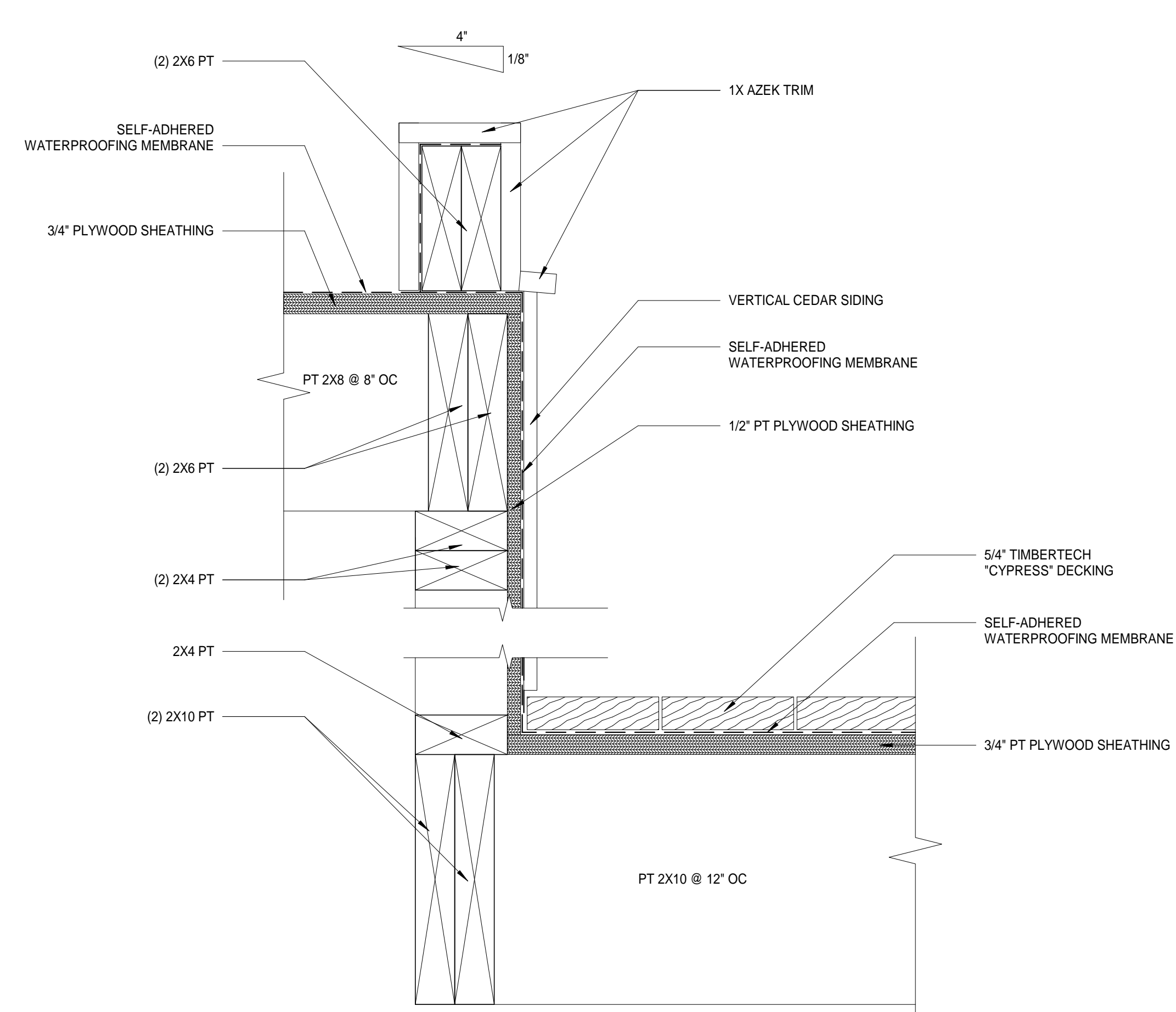


**VANKO STUDIO  
ARCHITECTS**

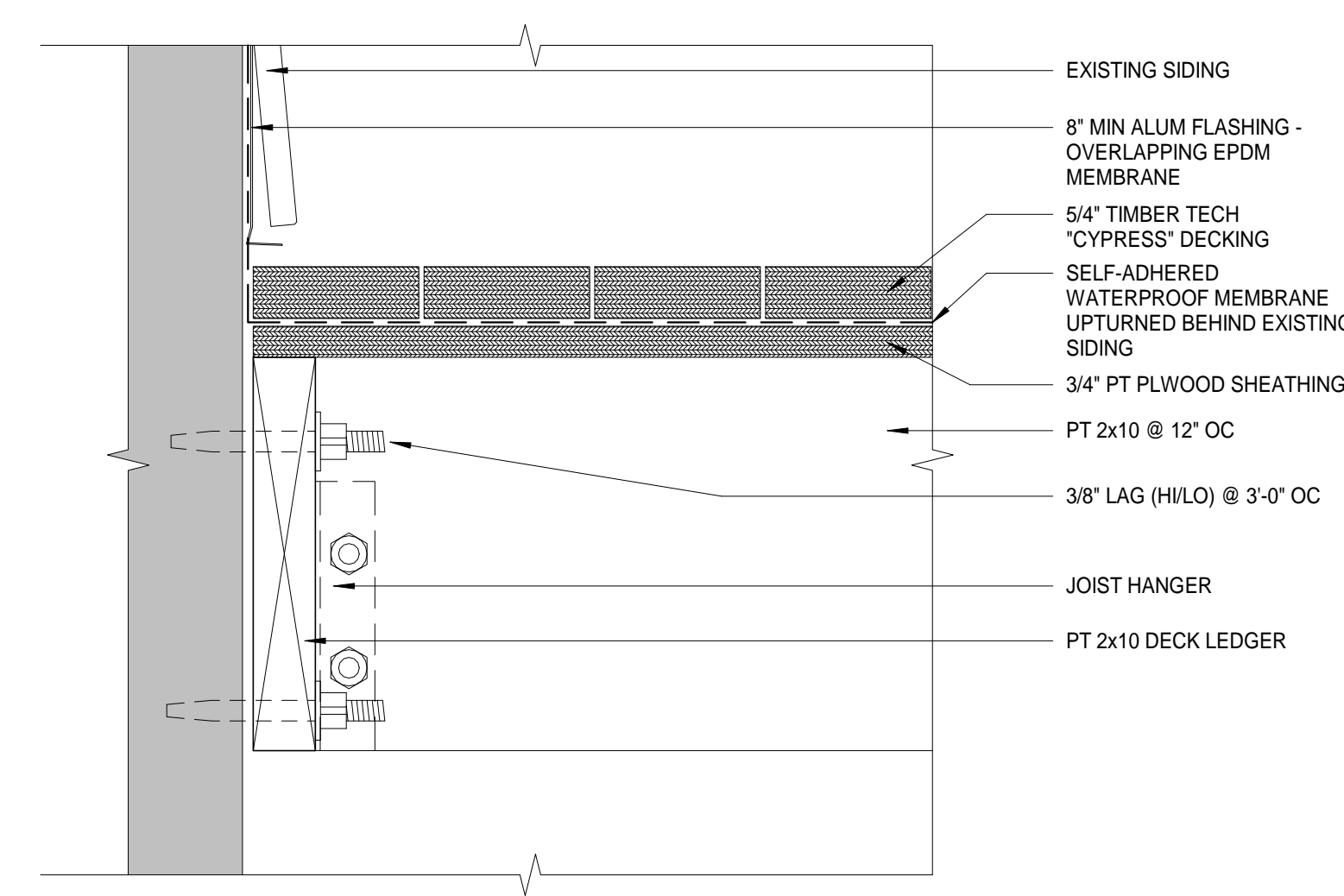
407 DUDLEY STREET, SUITE 4  
BOSTON, MA 02119 |  
617.502.1120

