TO: All Bidders

FROM: City of Cambridge

DATE: June 21, 2022

RE: File No. 10318 – River Street - Addendum No. 6

This addendum is comprised of:
1. Bid Opening Date Change
2. Revised Price Proposal (Attached)
3. Clarifications
4. Modifications to Technical Specifications
5. Modifications to Drawings

BID OPENING DATE CHANGE:
The general bid opening has been postponed from June 23, 2022, at 2:00PM to June 30, 2022, at 2:00PM

CLARIFICATIONS
1. Appendix I – Preconstruction Survey Address List (to be provided later) - this information will be provided after bid.
2. Clarification to Item 2630.3, 8” DI Water pipe can be found on sheets U1.01-U1.11 and sheets U-1.20 through U-1.26

REVISED BID TAB

1. Added Bid item 1061.1 NPDES CONSTRUCTION GENERAL PERMIT
2. Revised Bid item 2524.10 to NEW GRANITE CURB FOR RAISED CROSSWALKS
3. Revised Bid item 2609.1 PIPE – RCP (GRAVITY) 30-INCH has been revised from 985 LF to 895 LF.
4. Revised Bid item 2622.4 PIPE - PVC (GRAVITY) 8-INCH has been revised from 965 LF to 710 LF.
5. Revised Bid item 2622.6 PIPE - PVC (GRAVITY) 12-INCH has been revised from 5,950 LF to 4,450 LF.
6. Revised Bid item 16135.1 to 2-INCH ELECTRICAL CONDUIT CONCRETE ENCASED (LIGHTING)
7. Revised Bid item 16135.2 to 4-INCH ELECTRICAL CONDUIT CONCRETE ENCASED (LIGHTING)
8. Revised Bid item 16135.5 to SHALLOW FOUNDATION (SHALLOW PRECAST)
9. Revised Bid item 16135.6 to SELUX FOUNDATION (STANDARD PRECAST)
MODIFICATIONS TO SPECIFICATIONS

1. SECTION 00020 TABLE OF CONTENTS
   i. ADDED text to Division 1 – GENERAL REQUIREMENTS, “01061 National Pollutant Discharge Elimination System (NPDES) Construction General Permit (CGP) for Stormwater Discharges from Construction Activities”
   ii. ADDED Appendix N - MBTA License for Entry

2. SECTION 01060 PERMITS AND REGULATORY REQUIREMENTS
   i. ADDED text to Part 1 – General, Section 1.1 REGULATORY AGENCIES, B, “U.S. Environmental Protection Agency (EPA)”.
   ii. REVISED text in Part 1 – General, Section 1.2 PERMITS OBTAINED BY THE CONTRACTOR, E, to read,
      At a minimum, the other Permits the Contractor shall be responsible for obtaining, paying for, and complying with should they be required include, but are not limited to, the following:
      • (NPDES) Construction General Permit (CGP) for Stormwater Discharges from Construction Activities
      • NPDES Remediation General Permit (RGP)
      • NPDES Dewatering and Remediation General Permit (DRGP)
      • MWRA Construction Site Dewatering Permit
      • MWRA wastewater discharge permits for CIPP Lining operations
      • ADDED the words “or initiated” to Part 1 – General, Section 1.3 PERMITS OBTAINED BY THE CITY.
      • ADDED the following text to Part 1 – General, Section 1.3 PERMITS OBTAINED BY THE CITY;
      • MBTA License for Entry
         i. This License pertains to work above the MBTA tunnel in the Central Square area. The Contractor shall execute this License before commencing work, and abide by all of its terms and conditions.

3. SECTION 01061 National Pollutant Discharge Elimination System (NPDES) Construction General Permit (CGP) for Stormwater Discharges from Construction Activities
   i. ADDED new specification 1061.1 for NPDES CONSTRUCTION GENERAL PERMIT

4. SECTION 02140 DEWATERING
   i. ADDED text to Part 1 – General, Section 1.1 Summary, A, 1a, “A Draft Dewatering and Remediation General Permit (DRGP) was issued in May 2022 but is not yet in effect. If the Final Permit is issued in advance of securing the current necessary RGP, then this will need to be obtained instead of the RGP which it will replace.”
   ii. ADDED text to Part 1 – General, Section 1.1 Summary, A, 1j, “Dewatering and Remediation General Permit (DRGP), and/.”
iii. ADDED text to Part 1 – General, Section 1.2 Related Sections, A, “Section 01060 – PERMITS AND REGULATORY REQUIREMENTS”

iv. REVISED text to Part 1 – General, Section 1.5 Quality Assurance, F, “If oil and/or other hazardous materials are encountered after dewatering begins, dewatering procedures should be halted immediately, and the Engineer should be notified immediately and before any dewatering activities resume.”

v. ADDED text to Part 3 – Execution, Section 3.1 General, B, “and the applicable permit” and “treatment measures as required by the permit”.

vi. ADDED Section H to Part 3 – Execution, Section 3.1 General, “In the event the project needs and secures either an EPA NPDES RGP or DRGP Permit, requirements and procedures for dewatering outlined in said permit supersede the procedures outlined in this specification.”

vii. ADDED text to Part 3 – Execution, Section 3.2 Dewatering Discharge, A, “unless directed by the applicable permit requirements.”

viii. ADDED text to Part 3 – Execution, Section 3.3 COMPLIANCE WITH DEWATERING AND RELATED PERMITS AND REGULATIONS, A, “must be permitted” and “Dewatering and Remediation General Permit (DRGP), and”.

ix. ADDED text to Part 3 – Execution, Section 3.3 COMPLIANCE WITH DEWATERING AND RELATED PERMITS AND REGULATIONS, B, 8a, “or Dewatering and Remediation General Permit (DRGP)”.

5. SECTION 02210 EARTH EXCAVATION, BACKFILL, FILL AND GRADING

i. ADDED text to the table in Section 3.10, COMPACTION REQUIREMENTS, Part A, “General backfill with CDF adjacent to structures other than manholes or catch basins”

ii. REMOVED the following text from Section 3.12, STRUCTURE AND TRENCH BACKFILL, Part C, “The balance of trench backfill around structures shall be CDF material from the crushed stone layer at the bottom of the structure to the common fill layer at the top of the structure.”

iii. REVISED the numbering for Section 3.9, BACKFILLING AGAINST STRUCTURES, to Section 3.13.

iv. REMOVED the following text from Section 3.13, BACKFILLING AGAINST STRUCTURES, Part A, “using CDF Material.”

v. REVISED the numbering for Section 3.10, CDF QUALITY CONTROL TESTING DURING CONSTRUCTION, to Section 3.14.

vi. REMOVED the following text from Part 4 – Compensation, Item 2210.3 – Gravel Borrow (Type B), SPECIAL NOTES/EXCLUSIONS, “outside trench limits.”

vii. REMOVED the following text from Part 4 – Compensation, Item 2210.4 – Dense Graded Crushed Stone, SPECIAL NOTES/EXCLUSIONS, “outside trench limits.”

viii. ADDED the following text to Part 4 – Compensation, Item 2210.5 – Unclassified Excavation, BASIS OF PAYMENT / INCLUSIONS, “including removal of authorized temporary pavement placed under this Contract”
ix. REVISED the first sentence of Part 4 – Compensation, Item 2210.5 – Unclassified Excavation, EXCLUSIONS OR SPECIAL NOTES to read, “This item does not include payment for as the initial removal of pre-existing bituminous pavement and concrete subbase within the trench limits of structures, manholes, or pipe, as it is paid for elsewhere in the Contract Documents.”

x. ADDED the following text to Part 4 – Compensation, Item 2210.6 – Roadway Earth Excavation, BASIS OF PAYMENT / INCLUSIONS, “including removal of authorized temporary backfill materials placed under this Contract”

xi. REVISED the first sentence of Part 4 – Compensation, Item 2210.6 – Roadway Earth Excavation, EXCLUSIONS OR SPECIAL NOTES to read, “This item does not include payment for the initial removal of pre-existing asphalt, gravel and/or soil within the trench limits of structures, manholes, or pipe, as it is paid for elsewhere in the Contract Documents.”

6. SECTION 02456 HELICAL PILES
   i. ADDED text to Part 1 – General, Section 1.01 Summary, A, to include the language, “the Green Street Shelter, Art foundation, and”.
   ii. ADDED text to Part 1 – General, Section 1.01 Summary, B, to include the language,
       1. Mainline drainage and sewer support: 10 kips per pile.
       2. Art Foundations: 3.8 kips per pile.
       3. Green Street Shelter: axial service compression load of 25 kips and a service moment of 10 kip*ft.
   iii. REVISED text in Part 1 – General, Section 1.03 CONTRACTOR SUBMITTALS, A,3, to read “Helical pile”.
   iv. ADDED text to Part 1 – General, Section 1.03 CONTRACTOR SUBMITTALS, A,6, “The safety factor need not be applied to the design moment.”
   v. ADDED text to Part 1 – General, Section 1.03 CONTRACTOR SUBMITTALS, A,7, to include the word “field” and “during construction”.
   vi. ADDED text to Part 1 – General, Section 1.03 CONTRACTOR SUBMITTALS, A,8, to include the word “an axial” and “service”.

7. SECTION 02524 CURBS, WALKS AND DRIVEWAYS
   i. REVISED bid item 2524.10 to New Granite Curb for Raised Crosswalks
   ii. REVISED Part 4 – COMPENSATION section for bid item 2524.10 to New Granite Curb for Raised Crosswalks
   iii. REVISED Part 4 – COMPENSATION section for bid item 2524.10, METHOD OF MEASUREMENT, to remove “Type VA3”
   iv. REVISED Part 4 – COMPENSATION section for bid item 2524.10, BASIS OF PAYMENT / INCLUSIONS, to remove “Type VA3”

8. SECTION 16135 ROADWAY LIGHTING INFRASTRUCTURE
   i. REVISED bid item 16135.1 to 2-Inch Electric Conduit Concrete Encased (Lighting)
ii. REVISED bid item 16135.2 to 4-Inch Electric Conduit Concrete Encased (Lighting).

iii. ADDED text to Part 1 – General, Section 1.1 Summary A to include the language, “Per City of Cambridge Standards, all”.

iv. ADDED text to Part 1 – General, Section 1.1 Summary E, “structures”.

v. REVISED text to Part 4 – Compensation to Item 16135.1 2-Inch Electric Conduit Concrete Encased (Lighting).

vi. REVISED text to Part 4 – Compensation to Item 16135.2 4-Inch Electric Conduit Concrete Encased (Lighting).

vii. ADDED text to Part 4 – Compensation, Item 16135.1 2-Inch Electric Conduit Concrete Encased (Lighting) and Item 16135.2 4-Inch Electric Conduit Concrete Encased (Lighting) Section on METHOD OF MEASUREMENT, “Measurement for payment for Items 16135.1 and 16135.2 will be based on the linear foot of each individual conduit installed, regardless of the configuration (as an example, a two-conduit duct bank would be two times the length to capture both individual conduits) as indicated in the Contract Documents or as otherwise required by the Engineer.”

9. Appendix N - MBTA License for Entry
   i. ADDED to the submission.
MODIFICATIONS TO DRAWINGS

1. SHEET E-1.05: edits will be included in the Conformed Set
   ii. REVISED Callout C in the Conduit & Circuit Schedule to read as follows
       1 OF 4 IN PLASTIC CONDUIT
       3 OF 1/0 AWG CONDUCTOR (LIGHTING)
       1 OF 1/0 AWG CONDUCTOR (GROUND)
       1 OF 4 IN PLASTIC CONDUIT (SPARE)

2. SHEET ED-1.03: edits will be included in the Conformed Set
   iii. REMOVED Precast Light Standard Foundation
    iv. ADDED SELUX PRECAST FOUNDATION DETAIL

All other details remain the same.