# REAR YARD RENOVATION

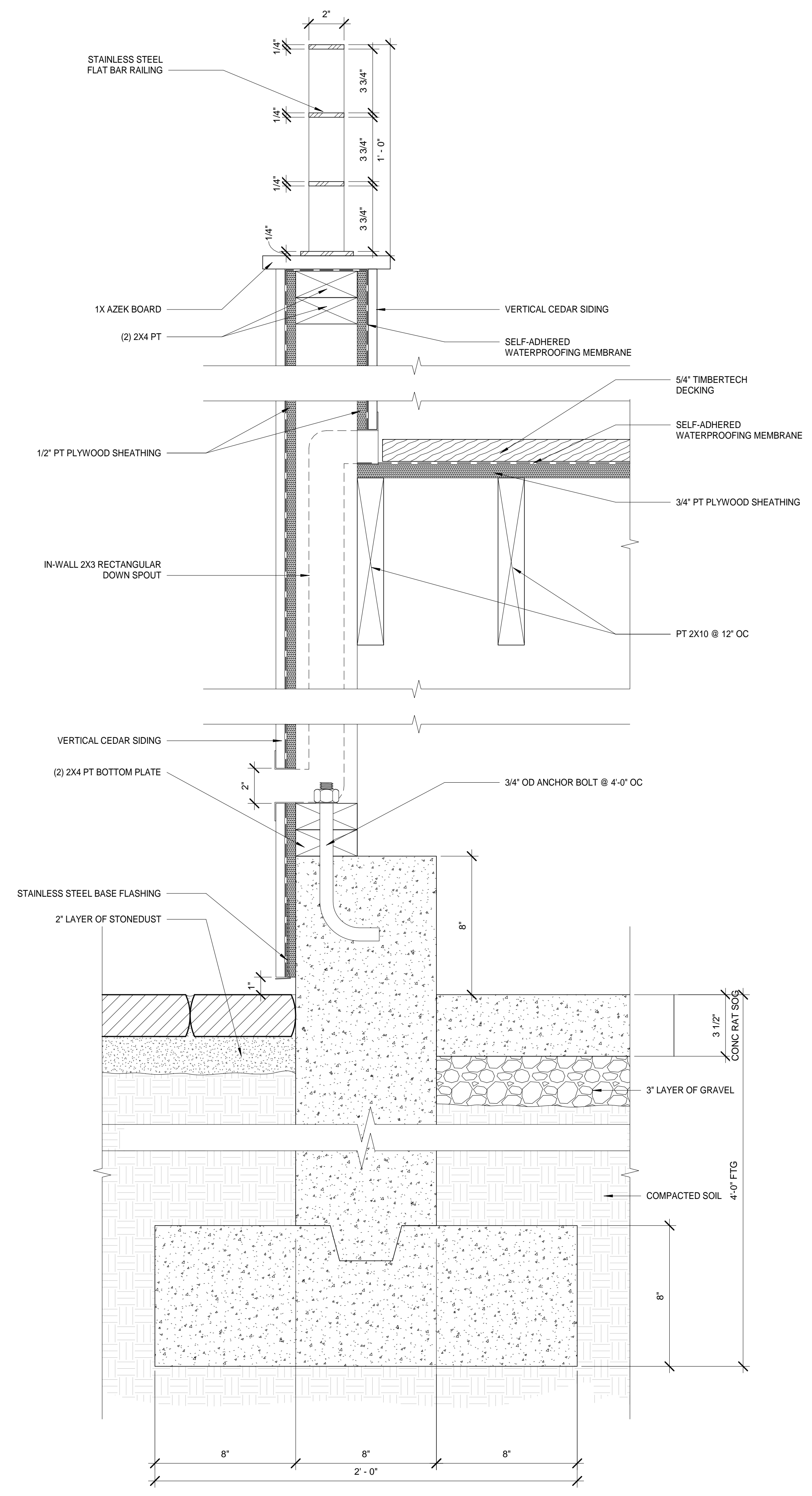
93 WINSLOW AVENUE, SOMERVILLE MA



1 WALL SECTION DETAIL B THROUGH PLANTING BED  
3" = 1'-0"



3 NEW DECK TO EXISTING STRUCTURE  
3" = 1'-0"



2 WALL SECTION DETAIL A  
3" = 1'-0"

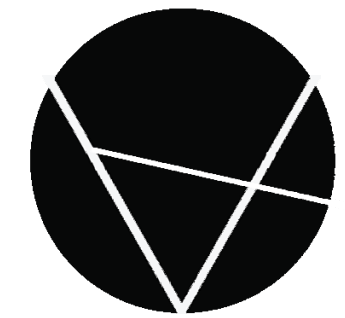
REVISIONS		