Elizabeth Unger
Purchasing Agent

Addendum No. 6
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| 2095.4 | 100 | OHM - DISPOSAL OF SOIL – NON-HAZARDOUS SOLID WASTE ASPHALT BATCHING (CLASS B-3) AT *Forty +* ★★★★★★★★ Dollars TON |
| 2095.5 | 100 | DISPOSAL OF SOIL – NON-HAZARDOUS SOLID WASTE THERMAL TREATMENT (CLASS B-4) AT *Fifty +* ★★★★★★★★ Dollars TON |
| 2095.6 | 100 | OHM - DISPOSAL OF SOIL – NON-HAZARDOUS SOLID WASTE (CLASS B-5) AT *Fifty-Five +* ★★★★★★★★ Dollars TON |
| 2095.7 | 100 | OHM - DISPOSAL OF SOIL WITH DEBRIS – NON-HAZARDOUS SOLID WASTE (CLASS B-6) AT *Sixty +* ★★★★★★★★ Dollars TON |
| 2095.8 | 100 | OHM - DISPOSAL OF SOIL – TREATMENT OF RCRA CHARACTERISTICALLY HAZARDOUS SOIL TO DE-CHARACTERIZE AND DISPOSAL OF SOIL AS NON-HAZARDOUS WASTE (CLASS C-1) AT *Seventy-Five +* ★★★★★★★★ Dollars TON |
| 2095.9 | 100 | OHM - DISPOSAL OF RCRA HAZARDOUS WASTE (CLASS C- 2) AT *Eighty-Five +* ★★★★★★★★ Dollars TON |
| 2095.10 | 100 | OHM - DISPOSAL OF SPECIAL WASTE AT *Eighty-Five +* ★★★★★★★★ Dollars TON |

Bidder’s Name: _____________________________ 00300-8

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| 2252.4 | 21 | TYPE 1 MANHOLE - PRECAST 5-FOOT DIAMETER  
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| 2252.5 | 1  | TYPE 1 MANHOLE PRECAST WITH KNOCKOUT BASE  
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| 2252.6 | 15 | TYPE 7 MANHOLE PRECAST 3’X4’  
   AT EACH |
| 2252.8 | 106 | EXISTING DRAINAGE OR SEWER STRUCTURE ADJUSTED  
   AT EACH |
| 2252.10 | 16 | EXISTING DRAINAGE OR SEWER MANHOLE REMODELED  
   AT EACH |
| 2456.1 | 1  | HELICAL PILE MOBILIZATION/DEMOBILIZATION  
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| 2890.8 | 6 | PULL BOX 24"X12"  
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| 2890.9 | 19 | SERVICE CONNECTION EVERSOURCE APPROVED HANDHOLE  
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| 2890.10 | 1 | RECTANGULAR RAPID FLASHING BEACON (AC POWER)  
AT LUMP SUM |
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Bidder’s Name: _____________________________ 00300-28

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| 2995.90 | 1 | REFURBISHED CONCRETE WALL AT LUMP SUM |
| 3300.1  | 2 | CAST-IN-PLACE CONCRETE PIPE CONNECTION 12-INCH THROUGH 30-INCH DIAMETER (CAST-IN-PLACE FIELD CLOSURES) AT EACH |
| 3300.3  | 1 | CONCRETE FOUNDATIONS FOR RITSUKO ART INSTALLATION AT LUMP SUM |
| 5700.1  | 1 | RIBBON STRUCTURE AT LUMP SUM |
| 10730.1 | 1 | SHELTER 1 - RIVER ST SHELTER AT LUMP SUM |
| 10730.2 | 1 | SHELTER 2 - MAGAZINE ST SHELTER AT LUMP SUM |
| 10730.3 | 1 | SHELTER 3 - GREEN ST SHELTER AT LUMP SUM |

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(*THESE FORMS MUST BE SUBMITTED WITH THE BID*)
DIVISION 1 - GENERAL REQUIREMENTS

01010 Summary of Work
01025 Measurement and Payment
01040 Project Coordination and Meetings
01045 Cutting and Patching
01060 Permits and Regulatory Requirements
01061 National Pollutant Discharge Elimination System (NPDES) Construction General Permit (CGP) for Stormwater Discharges from Construction Activities
01063 Sequencing of Work
01070 Abbreviations
01090 Reference Standards
01105 Rodent Control
01108 Health and Safety Procedures
01200 General Requirements for Utility Work
01300 Submittals
01301 Schedule of Values
01311 Scheduling and Reporting
01390 Pre-Construction Survey
01400 Quality Control
01500 Temporary Facilities and Controls
01505 Mobilization
01560 Temporary Environmental Controls
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
01740 Warranties and Bonds
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03410 Plant-Precast Structural Concrete

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04200 Stone Cladding

DIVISION 5 – METALS
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05700 Ribbon Structure

DIVISION 7 – THERMAL AND MOISTURE PROTECTION
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07210 Thermal Insulation
07220 Closed-Cell Spray Foam Insulation
07411 Preformed Metal Roof System
07600 Flashing and Sheet Metal
07920 Joint Sealants

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08801 Glass and Glazing

DIVISION 9 – MISCELLANEOUS
09260 Gypsum Board Assemblies
09546 Linear Metal Ceiling
09900 Painting

DIVISION 10 – SIGNAGE
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10426 Tactile-Braille Signage
10730 Transit Shelter
DIVISION 12 – SITE FURNISHINGS

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12930   Site Furnishings

DIVISION 15 – HVAC

15600   Heating, Ventilating, and Air Conditioning

DIVISION 16 – SPECIAL CONSTRUCTION

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16135   Roadway Lighting Infrastructure
16195   Electric Identification
16800   Digital Sign

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Appendix A – Oil and Hazardous Materials Findings and Soil Management Recommendations
Appendix B – Boring Logs
Appendix C – City of Cambridge Sign Details
Appendix D – CCTV Logs
Appendix E – Subsurface Utility Investigation Plans
Appendix F – MWRA 48” CIP Spot Pond Supply Main Record Drawings
Appendix G – Holmes Building Record Plans
Appendix H – MWRA 8m Permit Applications
  1) MWRA 8m Permit – 48” Water Main Survey - Test Pits
  2) MWRA 8m Permit – 48” Water Main Design – Carl Barron Plaza
  3) MWRA 8m Permit – 48” Water Main Design – Magazine Street
  4) MWRA 8m Permit – North Charles Relief Sewer Design
  5) MWRA 8m Permit – Metropolitan Sewer Design
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Appendix J – DCR Construction Access Permit (to be provided after bid after later)
Appendix K – Water Service Information (to be provided after bid after later)
Appendix L – City of Cambridge Artist Selection Call (to be provided after bid after later)
Appendix M – MBTA Red Line Reconstruction Drawings (to be provided after bid after later)
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SECTION 01060

PERMITS AND REGULATORY REQUIREMENTS

1060.1 MWRA DEWATERING DISCHARGE PERMIT FEE ALLOWANCE
1060.2 ERUV MAINTENANCE OF NORTH CHARLES LUMP SUM ERUV SYSTEM
1060.3 MBTA FORCE ACCOUNT ALLOWANCE

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 Department of Public Safety, Cambridge Fire Department, Cambridge Police Department, Cambridge Electrical Department, Cambridge Water Department, Cambridge Department of Public Works, Massachusetts Water Resource Authority, Massachusetts Department of Environmental Protection, Department of Conservation and Recreation, Massachusetts Bay Transit Authority, U.S. Environmental Protection Agency (EPA) 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.

C. Permit fees will be waived for permits administered by the Cambridge Department of Public Works and Cambridge Traffic, Parking and Transportation Department.

D. The Contractor shall be fully responsible for maintaining and preserving the portion of the North Charles Eruv (NC Eruv) and coordinating with the North Charles Community Eruv through construction.

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 Cambridge Department of Public Works and Cambridge Traffic and Parking Department permits that the Contractor shall be responsible for obtaining, paying for, and complying with include, but are not limited to, the following:

1. Excavation Permit
2. Street Obstruction Permit
3. Sidewalk Obstruction Permit
4. Street Closing Permit
5. Curb Cut Permit
6. Traffic Management Plans including Detours and Bus Routing
7. Pedestrian Management Plans
8. Water Construction Permit
   a. The Cambridge Water Department (CWD) will not issue new water construction permits until all requirements for previous (i.e., initial CWD permit) CWD permits are met. These requirements include accurate and legible swing tie dimensions to all new water main gate valves, Tee’s and elbows, required CWD “sign off’s” on the contractor’s copy of the CWD executed permit (when permitted work is complete), test documentation that includes Massachusetts State certified initial chlorination and bacteria testing of new water main work, and pressure test results of new water main work. The contractor is hereby advised that the CWD will not be responsible for the contractor’s slip in project schedule if these requirements for permits are not followed.

9. Noise Variance for work outside regular hours of construction. Regular hours of construction are Monday through Friday (excluding City Holidays) from 7:00 am to 6:00 pm and Saturdays (excluding City Holidays) from 9:00 am to 6:00 pm.

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

- (NPDES) Construction General Permit (CGP) for Stormwater Discharges from Construction Activities
- NPDES Remediation Dewatering General Permit (RGP)
- NPDES Dewatering and Remediation General Permit (DRGP)
• MWRA Construction Site Dewatering Permit
• MWRA wastewater discharge permits for CIPP Lining operations

F. 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.

G. The Contractor shall be responsible for obtaining, paying for and complying with MassDEP and City of Cambridge Backflow Prevention Permits.

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

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

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

K. The Contractor shall, at a minimum, include compliance with the provisions and requirements of a typical NPDES Construction Dewatering Discharge General Permit and the MWRA dewatering permit and typical Cambridge permits listed above. The Contractor will receive no additional compensation for compliance with any permit requirements.

1.3 PERMITS OBTAINED BY THE CITY

A. The City has obtained or initiated the following permits, which are included in the appendices to these Specifications. All other permits, including construction dewatering discharge permits, are the responsibility of the Contractor.
   a. DCR Construction Access Permit
   b. MWRA Waterworks 8(m) Permits
   c. MWRA Wastewater 8(m) Permits
   d. MBTA License for Entry
      i. This License pertains to work above the MBTA tunnel in the Central Square area. The Contractor shall execute this License before commencing work, and abide by all of its terms and conditions.

1.4 MAINTENANCE OF NORTH CHARLES EREV

A. The work shall include the maintenance and preservation of the portion of the North Charles Eruv System located within the limits of this contract for the total duration of the construction work. The Eruv is a boundary of religious significance to the Jewish community that is generally comprised of linear elements of a minimum height of 48-inches but generally 15-18 feet high; commonly chain-link
fences, walls of buildings, and utility poles and wires. The Eruv is a continuous boundary with no gaps or openings, except for certain openings that are allowed if the opening is framed in a type of a doorway scheme (two doorposts and a lintel). The purpose of an Eruv is to integrate a number of private and public properties into one larger private domain that then permits the carrying of objects from home to public areas, and within public areas, by members of the Jewish community on the Sabbath and Holidays, that would be restricted by Jewish Law without the presence of the Eruv.

The Eruv boundary map can be found at the following website: nceruv.org/eruvBoundary.html

Along Memorial Drive at River Street, the existing Eruv is comprised of a polypropylene twine attached to two 20’ high, light poles, one wood and the other metal. The first pole is on the southeast corner of River Street, the pole Eruv continues to the west 120’ to the next wood pole along Memorial Drive.

The Eruv must always be maintained intact, except for temporary dismantling for construction purposes, or if relocated. In either case, approval by the North Charles Community Eruv, Inc. (NCCE) is required prior to work. Construction activities may proceed so long as the work does not disturb the integrity of the Eruv. The Contractor is not responsible for damage to the Eruv outside of the work limits of the Contract, unless that damage is perpetrated by the Contractor during work on this Contract.

B. Before any work is performed to maintain or relocate the Eruv, the Contractor shall attend a meeting with the NCCE to coordinate the required relocation/modification of the Eruv. The Contractor shall submit to Engineer, City of Cambridge and NCCE for approval a plan and schedule for any work associated with the Eruv. The Contractor may adjust the alignment of the Eruv within the limits of the contract area, and shall submit for approval each alternate alignment for the Eruv. Submittals shall be sent to info_eruv@nceruv.org for review and approval. Additionally, the Contractor shall contact the NCCE a minimum of ten (10) business days prior to any work associated with the Eruv and coordinate all schedules for maintenance, relocation, dismantlement, and reconstruction.

C. RELIGIOUS HOLIDAY RESTRICTIONS

If the Eruv is temporarily dismantled for construction purposes, the Eruv shall be reconstructed and kept intact for the duration of the Sabbath and Holidays. Construction activities may proceed during the Sabbath and Holidays so long as the work does not disturb the integrity of the Eruv. For the purposes of this Contract, the Sabbath shall be defined as a 36-hour period beginning at 12:00 PM (noon) on every Friday, and ending at 11:59 PM (midnight) on the succeeding Saturday. This period roughly approximates the hours of the Jewish Sabbath. For the purposes of this Contract, Holidays in calendar years 2022, 2023, 2024, and...
2025 shall consist of the holidays specified below. It is the responsibility of the Contractor to confirm each holiday period specified for each year of the contract. Holidays last for a period of 36 hours up to 9 days, and shall always begin at 12:00 PM (noon) and end at 11:59 PM (midnight). Should this Contract extend past December 31, 2025, the Contractor shall obtain an updated list of Holidays from the NCCE

**Eruv Holidays and Durations**
- Passover (9 days)
- Shavuot (2 days)
- Rosh Hashana (2 days)
- Yom Kippur (1 day)
- Sukkot/Simchat Tora (9 days)

**PART 2 – PRODUCTS**

1.1 **ERUV MATERIALS**

   A. All materials used for maintaining the Eruv shall be of solid durable materials as approved or directed by the NCCE.

**PART 3 – EXECUTION (Not Used)**

1.1 **ERUV DISMANTLEMENT AND RECONSTRUCTION**

   A. The Eruv may only be dismantled by the Contractor within the work zone of this Contract. Any portion of the Eruv, including utility poles and overhead wires, that is dismantled as part of the work will constitute a disruption to the Eruv and must be supplemented by temporary work during the hours listed above. Any components of the Eruv that are owned by the NCCE that are removed by the Contractor shall be delivered to the NCCE. No existing Eruv components shall be modified, adjusted, or removed until approved by the NCCE. The Contractor shall provide access to the work site for representatives of the NCCE to perform the installation work. Any portion of the Eruv System that is impacted as part of work by the Contractor will constitute a disruption to the Eruv and must be maintained by approved temporary means.

   B. All work done to reconstitute (reconstruct) the Eruv shall be of durable construction as approved or required by the NCCE. All lines of the Eruv shall be continuous following neat lines and grades.

**PART 4 – COMPENSATION**
Item 1060.1 – 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.

Item 1060.2 – Eruv Maintenance of North Charles Eruv System

METHOD OF MEASUREMENT:
Measurement for Payment for Eruv Maintenance of North Charles Eruv System will be paid .

BASIS OF PAYMENT:
The Contractor shall be paid the lump sum contract price for all work associated with maintaining the North Charles Eruv System, including coordinating with the North Charles Community Eruv, Inc. to maintain, temporarily modify, and permanently modify the North Charles Community Eruv system as directed by the Engineer. This payment shall be full compensation for furnishing all equipment, labor, and materials necessary to complete the work.