No.	Description	Date

## DECK DETAILS

Project Number 16.1526.00  
Date 8/30/2017  
Drawn By PZ MM  
Checked By JPV

**A300**  
Scale As indicated

8/30/2017 1:40:48 PM



**VANKO STUDIO  
ARCHITECTS**

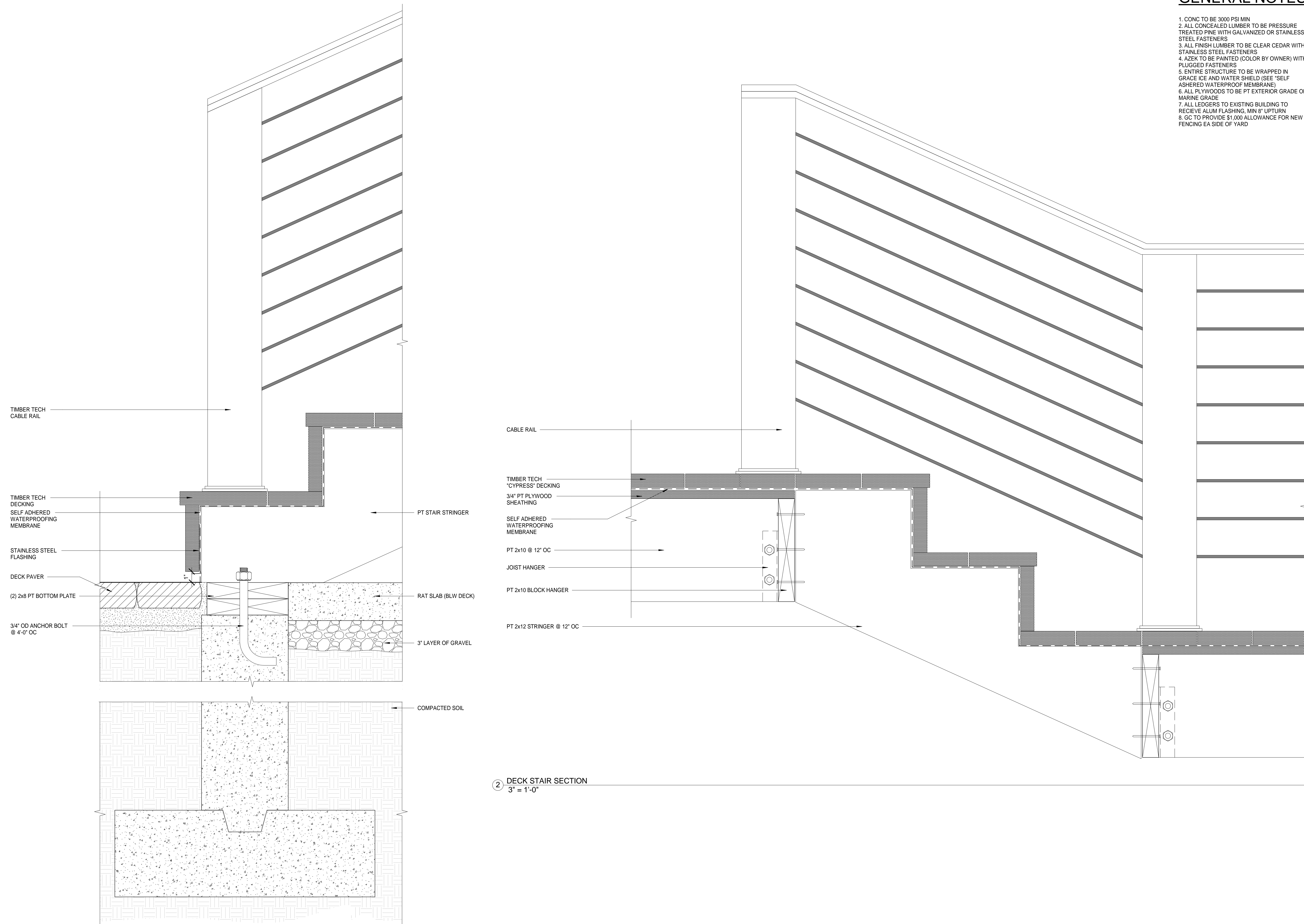
407 DUDLEY STREET, SUITE 4  
BOSTON, MA 02119 |  
617.502.1120