Item 1060.3 – MBTA Force Account

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 MBTA License Agreement Fees and Force Account fees.

END OF SECTION 01060
PERMITS AND REGULATORY REQUIREMENTS
Issued For Bid Addendum #6 01060-7

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SECTION 01061

National Pollutant Discharge Elimination System (NPDES)
Construction General Permit (CGP) for Stormwater Discharges from
Construction Activities

1061.1 NPDES CONSTRUCTION GENERAL PERMIT LUMP SUM

PART 1 – GENERAL

1.1 SUMMARY

A. This section includes the following:

1. Procedures to submit, secure, maintain, and conduct any and all construction activities in accordance with a NPDES Construction General Permit (CGP) for Stormwater Discharges from Construction Activities. Work to be done as part of this specification includes, but is not limited to:

   a. Obtain an EPA NPDES Construction General Permit (CGP) for Stormwater Discharges from Construction Activities.
   b. Develop and maintain a Storm Water Pollution Prevention Plan required by the National Pollutant Discharge Elimination System (NPDES) and applicable Construction General Permit (CGP).
   c. Perform site inspections and submit inspection reports.
   d. File a Notice of Termination.

1.2 RELATED SECTIONS

A. Section 01060 – PERMITS AND REGULATORY REQUIREMENTS

B. Section 01300 – SUBMITTALS

C. Section 02010 – SUBSURFACE INVESTIGATION

D. Section 02080 – SOIL AND WASTE MANAGEMENT

E. Section 02095 – TRANSPORTATION AND DISPOSAL OF SOIL AND FILL

F. Section 02140 – DEWATERING

G. Section 02160 – TEMPORARY EXCAVATION SUPPORT SYSTEMS
H. Section 02210 – EARTH EXCAVATION, BACKFILL, FILL, AND GRADING

1.3 SUBMITTALS

A. Submit the following in accordance with Section 01300 – SUBMITTALS or as otherwise directed below:

1. The Contractor must prepare and file a Notice of Intent (NOI) for a CGP to be secured in advance of construction using submittal methods [ex. NPDES eReporting Tool (NeT)] current and applicable at the time of filing. The Contractor is responsible to ensure that all required Permittees, including but not limited to, the City of Cambridge and the Contractor, are properly covered under said NOI and resultant CGP, and shall provide proof of same to the City of Cambridge prior to the start of any work.

2. The NPDES Construction General Permit requires the preparation and implementation of a Storm Water Pollution Prevention Plan (SWPPP) in accordance with the associated statutes and regulations. The SWPPP shall include the NPDES Construction General Permit conditions and required information, City of Cambridge Performance Standards, and detailed descriptions of erosion and sedimentation controls to be implemented during construction. It is the responsibility of the Contractor to prepare the SWPPP to meet the requirements of the most recently issued NPDES Construction General Permit and, if applicable, the DEP requirements. The Contractor shall submit an electronic copy, and by hard copy if requested, three (3) copies of the draft SWPPP to the City of Cambridge for review and approval at least four weeks prior to any regulated site activities. The Contractor is responsible for keeping the SWPPP current and for any necessary amendments that need to be made for throughout construction. Any need for amendment must be communicated to the City of Cambridge and said amendment must be provided to the City of Cambridge for review and approval in advance of implementation. It is the responsibility of the Contractor to be familiar with the NPDES Construction General Permit conditions and all other environmental permits and regulations applicable to this Project. The Contractor shall include in the SWPPP the methods and means necessary to comply with applicable conditions of said permits and regulations.

3. Included in the NPDES Construction General Permit conditions is the requirement for inspection of all erosion and sediment controls and site conditions. The Contractor must conduct inspections in accordance with the frequencies identified in the CGP. Written Weekly Inspection forms, Storm Event Inspection forms, and Monthly Summary Reports shall be completed and provided to the City of Cambridge within two (2) business days of completion. Monthly Summary Reports must include a summary of construction activities undertaken during the
reporting period, general site conditions, erosion control maintenance and corrective actions taken, the anticipated schedule of construction activities for the next reporting period, any SWPPP amendments, and representative photographs.

4. The Contractor must prepare and file a Notice of Termination (NOT) of coverage under the CGP using submittal methods [ex. NPDES eReporting Tool (NeT)] current and applicable at the time of filing. The Contractor is responsible to ensure that all required Permittees, including but not limited to, the City of Cambridge and the Contractor, are properly covered under said NOT, and shall provide proof of same to the City of Cambridge prior to filing.

PART 3 – EXECUTION

3.1 GENERAL

A. The Project is subject to the EPA Construction General Permit (CGP). Pursuant to the Federal Clean Water Act, construction activities which disturb one acre or more of land are required to apply to the U.S. EPA for coverage under the NPDES General Permit for Storm Water Discharges from Construction Activities. The Contractor must secure the applicable CGP which is in effect (currently 2022) at the time of application, and any subsequently issued CGP, if not grandfathered by EPA, during the applicable construction period until the Termination of Coverage.

3.2 COMPLIANCE WITH CONSTRUCTION GENERAL PERMIT

A. The contractor is required to comply with all requirements and procedures outlined in the Construction General Permit and said requirements and procedures take priority over the procedures outlined in these specifications.

B. Included in the NPDES Construction General Permit conditions is the requirement for inspection of all erosion and sediment controls and site conditions. The Contractor must conduct inspections in accordance with the frequencies identified in the CGP which has been applied for and in effect which may include: Once every seven (7) calendar days or once every fourteen (14) calendar days and within twenty-four (24) hours of the occurrence of a storm event of 0.25 inches or greater, or the occurrence of runoff from snowmelt sufficient to cause a discharge. For any location where stormwater may discharge to sensitive waters, as defined by the issued CGP, inspection frequency may need to be increased to facilitate compliance with said CGP. The Contractor shall choose a Qualified Person (herein after referred to as the “Inspector”), as defined by the issued CGP, who will be on-site during construction to perform the abovementioned
inspections. The City of Cambridge must approve the Contractor’s Inspector. In addition, if the City of Cambridge determines at any time that the Inspector’s performance is inadequate, the Contractor shall provide an alternate Inspector.

C. The Standard Specifications require adequate erosion control for the duration of the Contract. Inspection of these controls is considered incidental to the applicable items. All Control measures must be properly selected, installed, and maintained in accordance with manufacturer specifications and good engineering practices. If periodic inspections or other information indicates a control has been used inappropriately or is no longer adequate, it is the responsibility of the Contractor to replace or modify the control for site conditions at no additional cost to the Department. Contractor must maintain all control measures and other protective measures in effective operating condition and shall consider replacement of erosion controls for each construction season.

PART 4 – COMPENSATION

METHOD OF MEASUREMENT:
Payment for all work under this Item shall be made at the contract unit price, lump sum, which shall include all work detailed above, including Plan preparation, required revisions, revisions/addenda during construction, weekly inspections, weekly/monthly reports and filing fees, and termination of coverage.

BASIS OF PAYMENT / INCLUSIONS:
Payment of fifty (50) % of the contract price shall be made upon acceptance of the Notice of Intent and Stormwater Pollution Prevention plan. Payment of forty (40) % of the contract price shall be made in equal installments for implementation of the Stormwater Pollution Prevention Plan. Payment of the final ten (10) % of the contract price shall be paid upon satisfactory submissions of a Notice of termination (NOT) when final stabilization has been achieved.

END OF SECTION 01061
SECTION 02140

DEWATERING

2140.1 TREATMENT OF CONSTRUCTION DEWATERING DAY

PART 1 – GENERAL

1.1 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 discharge permit and other regulatory requirements. Work to be done as part of dewatering includes, but is not limited to:

a. Obtain necessary state, local and Federal discharge permits, including an EPA NPDES Remediation General Permit (RGP) Discharge Permit or MWRA Construction Site Dewatering Discharge Permit, as applicable. A Draft Dewatering and Remediation General Permit (DRGP) was issued in May 2022 but is not yet in effect. If the Final Permit is issued in advance of securing the current necessary RGP, then this will need to be obtained instead of the RGP which it will replace.

b. Lower the groundwater level within excavations to at least 2 feet below the bottom of the excavation.

c. Lower hydrostatic pressure.

d. Prevent surface and storm water from entering the excavation during construction.

e. Limit settlement of utilities and adjacent structures.

f. Implement erosion and sedimentation control measures for disposing of discharge water.

g. Provide treatment system to treat all water removed from excavations as required by discharge permits, 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.

h. Provide an Environmental Site Professional/Dewatering Specialist/Field Representative (hereinafter referred to as the
Dewatering Professional) who will be responsible for dewatering, re-infiltration, treatment and discharge of dewatering flows as specified and in compliance with all applicable permits and regulations.

i. Common dewatering methods include, but are not limited to, sump pumping, deep wells, well points, vacuum well points or any combinations thereof.

j. Water removed from excavations shall be re-infiltrated to the ground if feasible. If re-infiltration is not feasible, treated water shall be discharged to the City of Cambridge sewer system under either an EPA NPDES RGP Discharge Permit, Dewatering and Remediation General Permit (DRGP), and/or MWRA Construction Site Dewatering Discharge Permit, as applicable, to be obtained by the Contractor and other appropriate permit(s) and regulations. In no case shall dewatering flows be directly or indirectly released to surface waters or storm drains prior to settling of suspended solids and appropriate additional treatment. The Contractor is responsible for obtaining and paying for necessary permits.

1.2 RELATED SECTIONS

A. Section 01060 – PERMITS AND REGULATORY REQUIREMENTS

B. Section 01300 – SUBMITTALS

C. Section 02010 – SUBSURFACE INVESTIGATION

D. Section 02080 – SOIL AND WASTE MANAGEMENT

E. Section 02095 – TRANSPORTATION AND DISPOSAL OF SOIL AND FILL

F. Section 02160 – TEMPORARY EXCAVATION SUPPORT SYSTEMS

G. Section 02210 – EARTH EXCAVATION, BACKFILL, FILL, AND GRADING

1.3 SUBMITTALS

A. Shop Drawing: Submit the following in accordance with Section 01300 – SUBMITTALS:

1. Submit the following qualifications at least three weeks prior to the construction:

a. Qualifications of specialist or firm’s Registered Professional Engineer as specified below.
b. Qualifications of the Dewatering Professional who shall oversee the installation, operation and maintenance of the dewatering system.

2. 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 City 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 stamped and signed by a Massachusetts Registered Professional Engineer 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. Submit a generalized plan of actions at least two (2) weeks before operation of the groundwater control system 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. A groundwater monitoring plan shall be developed by the Professional Engineer retained by the Contractor that designs the dewatering system. The monitoring plan shall address groundwater control within the excavations and address settlements of utilities and adjacent structures.

g. A description of erosion/sedimentation control measures, and methods of disposal of pumped water.

h. List of all applicable laws, regulations, rules, and codes to which dewatering design conforms.
3. Data for the required discharge reports shall be collected by the Contractor’s Dewatering Professional. It shall consist of periodic sampling and analysis of system influents, midfluents and/or effluents and discharge quantities and other requirements of the relevant permits. The Contractor’s Dewatering Professional shall also coordinate analysis of samples at an appropriately certified analytical laboratory and shall comply with all permit reporting requirements.

4. 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 AVAILABLE SUBSURFACE INFORMATION

A. Subsurface exploration data are provided as referenced in Sections 02010 and 02080.

1.5 QUALITY ASSURANCE

A. Employ the services of a Dewatering Professional having the following qualifications: A Massachusetts Registered Professional Civil Engineer who has completed the design of at least five (5) successful dewatering projects of equal size and complexity and with equal systems within the last five (5) years consisting of deep wells, well points, vacuum well points, and sump pumping for heavy Civil projects of similar size, type, and complexity in urban areas with the appropriate temporary support of excavation systems proposed by the Contractor including, but not limited to, trench boxes, soldier pile and lagging, timber sheeting support and secant pile support of excavation systems.

B. The dewatering systems installer supervisor shall have a minimum of five (5) years’ experience in installation of well points, deep wells, recharge systems, or equal systems.

C. The Dewatering Professional responsible for day to day operation of the system shall have the following minimum qualifications:

1. Completion of at least five (5) successful dewatering projects of equal size and complexity with equal systems within the last five (5) years consisting of system operation and troubleshooting, collection of readings, maintenance of logs and other required documents, collection of samples, coordination of analysis of samples, and compliance with reporting requirements during pumping for heavy civil projects of similar size, type, and complexity in urban areas.

2. Valid certification from the Massachusetts Department of Environmental Protection (DEP) to operate the proposed treatment system.
D. 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 City.

E. 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 City.

F. If oil and/or other hazardous materials are encountered after dewatering begins, dewatering procedures should be halted immediately, and the Engineer should be notified immediately and before any dewatering activities resume.

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 earth retention 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, and the Dewatering Professional is on site and has begun the duties specified herein.

B. Furnish, install, operate, and maintain dewatering, re-infiltration, treatment and discharge systems as indicated or specified and in accordance with the dewatering plan and the applicable permit. As no dewatering flows shall be discharged to surface waters either directly or indirectly without appropriate settling treatment measures as required by the permit, at a minimum, the Contractor shall provide a settling tank, with a minimum capacity of 10,000 gallons, such that if pumping rates exceed discharge rates, additional storage capacity is available. Delays due to insufficient storage capacity will be at no additional cost to the City. The Contractor is responsible to evaluate available data and determine the necessary storage capacity so as to not impede construction activities.

C. Carry out dewatering program in such a manner as to prevent undermining or disturbing foundations of existing structures or of work ongoing or previously completed.

D. Do not excavate until the dewatering system is operational.

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 City.

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 City.

H. In the event the project needs and secures either an EPA NPDES RGP or DRGP Permit, requirements and procedures for dewatering outlined in said permit supersede take priority over the procedures outlined in this specification.
3.2 DEWATERING DISCHARGE

A. Water to be infiltrated need not be treated unless directed by the applicable permit requirements. 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 without prior treatment and permits.

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 discharge and/or pretreatment standards specified in any local, state, or federal discharge permit required shall be the responsibility of the Contractor and its Dewatering Professional. Water that cannot be infiltrated is anticipated to be discharged to the existing City of Cambridge Storm Drain system and discharged must be permitted under an EPA NPDES RGP Discharge Permit, Dewatering and Remediation General Permit (DRGP), and/or MWRA Construction Site Dewatering Discharge Permit, as applicable. The Contractor shall be responsible for seeking coverage under the appropriate EPA or MWRA Permit. At a minimum, the Contractor shall be prepared to comply with the permit influent/effluent testing requirements. 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 EPA NPDES RGP Discharge Permit or MWRA Construction Site Dewatering Discharge Permit obtained by the Contractor.

B. The Contractor, through its Dewatering Professional:

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 City 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 City and Engineer.

a. Water will be discharged under an EPA NPDES RGP Discharge Permit or MWRA Construction Site Dewatering Discharge Permit or Dewatering and Remediation General Permit (DRGP), 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. 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
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 EPA or 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 City, 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 the Remedial Contract.

C. All dewatering wells shall be abandoned upon completion of the work, and completely backfilled with cement grout.

PART 4 – COMPENSATION

2140.1 - Treatment of Construction Dewatering

METHOD OF MEASUREMENT:
Measurement for payment for Treatment of Construction Dewatering will be on a per work day basis for treatment of dewatering, as measured by the Engineer. The Contractor shall be paid per work day that the dewatering treatment system(s) is onsite and operational, as defined by this Section, as required by the applicable dewatering permits, and as required by the City or Engineer. The Contractor shall not be compensated when the dewatering treatment system is onsite when not required by the Engineer or not required by the applicable dewatering permits. A dewatering treatment system shall be assumed to include a settling tank, granular activated carbon (GAC) unit, filters, meters, hose connections, hoses and other treatment apparatus.

BASIS OF PAYMENT / INCLUSIONS:
Payment for Treatment of Construction Dewatering will be based on the unit price bid for this item in the proposal. Under the unit price bid for this item, the Contractor shall furnish all labor, materials, tools, equipment, analytical testing, permit preparation and filing, and incidentals required for treatment of construction dewatering complete, as required and as required by the Engineer. The work includes but is not limited to mobilization and demobilization of the complete system(s); design of the system(s); furnishing and installing treatment system(s); maintenance of the treatment system(s); “breakdown”, transportation and set-up of the treatment system(s) between on-site areas requiring treatment; sampling; reporting; maintenance of all logs and other documentation required; laboratory testing; coordination with permitting agencies and the City and Engineer; compliance with all permit requirements; removal, transportation, stockpiling, testing and disposal of all collected sediment; Dewatering Professional services; Dewatering Specialist services and all incidental work not included for payment elsewhere.
EXCLUSIONS
The Contractor shall not be compensated for construction dewatering under this item; including but not limited to re-infiltrated construction dewatering; providing, installing and maintaining pumps and hoses; installation and maintenance of well points, deep wells and pump filters and screens; temporary power sources and all incidental work. Construction dewatering shall be covered in the Contractor’s base bid, at no additional cost to the City. This is a Treatment Item only.

END OF SECTION 02140
SECTION 02210

EARTH EXCAVATION, BACKFILL, FILL AND GRADING

<table>
<thead>
<tr>
<th></th>
<th>Description</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>2210.1</td>
<td>TEST PITS</td>
<td>CUBIC YARD</td>
</tr>
<tr>
<td>2210.2</td>
<td>CONTROL DENSITY FILL FOR BACKFILL</td>
<td>CUBIC YARD</td>
</tr>
<tr>
<td>2210.3</td>
<td>GRAVEL BORROW (TYPE B)</td>
<td>CUBIC YARD</td>
</tr>
<tr>
<td>2210.4</td>
<td>DENSE GRADED CRUSHED STONE</td>
<td>CUBIC YARD</td>
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<td>2210.5</td>
<td>UNCLASSIFIED EXCAVATION</td>
<td>CUBIC YARD</td>
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<td>2210.6</td>
<td>ROADWAY EARTH EXCAVATION</td>
<td>CUBIC YARD</td>
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<tr>
<td>2210.7</td>
<td>EXCAVATION FOR SBSS FOR TREES IN PAVEMENT – TO DEPTH OF 4.5-FT BELOW FINISHED GRADE</td>
<td>CUBIC YARD</td>
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<td>2210.8</td>
<td>EXCAVATION FOR PLANTING BEDS – TO DEPTH OF 3.5-FT BELOW FINISHED GRADE</td>
<td>CUBIC YARD</td>
</tr>
</tbody>
</table>

PART 1 – GENERAL

1.1 SUMMARY

A. This section includes the following:

1. The Work shall consist of excavation of all materials removed 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 Cambridge, the Cambridge 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. Test pits per the drawings and as directed by the Engineer.

1.2 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 weeks prior to start of any earth moving activities. The review will be only for the information of the City 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.

2. Backfill Materials: Submit grain size analysis and performed in accordance with ASTM D422 and compaction moisture density curve (ASTM D1557) for each proposed source 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.

   a. 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 total metals (MCP 14 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.

b. All sampling of soils for chemical testing shall be performed by a person experienced in sample collection and shall be either: 1) a Licensed Site Professional registered in the Commonwealth of Massachusetts; 2) a Professional Engineer registered in the Commonwealth of Massachusetts; 3) a professional Geologist registered in the Commonwealth of Massachusetts; 4) a certified groundwater/environmental professional; or 5) an authorized representative of the one of the persons listed above. Samples of each material shall be submitted to a chemical analytical laboratory, certified by the Massachusetts Department of Environmental Protection.

c. Submit additional samples and geotechnical and analytical test data and certifications for every 1000 cubic yards (every 500 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 City.

d. 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.

e. Filter Fabric: Submit shop drawings and product data sheets.

3. 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.
4. Submit Qualifications of the Contractor’s Independent Testing Laboratory as specified in Paragraph 1.5.K, three weeks prior to the execution of any earth excavation, backfilling, filling, or compaction process.

5. Blasting shall not be permitted.

B. Test Pit Logs

1. Prepare and submit a log of the existing conditions observed. Each test pit log shall be submitted as its own document. The following information shall be indicated on the log at a minimum:

   a. Plan sketch indicating size, material, quantity, function, ownership and direction of flow for each structure and utility. Include a north arrow and approximate STA number.

   b. Swing ties indicating the horizontal location of each structure, utility and duct bank. Where horizontal alignment is found to vary, swing ties shall be recorded at appropriate intervals.

   c. Top and bottom elevations of each structure and utility, and the dimensions of any encasement. Where vertical elevations are found to vary, elevations shall be recorded at appropriate intervals.

   d. Where test pits are conducted to establish a vertical corridor for a proposed pipeline through conflicting utilities, include a profile sketch indicating the vertical separation between utilities.

2. Submit photographs that document wide-angle and close-up views of the existing conditions observed.

1.3 DEFINITIONS

A. Acceptable 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; ice or frozen material; or refuse. Stones or rock fragments shall not exceed 40 percent by weight of the backfill material. Clay or silt content shall not exceed 25 percent by weight of the backfill material.

B. Unacceptable 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 ASTM D1556 or ASTM D6938 to the maximum dry density determined by ASTM D1557, 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.

E. 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 foot 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 will 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. If the area to be excavated is preblasted prior to the excavation of overburden soils, the Engineer shall be notified at least two days in advance to allow observation of the preblast drilling by the Engineer in order to classify the excavation. 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.
1.4 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 Cambridge, the Cambridge Department of Public Works, the Cambridge Water Department, DEP, EPA, OSHA, and other regulatory agencies having jurisdiction over the Work.

1.5 QUALITY ASSURANCE

A. Dewatering and Groundwater Control: Provide and maintain as specified in Section 02140 - DEWATERING.

B. Excavations shall be performed in the dry, and kept free from standing water, snow and ice during construction.

C. Temporary Excavation Support Systems: Provide and maintain as specified in Section 02160 – TEMPORARY EXCAVATION SUPPORT SYSTEMS

D. Do not excavate or fill until the Engineer has reviewed all the required submittals.

E. 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.

F. 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.

G. Dig test pits considered separate to the normal excavation as required to locate underground utilities, obstructions or water table.

H. If material for foundation or pavement support is found to be unacceptable, as defined in these Specifications, at or below the grade to which excavation would normally be carried in accordance with the drawings and/or specifications, remove such material to the required width and depth as
required by the Engineer and replace it with crushed stone.

I. During progress of work, conduct earth-moving operations and maintain work site so as to minimize the creation and dispersion of dust.

J. Bedding and backfill material shall not be placed in water. Water shall not be allowed to rise upon or flow over the bedding and backfill material.

K. Employ an independent testing company to perform field and laboratory 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.

1.6 PROJECT/SITE CONDITIONS

A. Subsurface investigation data are available as referenced in Section 02010.

1.7 MATERIAL TESTING

A. Moisture Density - One per source, except for crushed stone. Repeat the moisture density test for every 500 cubic yard of material used, and whenever visual inspection indicates a change in material gradation as required shall be as determined by the Engineer.

B. Gradation Analysis - A minimum of one per source, for each moisture density test, for every 100 cubic yards of material used, and whenever visual inspection indicates a change in material gradation. For on-site fill soil, the Engineer shall determine frequency of tests required.

C. Construction Tolerances: 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.

1.8 FIELD TESTING

A. Field Testing and Inspections: By Contractor’s independent testing company, 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 City.
B. Methods of Field Testing: In-Place Density: ASTM D1556, ASTM D2167, or ASTM D2922; In-Place Moisture Content: ASTM D3017, ASTM D4944, or ASTM D4959; Material Testing Frequency: The following testing frequencies are minimum required for all fill materials.

C. Field In-Place Density and Moisture Content - Crushed stone 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, foundation preparation, or roadways subbase: Every 30 linear ft. per lift.
2. Trenches in areas without structures or roadways: Every 50 lin. ft. per lift
3. Under Structure: Every 300 sq. ft. per lift.
4. Adjacent to Structure Exteriors: Every 300 sq. ft. per lift.

PART 2 – PRODUCTS

2.1 SAND BORROW

A. Sand borrow shall consist of clean, inert, hard, durable grains of quartz or other hard durable rock free from clay and loam or other deleterious or organic material.

B. The sand borrow shall conform to Massachusetts Highway Department (MHD) Specification Designation, M1.04.1, and the following gradation:

<table>
<thead>
<tr>
<th>Sieve Size</th>
<th>Percent Passing by Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>½-inch (12.7mm)</td>
<td>100</td>
</tr>
<tr>
<td>3/8-inch (9.525mm)</td>
<td>85-100</td>
</tr>
<tr>
<td>No. 4</td>
<td>60-100</td>
</tr>
<tr>
<td>No. 16</td>
<td>35-80</td>
</tr>
<tr>
<td>No. 50</td>
<td>10-55</td>
</tr>
<tr>
<td>No. 200</td>
<td>2-10</td>
</tr>
</tbody>
</table>

2.2 COMMON FILL AND ON-SITE MATERIAL GEOTECHNICALLY SUITABLE FOR REUSE ON-SITE AS BACKFILL:

A. Common fill and on-site material geotechnically suitable for reuse on-site as backfill 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.
B. Common fill and on-site material geotechnically suitable for reuse on-site as backfill shall be used from the top of the sand borrow or crushed stone layer up to the bottom of the gravel subbase or landscaping layer.

C. Common fill and on-site material geotechnically suitable for reuse on-site as backfill shall conform to the following gradation requirements:

<table>
<thead>
<tr>
<th>Sieve Size</th>
<th>Percent Finer by Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>6-inch (152.4mm)</td>
<td>100</td>
</tr>
<tr>
<td>No. 4</td>
<td>30-80</td>
</tr>
<tr>
<td>No. 40</td>
<td>30-50</td>
</tr>
<tr>
<td>No. 200</td>
<td>0-25</td>
</tr>
</tbody>
</table>

2.3 CRUSHED STONE

A. As per MHD Standard Specifications for Highway and Bridges, as amended, M2.01.0, crushed stone shall consist of durable crushed rock or durable crushed gravel stone, angular in shape and free from structural defects, comparatively free of chemical decay, and free of any foreign material including, but not limited to ice and snow, sand, silt, clay, loam, or other deleterious or organic material.

B. Crushed stone shall be wrapped in filter fabric.

C. The crushed stone shall be uniformly blended and shall conform to MHD Specification Designation, M2.01, and the following gradation requirements:

<table>
<thead>
<tr>
<th>Sieve Size</th>
<th>Percent Passing by Weight M2.01.4 3/4 inch crushed stone</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-inch (25.4 mm)</td>
<td>100</td>
</tr>
<tr>
<td>3/4-inch (19.05 mm)</td>
<td>90-100</td>
</tr>
<tr>
<td>5/8-inch (15.875 mm)</td>
<td>---</td>
</tr>
<tr>
<td>½-inch (12.7 mm)</td>
<td>10-50</td>
</tr>
<tr>
<td>3/8-inch (9.5 mm)</td>
<td>0-20</td>
</tr>
<tr>
<td>No. 4</td>
<td>0-5</td>
</tr>
<tr>
<td>No. 8</td>
<td>---</td>
</tr>
</tbody>
</table>

2.4 DENSE GRADED CRUSHED STONE

A. As per MHD Standard Specifications for Highway and Bridges, as amended, M2.01.7, dense graded crushed stone shall consist of hard, durable fragments of stone. Dense graded crushed stone shall be angular in shape and free from structural defects, comparatively free of chemical decay, and free of any deleterious or organic material.
foreign material including, but not limited to ice and snow, sand, silt, clay, plastic, loam, or other deleterious or organic material.