**REAR YARD RENOVATION**

93 WINSLOW AVENUE, SOMERVILLE MA

**GENERAL NOTES**

1. CONC TO BE 3000 PSI MIN
2. ALL CONCEALED LUMBER TO BE PRESSURE TREATED PINE WITH GALVANIZED OR STAINLESS STEEL FASTENERS
3. ALL FINISH LUMBER TO BE CLEAR CEDAR WITH STAINLESS STEEL FASTENERS
4. AZEK TO BE PAINTED (COLOR BY OWNER) WITH PLUGGED FASTENERS
5. ENTIRE STRUCTURE TO BE WRAPPED IN GRACE ICE AND WATER SHIELD (SEE 'SELF ADHERED WATERPROOF MEMBRANE')
6. ALL PLYWOODS TO BE PT EXTERIOR GRADE OR MARINE GRADE
7. ALL LEDGERS TO EXISTING BUILDING TO RECEIVE ALUM FLASHING, MIN 8" UPTURN
8. GC TO PROVIDE \$1,000 ALLOWANCE FOR NEW FENCING EA SIDE OF YARD



1 BOTTOM OF STAIR SECTION  
3" = 1'-0"

2 DECK STAIR SECTION  
3" = 1'-0"

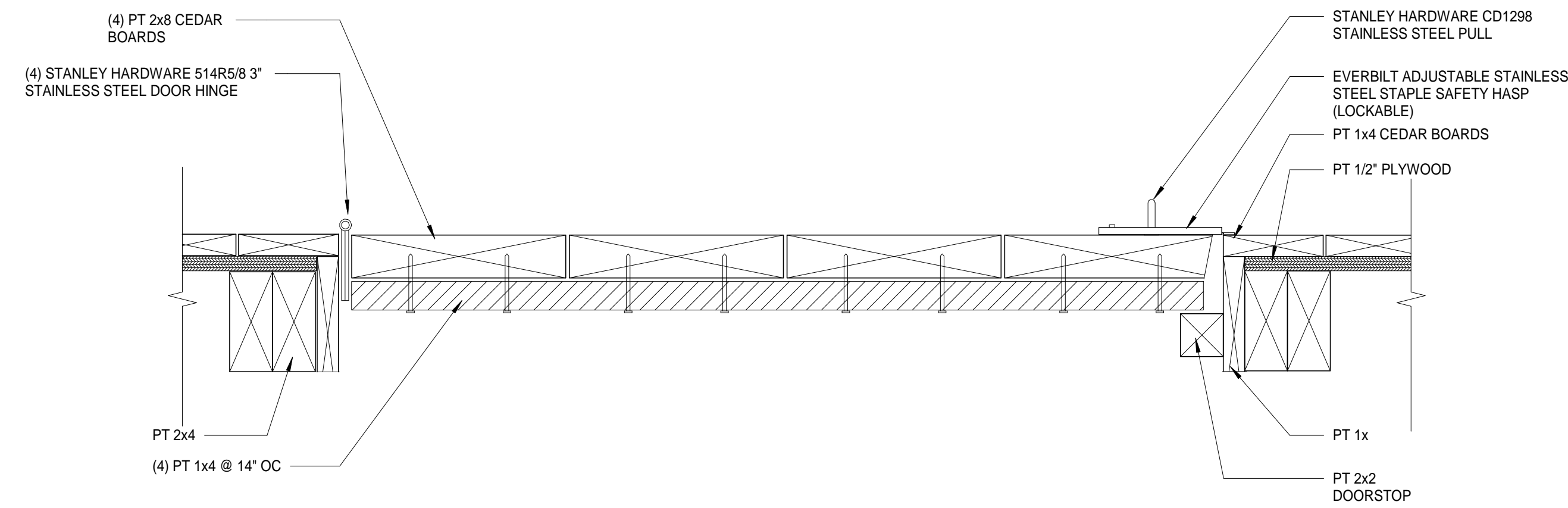
REVISIONS		
No.	Description	Date

**DECK STAIR  
DETAILS**

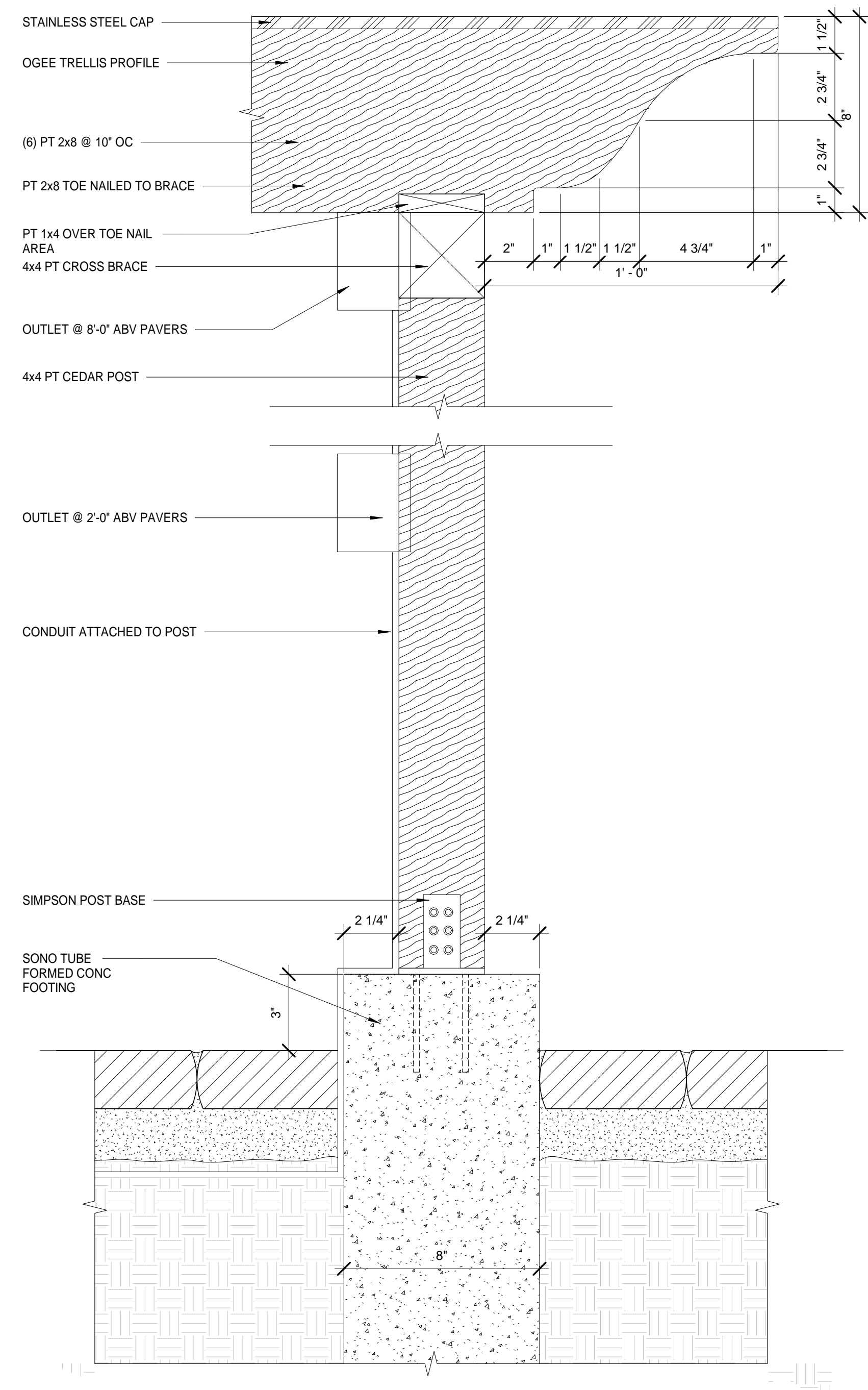
Project Number 16.1526.00  
Date 8/30/2017  
Drawn By MM  
Checked By JPV

**A301**  
Scale As indicated

8/30/2017 1:40:51 PM



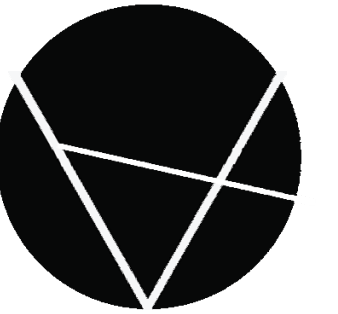
① STORAGE DOOR SECTION  
3" = 1'-0"



② TRELLIS SECTION  
3" = 1'-0"