B. The crushed stone shall be uniformly blended and shall conform to MHD Specification Designation, M2.01.7, and the following gradation requirements:

<table>
<thead>
<tr>
<th>Sieve Size</th>
<th>Percent Passing by Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>2-inch (50 mm)</td>
<td>100</td>
</tr>
<tr>
<td>1.5-inch (37.5 mm)</td>
<td>70-100</td>
</tr>
<tr>
<td>3/4-inch (19.0 mm)</td>
<td>50-85</td>
</tr>
<tr>
<td>No. 4 (4.75 mm)</td>
<td>30-55</td>
</tr>
<tr>
<td>No. 50</td>
<td>8-24</td>
</tr>
<tr>
<td>No. 200</td>
<td>3-10</td>
</tr>
</tbody>
</table>

2.5 CONTROLLED DENSITY FILL (CDF)

A. Controlled density fill shall consist of a cementitious hard excavatable mixture of aggregate, Portland Cement conforming to ASTM C-150, Type II, and air entraining admixtures. Controlled density fill may have coarse and fine aggregate consisting of well graded crushed stone.

B. Controlled density fill shall be a maximum of 100 psi, consist of no fly ash and shall have clean water free from oils, acid, and organic matter.

C. Controlled density fill shall be of the type specified in MHD 1995 Standard Specifications for Highway and Bridges, as amended, Type 2E.

D. Controlled density fill shall be used as trench backfill material in areas inaccessible to compaction equipment such as below existing utilities and in narrow excavations for structures or as directed by the Engineer.

E. Controlled density fill shall also be used to fill abandoned utilities and around the excavation support systems as directed by the Engineer.

2.5 GRAVEL BORROW (TYPE B)

A. As per MHD Standard Specifications for Highway and Bridges, as amended, M1.03.0, Gravel Borrow (Type B) shall consist of hard, durable stone and coarse sand free from trash, ice and snow, loam and clay, surface coatings, tree stumps, roots and other organic and deleterious matter.
B. Gravel Borrow shall conform to MHD Specification Designation, M1.03.0 Type B and the following gradation requirements:

<table>
<thead>
<tr>
<th>Sieve Size</th>
<th>Percent Passing by Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>3-inch (76.2 mm)</td>
<td>100</td>
</tr>
<tr>
<td>½-inch (12.5 mm)</td>
<td>50-85</td>
</tr>
<tr>
<td>No. 50</td>
<td>8-28</td>
</tr>
<tr>
<td>No. 200</td>
<td>0-10</td>
</tr>
</tbody>
</table>

2.6 FILTER FABRIC

A. Filter Fabric shall consist of a nonwoven fabric made from polypropylene or polyethylene filaments or yarns.

B. Filter Fabric shall be inert to organic chemicals commonly encountered in the soil.

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

D. Filter Fabric used as a drainage medium shall conform to MHD Specification Designation, M9.50.0 Type III and the following recommended property tests:

<table>
<thead>
<tr>
<th>Property</th>
<th>Unit</th>
<th>Test Method</th>
<th>Minimum Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grab Strength</td>
<td>Lbs</td>
<td>ASTM D-4632</td>
<td>80</td>
</tr>
<tr>
<td>Grab Elongation</td>
<td>Percent</td>
<td>ASTM D-4632</td>
<td>15</td>
</tr>
<tr>
<td>Sewn Seam Strength</td>
<td>Lbs</td>
<td>ASTM D-4632</td>
<td>70</td>
</tr>
<tr>
<td>Puncture Strength</td>
<td>Lbs</td>
<td>ASTM D-4833</td>
<td>25</td>
</tr>
<tr>
<td>Trapezoid Tear Strength</td>
<td>Lbs</td>
<td>ASTM D-4533</td>
<td>25</td>
</tr>
<tr>
<td>Mullen Burst Strength</td>
<td>Psi</td>
<td>ASTM D-3786</td>
<td>130</td>
</tr>
</tbody>
</table>
E. Filter Fabric used as a separation medium shall conform to MHD Specification Designation, M9.50.0 Type I and the following recommended property tests:

<table>
<thead>
<tr>
<th>Property</th>
<th>Unit</th>
<th>Test Method</th>
<th>Minimum Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grab Strength</td>
<td>Lbs</td>
<td>ASTM D-4632</td>
<td>180</td>
</tr>
<tr>
<td>Grab Elongation</td>
<td>Percent</td>
<td>ASTM D-4632</td>
<td>15</td>
</tr>
<tr>
<td>Sewn Seam Strength</td>
<td>Lbs</td>
<td>ASTM D-4632</td>
<td>160</td>
</tr>
<tr>
<td>Puncture Strength</td>
<td>Lbs</td>
<td>ASTM D-4833</td>
<td>70</td>
</tr>
<tr>
<td>Trapezoid Tear Strength</td>
<td>Lbs</td>
<td>ASTM D-4533</td>
<td>70</td>
</tr>
<tr>
<td>Mullen Burst Strength</td>
<td>Psi</td>
<td>ASTM D-3786</td>
<td>210</td>
</tr>
</tbody>
</table>

2.7 GRAVEL SUBBASE

A. Gravel Subbase shall consist of inert material that is hard, durable stone and coarse sand, free from loam and clay, surface coatings and deleterious materials.

B. Gravel Subbase shall be graded in accordance with Massachusetts Highway Department (MHD) specification section M1.03.1 as indicated below:

<table>
<thead>
<tr>
<th>Sieve Size</th>
<th>Percent Passing by Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>3-inch</td>
<td>100</td>
</tr>
<tr>
<td>1-1/2-inch</td>
<td>70-100</td>
</tr>
<tr>
<td>3/4-inch</td>
<td>50-85</td>
</tr>
<tr>
<td>No. 4</td>
<td>30-60</td>
</tr>
<tr>
<td>No. 200</td>
<td>0-10</td>
</tr>
</tbody>
</table>
PART 3 – EXECUTION

3.1 GENERAL

A. Do not excavate or fill until the Engineer has reviewed all the required submittals.

3.2 SITE MAINTENANCE

A. 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.

3.3 SUBGRADE PREPARATION AND PROTECTION

A. As directed by the Engineer, over-excavate any unacceptable materials below the subgrade, and replace with compacted Gravel Borrow.

B. Utilize excavating equipment equipped with a toothless or smooth edged, excavating bucket to expose the pipe trench subgrade to minimize disturbance of the bearing surface.

C. Proof roll the exposed subgrade below pipes and structures prior to backfilling and filling operation, or placing crushed stone or sand borrow.

D. Proof roll to a firm and unyielding condition with a minimum of 4 passes of a vibratory plate compactor or double drum roller the exposed subgrade prior to backfilling and filling operation or placing soil-supported pipeline.

E. 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 shall be placed.

3.4 TRENCH EXCAVATION

A. For pipe installation in a cradle or within bedding, excavate trench by machinery to, or just below designated subgrade. If material remaining at bottom of trench is disturbed, recompaction shall be required.

B. When pipe is to be laid directly on bottom of trench, do not excavate lower part of trenches by machinery to subgrade. Remove remainder of material to be excavated by use of hand tools just before placing of pipe. Form a flat or shaped bottom, true to grade, so pipe will have a uniform and continuous bearing. Support on firm and undisturbed material between joints, except for limited areas where use of pipe slings have disturbed bottom.
C. Excavate trenches to depths so as to permit pipe to be laid at elevations, slopes, or depths of cover indicated on drawings, and at uniform slopes between indicated elevations.

D. Make trenches as narrow as practicable and do not widen by scraping or loosening materials from the sides. Make every effort to maintain sides of trenches firm and undisturbed until backfilling has been placed and compacted.

E. Excavate trenches with approximately vertical sides between springline of pipe and elevation 1 ft. above top of pipe.

3.5 EXCAVATION NEAR EXISTING STRUCTURES

A. Discontinue digging by machinery when excavation approaches pipes, conduits, or other underground structures. Continue excavation by use of hand tools. Include such manual excavation in work to be done when incidental to normal excavation and under items involving normal excavation.

B. Excavate test pits when determination of exact location of pipe utilities or other underground structures is necessary for doing work properly.

1. Conduct test pits in accordance with Specification Section 01500-1.7 TEST PITS.

2. Record all information required under Part 1.2.B - Test Pit Logs of this Specification Section.

3. Perform an instrument survey of all horizontal and vertical alignments.

4. Photograph the existing conditions observed. Mark any utilities, structures or encasement that is difficult to discern with orange paint prior to photographing.

C. 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.

D. Carry out program of excavation, dewatering, and excavation support systems to eliminate possibility of undermining or disturbing foundations of existing structures or utilities of the work previously completed under this contract.

E. Excavate to widths that give suitable room for constructing structures or laying and jointing piping.

F. Do not plow, scrape or dig by machinery near to finished subgrade in a manner that would result in disturbance of subgrade.
G. Excavate to lines and grades indicated in an orderly and continuous program.

H. Establish limits of excavation to allow adequate working space for installing forms and for safety of personnel.

I. Excavate to elevations indicated, or deeper, as required by the Engineer, to remove unacceptable subgrade material.

J. Exercise care to preserve material below and beyond the lines of excavations.

K. Boulders, rock fragments, and concrete less than one-half cubic yard encountered during excavation shall not be included for payment as rock.

3.6 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.

3.7 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.

3.8 SEPARATION OF EXCAVATED MATERIAL FOR REUSE

A. Carefully remove acceptable 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 acceptable excavated materials for backfill as indicated and in accordance with Section 02080 – SOIL AND FILL MANAGEMENT; deposit neatly and grade.

3.9 COMPACtion EQUIPMENT

A. The compaction equipment shall be selected by the Contractor, and shall be capable of consistently achieving the specified compaction requirements. The selected compaction equipment shall meet the following minimum requirements:

1. Manually operated vibratory plate compactors weighing no less than
200 pounds with vibration frequency no less than 1600 cycles per minute.

2. Vibratory steel drum roller weighing at least 12,000 pounds.

3. Water jetting and puddling will not be allowed.

3.10 COMPACTION REQUIREMENTS

A. The degree of compaction is expressed as a percentage of the maximum dry density at optimum moisture content as determined by ASTM Test D1557, Procedure C. The compaction requirements are as follows:

<table>
<thead>
<tr>
<th>Area</th>
<th>ASTM Density Degree of Compaction</th>
</tr>
</thead>
<tbody>
<tr>
<td>Natural subgrade</td>
<td>Proof roll</td>
</tr>
<tr>
<td>Crushed stone</td>
<td>As specified herein</td>
</tr>
<tr>
<td>Sand Borrow</td>
<td>95%</td>
</tr>
<tr>
<td>Gravel subbase</td>
<td>95%</td>
</tr>
<tr>
<td>General backfill with CDF</td>
<td>As specified herein</td>
</tr>
<tr>
<td>adjacent to structures other than manholes or catch basins</td>
<td></td>
</tr>
<tr>
<td>Trench backfill (on-site fill)</td>
<td>95%</td>
</tr>
<tr>
<td>- below pavements</td>
<td></td>
</tr>
<tr>
<td>- below landscaped areas</td>
<td>90%</td>
</tr>
<tr>
<td>Other areas</td>
<td>90%</td>
</tr>
</tbody>
</table>

B. Moisture Control: 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 City.

C. 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. Unfavorable Conditions: In no case shall fill be placed in standing water, over organic silt or peat or material that is frozen. 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.
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. Compaction Control: In-place density tests shall be made at the Contractor’s expense in accordance with ASTM D1556, D2922 or D2167 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 City.

G. 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.

H. Placement: 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. Each layer of fill should be benched into the existing slope in order to avoid the formation of a shear plane.

I. Surfaces: 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 City.

J. 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.

3.11 BACKFILL MATERIAL SELECTION

A. Backfill Material Selection: Unless otherwise specified or required, material used for filling and backfilling shall meet the requirements specified under Backfill materials. In general, the material used for backfilling trench excavations within the zone above structures and 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 meets the gradation requirements specified for on-site fill. 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 shall be placed.

B. Place backfill to a maximum loose lift thickness of 9 inches except where used as pipe bedding. Maintain backfill material with a uniform moisture content, with no visible wet or dry streaking, between plus 2 percent and minus 3 percent of optimum moisture content. The final filled soil mass shall be as uniform as possible in lift thickness, moisture content, and effort required to compact soil mass.

3.12 STRUCTURE AND TRENCH BACKFILL

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. Backfill material for pipe bedding shall be placed in the trench, uniformly on both sides of the pipe, for the entire width of the trench as indicated on the drawings. 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. 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 or roller compactor.

C. The balance of trench backfill around structures shall be CDF material from the crushed stone layer at the bottom of the structure to the common fill layer at the top of the structure. The common fill material shall be spread in layers not exceeding 9-inches in loose depth and each layer thoroughly compacted by mechanical methods and shall contain no rock, stones or boulders larger than 6-inches in their greatest dimension. The balance of the trench with no structures shall be common fill material placed in 9-inch think lifts and compacted up to the bottom of the gravel subbase layer.