**GENERAL NOTES**

1. CONC TO BE 3000 PSI MIN
2. ALL CONCEALED LUMBER TO BE PRESSURE TREATED PINE WITH GALVANIZED OR STAINLESS STEEL FASTENERS
3. ALL FINISH LUMBER TO BE CLEAR CEDAR WITH STAINLESS STEEL FASTENERS
4. AZEK TO BE PAINTED (COLOR BY OWNER) WITH PLUGGED FASTENERS
5. ENTIRE STRUCTURE TO BE WRAPPED IN GRACE ICE AND WATER SHIELD (SEE 'SELF ASHERED WATERPROOF MEMBRANE)
6. ALL PLYWOODS TO BE PT EXTERIOR GRADE OR MARINE GRADE
7. ALL LEDGERS TO EXISTING BUILDING TO RECEIVE ALUM FLASHING, MIN 8' UPTURN
8. GC TO PROVIDE \$1,000 ALLOWANCE FOR NEW FENCING EA SIDE OF YARD



**VANKO STUDIO  
ARCHITECTS**

407 DUDLEY STREET, SUITE 4  
BOSTON, MA 02119 |  
617.502.1120

**REAR YARD RENOVATION**

93 WINSLOW AVENUE, SOMERVILLE MA

REVISIONS		
No.	Description	Date

**TRELLIS &  
DOOR  
DETAILS**

Project Number 16.1526.00

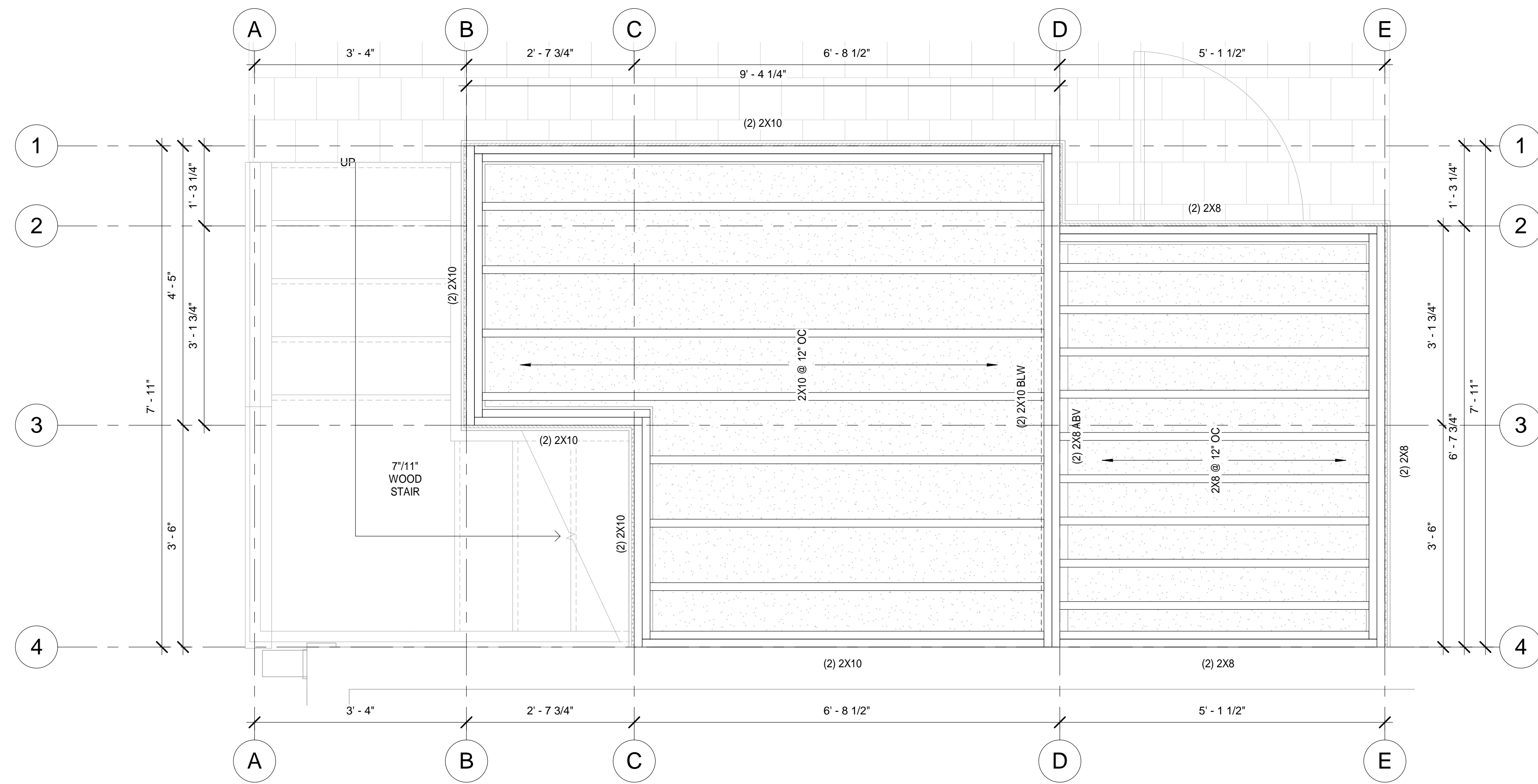
Date 8/30/2017

Drawn By MM

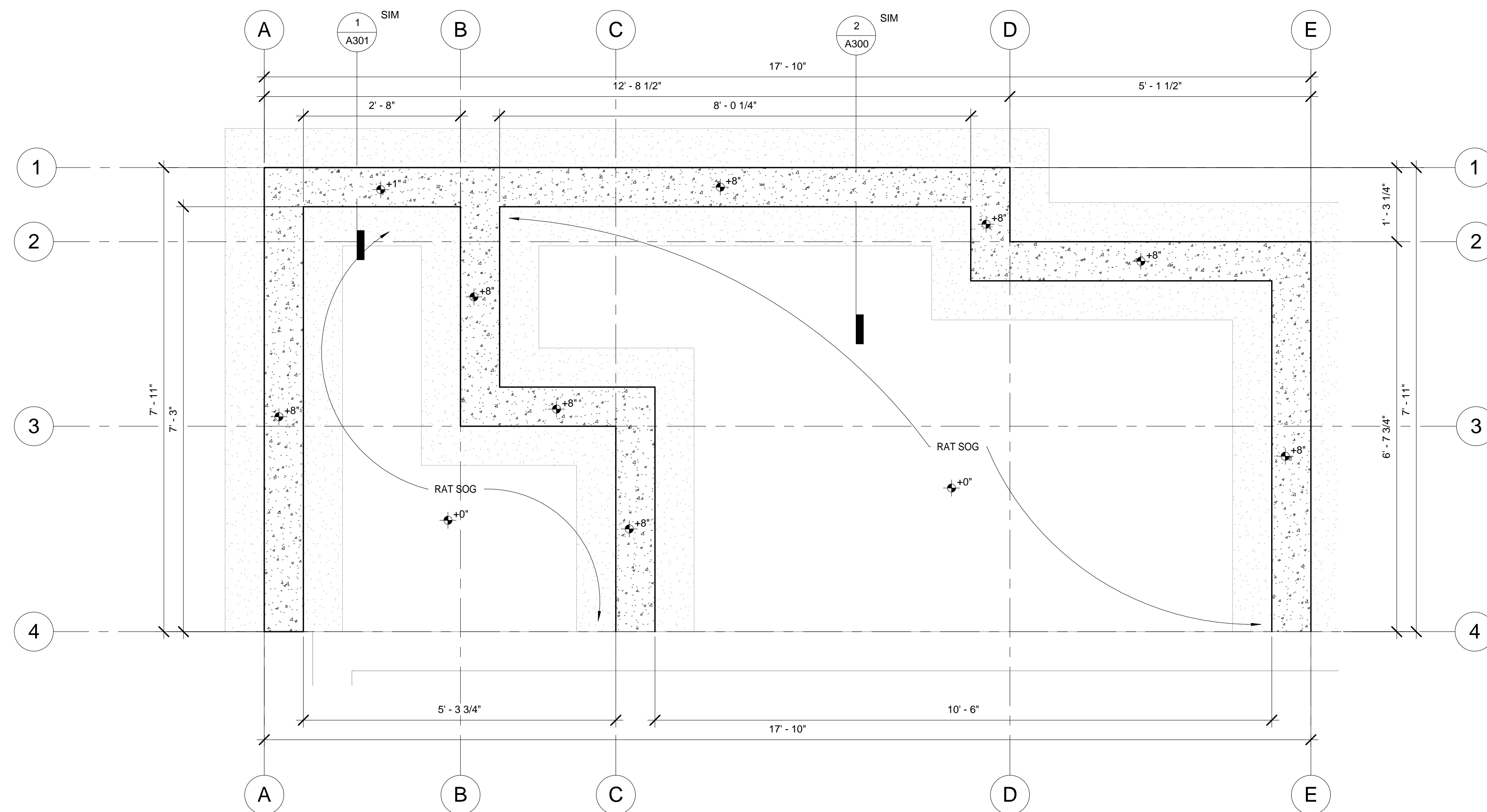
Checked By JPV

**A302**

Scale As indicated



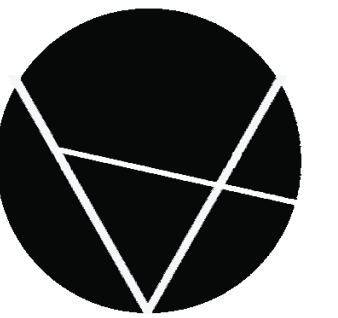
93 REAR YARD UNDER DECK  
STRUCTURAL  
3/4" = 1'-0"



93 REAR YARD FOUNDATION PLAN  
3/4" = 1'-0"

## GENERAL NOTES

1. CONC TO BE 3000 PSI MIN
2. ALL CONCEALED LUMBER TO BE PRESSURE TREATED PINE WITH GALVANIZED OR STAINLESS STEEL FASTENERS
3. ALL FINISH LUMBER TO BE CLEAR CEDAR WITH STAINLESS STEEL FASTENERS
4. AZEK TO BE PAINTED (COLOR BY OWNER) WITH PLUGGED FASTENERS
5. ENTIRE STRUCTURE TO BE WRAPPED IN GRACE ICE AND WATER SHIELD (SEE 'SELF ASHERED WATERPROOF MEMBRANE)
6. ALL PLYWOODS TO BE PT EXTERIOR GRADE OR MARINE GRADE
7. ALL LEDGERS TO EXISTING BUILDING TO RECEIVE ALUM FLASHING, MIN 8" UPTURN
8. GC TO PROVIDE \$1,000 ALLOWANCE FOR NEW FENCING EA SIDE OF YARD