D. All trench backfill under, and service lateral trench backfill within 3 feet of the large diameter (>18-inches) water transmission mains shall be quick-set CDF. Backfill shall be placed in appropriately sized lifts and on both sides of the transmission main simultaneously to ensure that all loads applied to the main by the backfill are properly balanced and that they do not exceed the safe load carrying capacity of the main at any time.

E. 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.

F. In backfilling trenches, each layer of backfill material shall be moistened and compacted to a density as specified herein, and in such a manner as to permit the rolling and compaction of the filled trench or excavation with the adjoining earth to provide the required bearing value.

G. 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 City.

H. During filling and backfilling operations, pipelines will be checked by the Engineer to determine whether any displacement of the pipe has occurred. If the observation of the pipelines shows poor alignment, displaced pipe or any other defects they shall be remedied to meet Engineer and Owner requirements at no additional cost to the City.

3.13 BACKFILLING AGAINST STRUCTURES

A. Backfilling against masonry or concrete shall not be done until permitted by the Engineer. The Contractor shall not place backfill against or on structures until they have attained sufficient strength to support the loads (including construction loads) to which they will be subjected, without distortion, cracking or other damage. As soon as practicable after the structures are structurally adequate and other necessary work has been satisfactorily completed, the Contractor, as required by the Engineer, shall make special leakage tests of the structures. After the satisfactory completion of leakage tests and the satisfactory completion of any other required work in connection with the structures, the backfilling around the structures shall proceed using CDF Material.

B. Symmetrical backfill loading shall be maintained. Special care shall be taken to prevent any wedging action or eccentric loading upon or against the structures.

C. In compacting and other operations, the Contractor shall conduct his 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 City.

3.14 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.

3.15 CARE AND RESTORATION OF PROPERTY

A. Do not use or operate tractors, bulldozers, or other power-operated equipment on paved surfaces when their treads or wheels of which are so shaped as to cut or otherwise damage such surfaces. Restore surfaces damaged by the Contractor's operations 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.

3.16 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 computed volume in cubic yards of material displaced during test pit excavation as required and measured by the Engineer. Depth of excavation will be measured to the average depth of the excavation. Irregularly deep parts of the excavation will not be used as the excavation depth. The width of the excavation will be measured to an average width across the excavation. Irregularly wide parts of the excavation will not be considered the width of the excavation. 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 City.

BASIS OF PAYMENT / INCLUSIONS:
Payment for Test Pit 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 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 City or Engineer, or as approved by the City 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 City 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, in areas of difficult compaction, and where required by the Engineer; temporary bulkheads and forms; furnishing and installing filter fabric; and material testing.

**SPECIAL NOTES/EXCLUSIONS:**
Controlled Density Fill used for the abandonment of pipes and structures will not be paid for under this item. Gravel subbase shall only be paid for work related to full depth roadway construction work outside trench limits.

**Item 2210.3 – Gravel Borrow (Type B)**

**METHOD OF MEASUREMENT:**
Measurement for payment for Gravel Borrow Type B shall be made on the basis of cubic yards placed during full depth construction between limits of proposed curbing as indicated elsewhere in the Construction Documents or as otherwise approved by the Engineer.

**BASIS OF PAYMENT / INCLUSIONS:**
Payment for Gravel Borrow Type B 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 placement of Gravel Borrow Type B. The work includes, but is not limited to; furnish and install Gravel Borrow Type B where there is insufficient existing roadway base material and where required by the Engineer; material testing; compaction; and compaction testing.

**SPECIAL NOTES/EXCLUSIONS:**
Gravel Borrow Type B used as trench backfill and for sidewalk construction will not be paid for under this item and are covered under separate pay items. Gravel Borrow Type B shall only be paid for work related to full depth roadway construction work outside trench limits.
**Item 2210.4 – Dense Graded Crushed Stone**

**METHOD OF MEASUREMENT:**
Measurement for payment for Dense Graded Crushed Stone shall be made on the basis of cubic yards placed during full depth construction between limits of proposed curbing as indicated elsewhere in the Construction Documents or as otherwise approved by the Engineer.

**BASIS OF PAYMENT / INCLUSIONS:**
Payment for Dense Graded Crushed Stone 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 placement of Dense Graded Crushed Stone. The work includes, but is not limited to; furnish and install Dense Graded Crushed Stone where there is insufficient existing roadway base material and where required by the Engineer; material testing; compaction; and compaction testing.

**SPECIAL NOTES/EXCLUSIONS:**
Dense Graded Crushed Stone shall only be paid for work related to full depth roadway construction work outside trench limits.

**Item 2210.5 – Unclassified Excavation**

**METHOD OF MEASUREMENT:**
Measurement for payment for Unclassified Excavation shall be made on the basis of cubic yards of bituminous pavement, concrete subbase, concrete, remnants of foundation walls or slabs, cobblestones, and railroad ties and tracks 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 bituminous pavement, concrete subbase, concrete, remnants of foundation walls or slabs, cobblestones, and railroad ties and tracks excavated to final grade. The work includes, but is not limited to; saw cutting, torch cutting and excavating bituminous pavement, concrete subbase, concrete, remnants of foundation walls or slabs, cobblestones, and railroad ties and tracks; 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 bituminous pavement including removal of authorized temporary pavement placed under this Contract, concrete subbase, concrete, remnants of foundation walls or slabs, cobblestones, and railroad ties and tracks excavated to final grade. The work includes, but is not limited to; saw cutting, torch cutting and excavating bituminous pavement, concrete subbase, concrete, remnants of foundation walls or slabs, cobblestones, and railroad ties and tracks; 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 the initial removal of pre-existing bituminous pavement and concrete subbase 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 not include payment for removal of soil or gravel, as it is paid for elsewhere in the Contract Documents.

Item 2210.6 – Roadway Earth Excavation

METHOD OF MEASUREMENT:
Measurement for payment for Roadway Earth Excavation shall be made on the basis of cubic yards of gravel and soil, 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 gravel and soil excavated to final grade within limits of full depth construction. 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 Roadway Earth 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 gravel and other soils excavated to final grade, including removal of authorized temporary backfill materials placed under this Contract. The work includes, but is not limited to; saw cutting bituminous and cement concrete; excavating gravel and soil; transporting material to/from soil staging area; reuse of existing gravel or soil suitable for subbase; 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 the initial removal of pre-existing asphalt, temporary asphalt, gravel and/or soil 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 Roadway Earth Excavation, as it is paid for elsewhere in the Contract Documents. This item does not include final grading of subbase and work related to cold planing, as it is paid for elsewhere in the Contract Documents. Excess or unsuitable Roadway Earth Excavation shall be disposed of under soil management and disposal items.
Item 2210.7 – Excavation for SBSS for Trees In Pavement – To Depth of 4.5-ft Below Finished Grade

Item 2210.8 – Excavation for Planting Beds – to Depth of 3.5-ft Below Finished Grade

METHOD OF MEASUREMENT:
Measurement for payment for Excavation for SBSS and Planting Beds shall be made on the basis of cubic yards of gravel and soil, 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 gravel and soil excavated to final grade within limits of specialty soil placement. 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 Excavation of SBSS and Planting Beds 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 gravel and other soils excavated to final grade. The work includes, but is not limited to; saw cutting bituminous and cement concrete; excavating gravel and soil; transporting material to/from soil staging area; 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 removal of asphalt, temporary asphalt, gravel and/or soil 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 excavation, transportation and disposal of Roadway Earth Excavation, as it is paid for elsewhere in the Contract Documents. This item does not include payment for removal of concrete, asphalt, and cobbles, as it is paid for elsewhere in the Contract Documents.

END OF SECTION 02210
SECTION 02456

HELICAL PILES

2456.1 MOBILIZATION/DEMOBILIZATION

2456.2 HELICAL PILE

PART 1 GENERAL

1.01 SUMMARY

A. The design locations of the piles are shown on the contract drawings. The helical pile foundation system will be used to support the Green Street Shelter, Art foundation, and just the mainline drainage and sewer work. The foundations will not be needed for catch basin or laterals.

B. Provide all plant, labor, materials, equipment, and services for the complete design and installation of helical piles as specified herein. The Contractor will be responsible for furnishing piles of sufficient length to obtain the required bearing capacity. The helical piles shall be designed and installed to bear in the sand or clay layer below the fill and organic soils, with a minimum design bearing capacity of:

1. **Mainline drainage and sewer support:** 10 kips per pile.
2. **Art Foundations:** 3.8 kips per pile.
3. **Green Street Shelter:** axial service compression load of 25 kips and a service moment of 10 kip*ft. The Contractor will be responsible for furnishing piles of sufficient length to obtain the required bearing capacity.

B.C. The work includes, but is not limited to, the following:

1. Providing final design and shop drawings for helical piles.
2. Fabricating and delivering piles in accordance with approved shop drawings.
3. Installing the piles to the required torque resistance, as determined by the Contractor’s design engineer, and the minimum required depth indicated on the contract drawings.
4. Cutting off piles at the elevations shown on the contract drawings and disposing of cutoff portions.

1.02 REFERENCES

A. Without limiting the generality of other requirements of these specifications, perform all work in accordance with the requirements of the *Massachusetts State Building Code* and the requirements of the other referenced documents to the extent that the provisions of such other documents are not in conflict with the requirements of said Code.

1.03 CONTRACTOR SUBMITTALS

A. Shop Drawings and Design Calculations - Submit to Engineer at least three weeks before installing any piles. Design shall be performed by and shop drawings shall be stamped by a Professional Engineer registered in the Commonwealth of Massachusetts. Shop drawings shall include:

1. Type and size of central steel shaft. Select the helical pile shafts to provide a torque capacity at least 50 percent greater than the calculated torque needed to obtain the required bearing capacity.

2. Helix details and configuration (number, diameter and spacing of helical plates).

3. Helical pile bridge details over existing MWRA utility infrastructure.

3-4. Connection details and details of the pipe supports at top of pile.

4-5. Minimum installation depth required to ensure that all helices bear in the natural soils below the organic soils and fill.

5-6. Design bearing calculations using a design safety factor of 3.0 applied to the calculated ultimate bearing capacity. The safety factor need not be applied to the design moment.

6-7. Minimum final field installation torque resistance. During construction, the final installation torque resistance shall not be less than the value required for a safety factor of 2.0 on the ultimate bearing capacity determined using the following correlation (Perko, 2009):

\[ Q_u = \frac{22T}{d^{0.92}} \]

Where,

- \( Q_u \) = Ultimate bearing capacity (lbs)
- \( T \) = Torque resistance (ft-lbs)
- \( d \) = Pile shaft diameter or diameter of a circle circumscribed around a square shaft (inch)

7-8. The helical piles used for the foundation of the Green Street Shelter shall be designed for an axial service compression load of 25 kips and a service moment of 10 kip*ft.

B. Detailed description of the pile and bridge installation procedures, including minimum installation torque.

C. Manufacturer's literature for installation equipment.

D. Standard mill test reports shall be submitted to the Engineer in advance of shipment of any steel elements. Separate reports shall be submitted for each batch of steel represented in the structure. Reports shall cover test results indicating compliance with the chemical and physical requirements of ASTM A588.

E. Calibration reports for each torque indicator to be used on the project shall be submitted to the Engineer before installing any piles. The calibration tests shall have been performed within 3 months of the date submitted. These calibration reports shall include, but are not limited to, the following information:

1. Name of testing agency.
2. Identification (serial number) of device calibrated.
3. Description of calibrated testing equipment.
4. Date of calibration.
5. Calibration data.

F. As-Installed Pile Data:
1. Final as-installed pile location plan. Show locations of the centers of as-installed piles on a drawing in relation to the design location and submit to the Engineer within five days after the pile is installed. Include the following on the drawings:
   a. Each pile identified by a separate number.
   b. Elevation of top of each pile, prior to cutting, to nearest 0.1 foot.
   c. Elevation of tip of each pile to nearest 0.1 foot.
   d. Deviation from plan location in inches, measured to nearest ½ inch.
2. Pile installation records for each pile as the work progresses, as described in this specification.

As-installed plans and records for any piles that are placed beyond the specified tolerances shall be provided as work progresses so that other pile locations can be adjusted for a balanced pile group.

G. The details for the helical pile and bridge designs in the plan set are for bidding purposes only. Final design may be subject to MWRA review and approval for work within five feet of MWRA infrastructure.

1.04 DELIVERY, STORAGE AND HANDLING
A. All products shall be handled and transported carefully to prevent any deformation or damage. Care should be taken to prevent the accumulation of dirt, mud, or other foreign matter on the steel materials. Such accumulation shall be completely removed prior to installation.

1.05 EXAMINATION OF SITE
A. Inspect the site personally to evaluate the conditions affecting the work. No claim for additional costs will be allowed because of lack of knowledge of any existing conditions discernible from observation at the site, adjoining properties, and available sources of information.

1.06 SUBSURFACE CONDITIONS
A. The results of subsurface exploration programs and subsurface utility data provided included in the Appendices.

B. The subsurface information was obtained primarily for use in evaluating subsurface conditions and preparing geotechnical recommendations. Interpretation of the subsurface data for purposes of the work of the Contract shall be the sole responsibility of the Contractor. The Contractor should note that the subsurface data pertains only to the conditions at the exploration locations at the time of the explorations.
1.07 INSPECTION
A. Observation of pile and bridge installation operations will be performed by the Engineer. Install no piles or bridge except in the presence of the Engineer. Provide notice to Engineer at least two business days before commencing pile installation work.
B. Approvals given by the Engineer shall not relieve the Contractor of responsibility for performing the work in accordance with the plans and specifications.