VANKO STUDIO  
ARCHITECTS

407 DUDLEY STREET, SUITE 4  
BOSTON, MA 02119 |  
617.502.1120

# REAR YARD RENOVATION

93 WINSLOW AVENUE, SOMERVILLE MA

REVISIONS		
No.	Description	Date

## STRUCTURAL PLANS

Project Number 16.1526.00

Date 8/30/2017

Drawn By PZ

Checked By JPV

S100

Scale As indicated



# **APPENDIX F**

**32 Clifton Street Plantings and Agreement Package  
and 91 Winslow Avenue Plantings and Agreement Package**

## **32 Clifton Street Plantings and Agreement Package**

Bike Path Drainage Upgrades  
Willow Ave. to Grove St.  
Somerville, MA  
20163393.002A

The City of Somerville  
Department of Public Works

## Agreement

Project: **Bike Path Drainage Upgrades, Somerville, MA**

Property Owner:

Property Address:

Mailing Address:

I, \_\_\_\_\_, hereby acknowledge receipt of the plantings as listed in the  
(Name)

attached checklist (See Page 2) and confirm that all plantings are adequate. I will plant the items provided and maintain plantings in accordance with the attached landscaping maintenance requirements. Furthermore, I release the City of the installation and warranties associated with the installation of the plantings.

OWNER

\_\_\_\_\_  
Owner's Signature Date

Owner's Name: \_\_\_\_\_  
(please print)

City

\_\_\_\_\_  
City's Representative Signature Date

City's Representative Name: \_\_\_\_\_  
(please print)

Please return to:  
Bryan Manter, Assistant Director of Engineering  
City of Somerville  
Department of Engineering  
1 Franey Rd.  
Somerville, MA

Official Use:  
Note to the Contractor, the agreement must be pre-signed by the City's Representative prior to Owner's signature.

32 Clifton Street Plantings		
Item Number	Name	Quantity
1	Red Rose	1
2	Korean Spice Bush	1
3	Hellebore	6
4	Lily of the Valley	15
5	Scilla	200
6	Daffodil	150
7	Tulips	50
8	Grape Hyacinth	100
9	Hosta	20
10	Rose of Sharon	2
11	Trout Lilies	3
12	Euonymus	3
13	Day Lilies	15
14	Solomon's Seal	8
15	Prim Rose	3
16	Ginger	3
17	Ground Phlox	20
18	Creeping Myrtle	20
19	English Ivy (ground cover)	250 ft <sup>2</sup>

Excerpt from Specifications Section 02900 – Landscaping

“3.4 MAINTENANCE - SEEDED AREAS AND PLANTING

- A. Maintain lawn areas and other seed areas at maximum height of 2-1/2 inches by mowing. Weed thoroughly once and maintained until time of final acceptance. Reseed and refertilize with original mixtures, watering or whatever is necessary to establish over entire area of lawn and other seeded areas a close stand of grasses specified, and reasonably free of weeds and undesirable coarse native grasses.
- B. Begin maintenance immediately after each planting and continue until final acceptance of work. Water, mulch, weed, prune, spray, fertilize, cultivate and otherwise maintain and protect all plants.”

## **91 Winslow Avenue Plantings and Agreement Package**

Bike Path Drainage Upgrades  
Willow Ave. to Grove St.  
Somerville, MA  
20163393.002A



91 Winslow Avenue Plantings		
Item Number	Name	Quantity
1	Lilac 1: "Angel White"	1
2	Lilac 2: Common Lilac	2
3	Raspberry bush (producing fruit!)	1
4	Hoarhound	1
5	Stonecrop "Sunsparkler Dazzleberry"	1
6	Armeria "nifty thrifty"	1
7	dwarf forcythia	1
8	hydrangea: bright pink flowers (unsure the exact type)	1
9	hydrangea: bright blue flowers (unsure the exact type)	1
10	Spearmint patch	1
11	Box wood Buxus, 'Green Velvet"	1
12	Hosta "Francee"	1
13	Hosta "Guacamole," variegated leaf	1
14	Hydrangea paniculata quickfire	1
15	Creeping phlox: Purple beauty	1
16	Creeping phlox: Coral eye	1
17	creeping myrtle	2
18	Primrose evening	1
19	Japanese primrose	1
20	Hydrangea "Little Lime"	1
21	Japanese Toad Lily blue Wonder	1
22	Emerald Gaiety Euonymus	1
23	Bugle Rampante Silver Queen	2
24	Primula vulgaris Belurina "Pink Ice"	1



Excerpt from Specifications Section 02900 – Landscaping

“3.4 MAINTENANCE - SEEDED AREAS AND PLANTING

- A. Maintain lawn areas and other seed areas at maximum height of 2-1/2 inches by mowing. Weed thoroughly once and maintained until time of final acceptance. Reseed and refertilize with original mixtures, watering or whatever is necessary to establish over entire area of lawn and other seeded areas a close stand of grasses specified, and reasonably free of weeds and undesirable coarse native grasses.
- B. Begin maintenance immediately after each planting and continue until final acceptance of work. Water, mulch, weed, prune, spray, fertilize, cultivate and otherwise maintain and protect all plants.”