1.08 TOLERANCES AND CRITERIA FOR ACCEPTANCE
A. Install piles as close as practicable to the plan location. A maximum lateral deviation from the correct location at cutoff elevation equal to 3 inches will be permitted. A maximum deviation from design cutoff elevation equal to 1 inch will be permitted. Piles shall be installed to within 2 degrees of design alignment. Pulling piles into position will not be permitted.
B. When otherwise acceptably installed piles exceed the specified tolerances and are subject to eccentric loading, the Engineer will then analytically determine the total loads on individual piles. If the load on any pile exceeds 110 percent of the specified load capacity, corrections shall be made in accordance with a design provided by the Engineer at no additional cost to the City. The cost of analysis and redesign of the pile cap shall be charged to the Contractor.

PART 2 PRODUCTS

2.01 HELICAL PILES
A. All steel shall conform to an appropriate ASTM standard specified by the pile designer.
B. Provide hot dip galvanizing on all surfaces of the piles.
C. The central shaft shall consist of round pipe or tube sections with bolted couplers.
D. Helices shall be welded to the lead (bottom) section of the shaft with a pitch and spacing designed to screw into the soil without auguring.
E. The tip of the lead section shall be beveled to aid in advancing the pile.
F. All pile components shall be hot dip galvanized per ASTM A153 with a minimum coating thickness of 3 mils.

PART 3 EXECUTION

3.01 INSTALLATION EQUIPMENT
A. Shall be rotary type, hydraulic power-driven torque motor with clockwise and counterclockwise rotation capabilities. The torque motor shall be capable of continuous adjustment to revolutions per minute (RPM’s) during installation. Percussion drilling equipment shall not be permitted. The torque motor shall have torque capacity 15% greater than the torsional strength rating of the central steel shaft to be installed.
B. Equipment shall be capable of applying adequate down pressure (crowd) and torque simultaneously to suit project soil conditions and load requirements. The equipment shall be capable of continuous position adjustment to maintain proper pile alignment.

C. A torque indicator shall be used during pile installation. The torque indicator can be an integral part of the installation equipment or externally mounted in-line with the installation tooling. The torque indicator:
   1. Shall be capable of providing continuous measurement of applied torque throughout the installation.
   2. Shall be capable of torque measurements in increments of at least 500 ft-lb.
   3. Shall be re-calibrated, if in the opinion of the Engineer and/or Contractor reasonable doubt exists as to the accuracy of the torque measurements.

3.02 PILE INSTALLATION

A. Prior to positioning and initiation of pile placement, all locations are to be pre-excavated and vacuumed to a depth clear of the utility impact. Once confirmed, initiation of pile placement may commence.

B. The lead section shall be positioned at the location as shown on the contract drawings. Battered piles can be positioned perpendicular to the ground to assist in initial advancement into the soil before the required batter angle shall be established. The pile sections shall be engaged and advanced into the soil in a smooth, continuous manner at a rate of rotation of 5 to 20 RPM’s. Extension sections shall be provided to obtain the required minimum overall length and installation torque as shown on the shop drawings.

C. Sufficient down pressure shall be applied to uniformly advance the pile sections approximately 3 inches per revolution. The rate of rotation and magnitude of down pressure shall be adjusted for different soil conditions and depths.

D. Install the piles to a depth where all of the helices are below the bottom of the organic soils.

3.03 TERMINATION CRITERIA

A. The torque as measured during the installation shall not exceed the allowable torsional strength rating of the central steel shaft.

B. The criteria for minimum installation torque, as shown on the shop drawings, and minimum overall length, as shown on the contract drawings, shall be satisfied prior to terminating the pile.

C. If the torsional strength rating of the central steel shaft and/or installation equipment has been reached prior to achieving the minimum overall length required, the Contractor shall have the following options:
   1. Terminate the installation at the depth obtained subject to the review and acceptance of the Engineer, or
   2. Remove the existing pile and install a new one with fewer and/or smaller diameter helical plates. The new helix configuration shall be subject to review and acceptance of the Engineer.
D. If the minimum installation torque as shown on the shop drawings is not achieved at the minimum overall length, and there is no maximum length constraint, the Contractor shall have the following options:

1. Install the pile deeper using additional extension sections or displacement plates.
2. Remove the existing pile and install a new one with additional and/or larger diameter helical plates. The new helix configuration shall be subject to review and acceptance of the Engineer.
3. If acceptable to the Engineer, assign a reduced capacity to the pile based on the installation torque resistance that was achieved and supplement with additional piles.

E. The average torque for the last three feet of penetration shall be used as the basis of comparison with the minimum installation torque as shown on the shop drawings. The average torque shall be defined as the average of the last three readings recorded at one-foot intervals.

3.04 OBSTRUCTIONS

A. If the pile is refused or deflected by a subsurface obstruction, the installation shall be terminated, and the pile removed. The obstruction shall be removed, if feasible, and the pile re-installed. If obstruction can’t be removed, the pile shall be installed at an adjacent location, subject to prior review and acceptance of the Engineer.

B. If the Engineer determines that additional piles are required due to relocation required by obstructions, the Contractor will be reimbursed for the additional piles ordered by the Engineer.

3.05 TRIMMING FINAL EXTENSION SECTION:

A. After installation to the required depth, the top of the pile shall be cut to the specified elevation.

B. Cut off the tops of all piles square within 1 inch of the elevations shown on the Drawings. The pile cutoffs shall become the property of the Contractor, who shall remove them from the site.

C. Install Pile Top Bearing Plates at the tops of the cut-off piles as shown on the shop drawings.

3.06 DOCUMENTATION

A. Keep a record, independent of that which may be made by the Engineer, of all pertinent data relative to the installation of each pile. The record for each pile shall include:

1. Name of project and Contractor.
2. Date and time of installation.
3. Name and model of installation equipment.
4. Type of torque indicator used and calibration documentation.
5. Location of pile by assigned identification number.

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6. Actual pile type and configuration – including lead section (number and size of helical plates), number and type of extension sections (manufacturer’s SKU numbers).

7. Pile installation duration and observations.

8. Total length of installed pile.


10. Inclination of pile.

11. Installation torque at one-foot intervals for the final 10 feet.

12. Comments pertaining to interruptions, obstructions, unusual behavior, or other relevant information.

13. Rated load capacities.

3.07 DEFECTIVE, DAMAGED, AND MISINSTALLED PILES

A. Piles damaged due to internal defects or improper installation or lack of strength will not be accepted. Such defective and damaged piles, as well as piles installed out of proper location or in excess of the tolerances specified, shall be abandoned, and shall be replaced by additional piles which shall be installed adjacent thereto, all as directed by the Engineer and at no additional cost to the City.

B. At the option of the Engineer, measures for correcting any deficient pile shall consist of one of the following without any additional compensation.

1. Completely removing the defective pile and installing a new pile.

2. Abandoning the defective pile and installing additional piles. The abandoned pile shall be cut 3 feet below the given cutoff elevation.

3. Modification of pile caps.

PART 4 MEASUREMENT AND PAYMENT

4.01 BASIS OF PAYMENT

A. Mobilization and demobilization will be paid for at the contract lump sum price for Mobilization/Demobilization.

B. Piles will be paid for at the contract unit price per pile, complete in place, which shall include all labor, equipment, installation including bridging, all materials, cutoff, transportation, and such other appliances, equipment, materials, and labor not otherwise provided for, that may be required to execute the work properly in accordance with these specifications.

4.02 PAYMENT ITEMS

<table>
<thead>
<tr>
<th>ITEM NO.</th>
<th>DESCRIPTION</th>
<th>UNIT</th>
</tr>
</thead>
<tbody>
<tr>
<td>2456.1</td>
<td>MOBILIZATION/DEMOBILIZATION</td>
<td>LS</td>
</tr>
<tr>
<td>2456.2</td>
<td>HELICAL PILE</td>
<td>EA</td>
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</tbody>
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END OF SECTION
SECTION 02524
CURBS, WALKS AND DRIVEWAYS

2524.1 4-IN CEMENT CONCRETE SIDEWALKS SQUARE YARD

2524.2 6-IN CEMENT CONCRETE SIDEWALKS AT DRIVEWAYS SQUARE YARD

2524.3 6-IN CEMENT CONCRETE AT PEDESTRIAN RAMPS AND INTERSECTIONS SQUARE YARD

2524.4 6-IN REINFORCED CONCRETE DRIVEWAY AT FIRE STATION SQUARE YARD

2524.5 WIRE CUT BRICKS ON 4-IN HOT MIX ASPHALT (SIDEWALKS) SQUARE YARD

2524.6 REMOVE AND RESET/RELOCATE GRANITE CURB (STRAIGHT AND CURVED) LINEAR FOOT

2524.7 REMOVE AND DISCARD GRANITE CURB (STRAIGHT AND CURVED) LINEAR FOOT

2524.8 NEW GRANITE CURB TYPE VA4 LINEAR FOOT (STRAIGHT)

2524.81 NEW GRANITE CURB TYPE VA4 LINEAR FOOT (CURVED)

2524.9 NEW GRANITE CURB TYPE VA4 TRANSITION LINEAR FOOT (STRAIGHT)

2524.91 NEW GRANITE CURB TYPE VA4 TRANSITION LINEAR FOOT (CURVED)

2524.10 NEW GRANITE CURB TYPE VA3 FOR RAISED CROSSWALKS LINEAR FOOT

2524.11 NEW BEVELED CURB (STRAIGHT AND CURVED) LINEAR FOOT

2524.12 GRANITE CURB CORNER TYPE A EACH

2524.13 CAST-IN-PLACE DETECTABLE TILE SQUARE FOOT

2524.14 STAMPED CONCRETE TRUCK APRON SQUARE YARD
2524.15 REMOVABLE FALSE CURB UTILITY COVER EACH
PART 1 – GENERAL

1.1 SUMMARY

A. This Section specifies the following: cement concrete, hot mix asphalt, and brick sidewalks, driveways, and pedestrian ramps; the removal and resetting of curb and edging; and the construction of new granite curbs, berms, and edging.

1.2 RELATED WORK

A. Section 02210 – EARTH EXCAVATION, BACKFILL, FILL AND GRADING
B. Section 02500 – PAVING AND SURFACING
C. Section 02521 – FLEXIBLE POROUS PAVING
D. Section 02900 – PLANTING
E. Section 02950 – BACK OF SIDEWALK RESTORATION
F. Section 02980 – SITE IMPROVEMENTS
G. Section 03300 – CONCRETE

1.3 SUBMITTALS

A. Shop Drawings. Submit the following in accordance with Section 01300 - SUBMITTALS:
   1. Manufacturer product data and specifications for all materials, including, but not limited to:
      a. Cement Concrete for sidewalks, driveways, and pedestrian ramps including design mix
      b. Micro-fiber for sidewalk reinforcement
      c. Membrane Curing Compound
      d. Penetrating Liquid Concrete Sealer
      e. Expansion Joint
      f. Granite Curb, Granite Curb Corner and Granite Edging
      g. Cement Concrete Design Mix for granite curb work
      h. Hot mix asphalt for driveways, including design mix – Refer to Section 02500 – PAVING AND SURFACING for requirements
      i. Gravel Subbase – Submit in accordance with Section 02210 – EARTH EXCAVATION, BACKFILL, FILL AND GRADING
2. Detail drawings and layout plans for all materials.

B. Submit compaction testing results.

1.4 QUALITY CONTROL

A. Cement concrete and hot mix asphalt placement, weather, and temperature restrictions shall be in accordance with Section 03300 – CONCRETE and Section 02500 – PAVING AND SURFACING.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Provide in accordance with Section 01600 – PRODUCTS, MATERIALS AND EQUIPMENT.

B. Cement Concrete delivery time and storage time onsite shall be in accordance with Section 03300 – CONCRETE and as specified herein.

C. Batch ticket information shall be submitted to the Engineer upon placement of cement concrete and hot mix asphalt.

1.6 REGULATIONS

A. All pedestrian ramps and sidewalks shall conform to the most current applicable details of the Massachusetts Dept. of Transportation Highway Division (MassDOT); to the latest MA AAB rules and regulations; and to the latest ADA standards for accessible design.

1.7 GUARANTEES

A. The Contractor shall guarantee all work for one year from the date of Substantial Completion from damage due to improper installation and improper use.

PART 2 – PRODUCTS

2.1 MATERIALS

A. 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, 6 +/- 1.5% air entrained (AASHTO - M154), Type A water reducing admixture (AASHTO - M194), 3 to 4-inch slump, and Type II dark-colored by adding 1.5 – 2 lbs. of lamp black per cubic yard at the plant, dependent on the concrete supplier. Contractor shall coordinate with City of
Cambridge prior to specifying lamp black additive. Cement concrete shall contain micro-fiber added during batching at the plant to insure uniform distribution.

B. Micro-fiber: The cement concrete shall contain 1 pound of polypropylene micro-fiber 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.

C. Curing Compound: Shall conform to Section 03300 – CAST-IN-PLACE CONCRETE for evaporation retarder.

D. Penetrating Liquid Concrete Sealer: Shall conform to Section 03300 – CAST-IN-PLACE CONCRETE.

E. Expansion Joints: Shall be 3/8” thick polyethylene foam and ¼” thick polyethylene foam conforming to ASTM D1751.

F. Control Joints: Those indicated to be saw cut shall be cut with a saw specifically designed for that purpose, which will cut into slab at least 1 in., but in no case less than 25% of slab depth, and no more than 33% of slab depth. Sawing must be coordinated with the setting time of the concrete. It should be started as soon as the concrete has hardened sufficiently to prevent aggregates from being dislodged by the saw (usually within 4 to 12 hours after the concrete hardens); sawing should be completed before drying shrinkage stresses become large enough to produce cracking. The slab should be cut before the concrete cools, when the concrete sets enough to prevent raveling or tearing while saw cutting, and before drying-shrinkage cracks start to develop.

G. Hot Mix Asphalt for driveways: Shall conform to the applicable subsections of Section 02500 – PAVING AND SURFACING.

H. Granite curb, granite back curb, granite curb corners, granite edging, beveled granite curb, and granite curb transitions at pedestrian ramps: Shall conform to the Standard Specifications Section M9.04.

I. Cement Grout: Shall conform to Section 03315 – GROUT.

J. Cement Concrete for Granite Curb, Granite Back Curb, Granite Curb Corner, Granite Transitions for Pedestrian Ramps, and Granite Edging: Shall conform to Class A Concrete as indicated in Section 03300 – CONCRETE.

K. Water: Potable.

L. Gravel Subbase: Shall be in accordance with Section 02210 – EARTH
EXCAVATION, BACKFILL, FILL AND GRADING.

M. Forms: Shall be in accordance with Standard Specification Section 701.61A.

N. Brick: 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.

O. 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.

O. 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.

P. 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.

Q. 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.

R. Spikes: Are to be galvanized steel spiral not less than 10” in length.

S. Detectable tiles: The detectable warning strip at concrete pedestrian ramps, raised side street treatments abutting concrete sidewalks, and raised crosswalks abutting
concrete sidewalks shall be the Cast Iron Detectable Warning Plates by East Jordan Iron Works (800-626-4653) or approved equivalent product. The Cast Iron Detectable Plate shall meet all ADA Accessibility Guidelines for Detectable Warnings. Plates should have truncated domes and a slip resistant texture with a coefficient of friction rating greater than 0.80. Warning panels shall be at least 24” deep and 60” wide at the point of crossing. The detectable warning strip at brick interfaces shall be yellow dipped.

Size: 24 in. (+/- 1”) deep, cut as wide as the pedestrian ramp opening, and as wide of the crosswalk at raised side street treatments and raised crosswalks.

PART 3 – EXECUTION

3.1 PREPARATION

A. The edges of existing pavement, which is to remain, shall be saw cut to an even, straight edge in accordance with Section 01045 – CUTTING AND PATCHING. This includes roadways, sidewalks, and driveways.

B. Excavate, remove, segregate, and stockpile existing asphalt and cement concrete walks and driveways as required for utility installation or as indicated for replacement on the Contract Drawings.

1. Existing walks and driveways shall be sawcut at the limits of removal. Cement concrete walks and driveways shall be sawcut at existing score joint, so entire panel is removed.

2. Prior to excavation for pedestrian ramps, the Contractor shall review the location with the Engineer to determine what is necessary to allow for the installation to be compliant with the standards referenced above. Fixed objects such as utility poles and fire hydrants must be considered in location of pedestrian ramps. The type of pedestrian ramp may vary based on sidewalk width and slope.

3. Removed cement concrete and asphalt pavement including reinforcement shall be disposed of in accordance with Section 02051 – DEMOLITION, MODIFICATION AND ABANDONMENT.

4. Excess soil material removed shall be disposed of in accordance with Section 02080 – SOIL AND WASTE MANAGEMENT.

C. Excavate, remove, protect, and stack existing granite curb, granite edging, granite curb corners, and granite curb inlets as required for utility installations or as indicated for replacement on the Contract Drawings in accordance with the Standard Specifications Section 580.
D. Existing granite curb, granite edging, granite curb corners, and granite curb inlets not indicated to be reset shall be disposed of in accordance with Section 02051 – DEMOLITION, MODIFICATION AND ABANDONMENT.

E. The Contractor shall exercise special care when excavating near trees and roots. Excavation shall conform to the requirements in Section 02100 – SITE PREPARATION AND TREE PRUNING.

F. Traffic signs shall be removed as required during the excavation. Bike rings, trash receptacles, parking meters and signs, etc. to be reused shall be appropriately protected, stacked, and stored for reuse. Traffic signs to be replaced, as indicated on the Contract Drawings or as required by the Engineer, shall be disposed of by the Contractor. Reinstallation of traffic signs shall be done the prior to the concrete pour. All regulatory signs shall be maintained throughout construction.

G. Subgrade under walks, pedestrian ramps, driveways, and curbs shall be graded to required elevations and proof rolled.

H. **Finish Grades:** At locations where the Drawings do not indicate proposed sidewalk grades, the grades shall be discussed with the Engineer prior to work, in order to address existing and proposed drainage concerns. The Contractor shall be responsible for ensuring that all new sidewalk area are graded to drain, either to existing structures or new structures.

I. 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.

J. Existing in-situ material shall be used for gravel subbase only when approved by the Engineer. The Contractor shall provide analytical proctor results of the existing material in accordance with Section 02210 - EARTH EXCAVATION, BACKFILL, FILL, AND GRADING for compaction testing if requested by the Engineer.

K. Imported gravel subbase shall be placed in one six-inch lift, loose measure unless otherwise noted.

L. Add approved material to bring to required grade and compact.

M. 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.
N. Materials shall not be placed when subgrade and subbase is muddy, frozen, or has frost, snow, or water thereon.

O. The Contractor shall raise all water curb stop boxes and sewer, drain, and combined sewer castings to final grade and shall coordinate raising of other utility boxes and castings prior to pouring of concrete. The Contractor shall remove material from curb stop boxes with compressed air, after raising is complete and prior to pouring of concrete. Prior to pouring the concrete, the Contractor shall review locations where curb boxes have been raised with the Engineer.

3.2 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 1st (pending no upcoming snow storms) and November 1st only. Do not place concrete when air temperature at time of placement, or anticipated temperature for the following 24 hours, is lower than 40 degrees F or higher than 90 degrees F.

C. Strict compliance with the MassDOT-specified plant-to-placement time of 90 minutes will be enforced. The concrete shall be delivered to the site and discharge shall be completed within 90 minutes after the addition of the cement to the aggregates. In hot weather or under conditions contributing to quick stiffening of the concrete or when the temperature of the concrete is 85 degrees F or above, the time between the introduction of cement to the aggregates and discharge shall not exceed 1 hour.

D. Forms shall be placed in accordance with Standard Specification Section 701.61A.

E. 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 ¼” 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.

F. 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 (or as shown on the drawings) with sawcut joints, made with sawing tools, having a penetration depth which will cut into slab at least 1 in., but in no case less than 25% of slab depth, and no more than 33% of slab depth and at 10 foot intervals (or as shown on the drawings) with construction joints. Joints shall be placed 90° transverse with the direction of traffic and shall be straight within a tolerance of ¼-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.

G. Curing compound shall be a clear, waterborne, membrane-forming compound, 18-22 percent solids. The Contractor shall propose the curing method and specifications for review prior to starting. The curing compound shall not discolor the concrete, shall be compatible with anti-spalling sealant application after 14 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.

H. 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.

I. 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 – PLANTING or match the existing material and grade as specified.

J. After a minimum of 14 days, and after a 48-hour drying period in the event of precipitation, using pressure-spray equipment, the Contractor shall apply an alkaline resistant, protective penetrating, VOC compliant, solvent-based concrete sealer to the new concrete pavement as an anti-spalling seal. The sidewalk shall be swept and cleaned of any debris, gum, etc. and pressure washed, just prior to application of the sealant compound. Two applications are required, with the second application not being performed until after the concrete has regained its dry appearance.

K. 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 City.

3.3 CEMENT CONCRETE PEDESTRIAN RAMPS

A. Concrete shall be installed to a depth of 6” depth.

B. The Contractor shall establish grade elevations at all pedestrian ramp locations, and shall set transition lengths as shown on the Contract Drawings and as per ADA and MA AAB requirements.

C. All pedestrian ramps joints and transition sections which define grade changes shall be formed, staked, and checked prior to placing cement concrete. All grade changes are to be made at joints. At driveways, a joint shall be located between the sloping portion of the driveway (15% maximum slope) and the level area where pedestrians will cross the driveway (1.5% maximum cross slope).

D. At intersections, pedestrian ramps shall be located in front of vehicle stop lines and within the crosswalk. The ramp shall be constructed so that the finished elevation of the concrete (curb removed) will meet the roadway flush (less than ½” lip) for a width no less than 42 inches. The elevation at this meeting point shall be properly designed to meet the gutter elevation of the road. The Contractor shall install pedestrian ramps and road grades in a manner which minimizes the potential for puddles in front of them.

E. The Contractor shall use a digital “Smart Level” to check all subbase grades for compliance prior to installation of concrete. The Contractor shall not proceed with concrete installation on a ramp that is out of compliance without first contacting the Engineer.

F. Forming, placement, finishing, curing and alkaline resistant protective penetrating concrete sealer shall be completed in accordance with Paragraph 3.2 of this Section except the pushbroom finish, which shall be perpendicular to the direction of the slope.

3.4 DETECTABLE TILE

A. Set detectable tile plate(s) into wet concrete in accordance with ADA and MA AAB requirements.

B. Tamp plate(s) thoroughly with rubber mallet until concrete seeps through vent holes.

C. Clean off excess concrete from plate(s) and finish concrete around plate(s).
D. Cast iron detectable tiles shall be installed at time of sidewalk construction per manufacturer’s directions and as shown on the plans and specified herein. Retrofit, bolted or surface applied installations shall not be accepted.

3.5 BRICK WALKS AND DRIVEWAYS

A. Hot mix asphalt base shall be installed to a depth of 4” and placed in accordance with the MassDOT Standard Specifications for hot mix asphalt.

1. Hot mix asphalt surface shall be rolled to remove irregularities prior to installing sand-cement setting bed.

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-cement 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.

3.6 GRANITE CURB, GRANITE BACK CURB, GRANITE CURB CORNER, GRANITE CURB TRANSITION AT PEDESTRIAN RAMPS, AND GRANITE EDGING

A. Granite Curb, Granite Back Curb, Granite Curb Corners, Granite Curb Transitions at Pedestrian Ramps, and Granite Edging shall be installed in accordance with the requirements of Section 501 of the Standard Specifications.

B. Existing Granite Curb, Granite Curb Corners, Granite Curb Inlets, Granite Curb Transitions at Pedestrian Ramps and Granite Edging that are to be removed and reset shall be installed in accordance with the requirements of Section 580 of the Standard Specifications.

1. The Contractor shall verify and record all existing grades at locations where granite will be reset at the existing grade.

C. Installations shall be backfilled with concrete as indicated on the Contract.
3.7 DRIVEWAYS

A. Hot mix asphalt driveways shall be placed in accordance with the Standard Specifications Section 701.63.

PART 4 – COMPENSATION

Item 2524.1 – 4-Inch Cement Concrete Sidewalks

METHOD OF MEASUREMENT:
Measurement for 4-inch Cement Concrete Sidewalks shall be based on the square yards installed, complete, within the payment limits, as shown on the Contract Drawings or as required by the Engineer.

BASIS OF PAYMENT / INCLUSIONS:
Payment for 4-inch Cement Concrete Sidewalks shall be based on the square yards of 4-in Cement Concrete Sidewalks installed complete for this item in the proposal. Under the square yard price for this item, the Contractor shall furnish all labor, materials, tools, equipment, and incidentals required for the installation of 4-in Cement Concrete Sidewalks as detailed and where indicated or required by the City or Engineer. The work includes, but is not limited to; remove, transport, stack, protect, and reset all parking meters, signs, or other items obstructing the construction of the sidewalk; excavate, removal and disposal of existing sidewalks; install, grade, compact, and test compaction of gravel sub-base and sub-grade; raise and adjust gate boxes, frames and covers, and other castings; furnish, install and compact Gravel Sub-base; furnish and install Cement Concrete complete with micro-fiber, expansion joints, and formwork; finish the Concrete; furnish and place the curing compound; protect the concrete after placement; furnish and place penetrating liquid concrete sealer; remove and dispose of formwork; backfilling; furnish and install loam and seed, mulch, or other backing and/or adjacent material specified including tree pits and grass areas; and all other work not included for payment elsewhere.

SPECIAL NOTES ON EXCLUSIONS:
The following items are not included for payment under this item; sidewalks installed to replace sidewalks damaged by the Contractor during construction; and 6-in sidewalks at driveways and pedestrian ramps.

Item 2524.2 – 6-Inch Cement Concrete Sidewalks at Driveways

METHOD OF MEASUREMENT:
Measurement for 6-inch Cement Concrete Sidewalks at Driveways shall be based on the square yards installed, complete, within the payment limits, as shown on the Contract Drawings or as required by the Engineer.

BASIS OF PAYMENT / INCLUSIONS:
Payment for 6-inch Cement Concrete Sidewalks at Driveways shall be based on the square yards
of 6-inch Cement Concrete Sidewalks at Driveways installed complete for this item in the proposal. Under the square yard price for this item, the Contractor shall furnish all labor, materials, tools, equipment, and incidentals required for the installation of 6-inch Cement Concrete Sidewalks at Driveways as detailed and where indicated or required by the City or Engineer. The work includes, but is not limited to; remove, transport, stack, protect, and reset all parking meters, signs or other items obstructing the construction of the sidewalk; excavate, removal and disposal of existing sidewalks; furnish, install, grade, compact and test compaction of gravel sub-base and sub-grade; raise and adjust gate boxes, frames and covers and other castings; furnish and install Cement Concrete complete with micro-fiber, expansion joints, and formwork; finish the Concrete; furnish and place the curing compound; protect the concrete after placement; furnish and place penetrating liquid concrete sealer; remove and dispose of formwork; reinforcing; backfilling; furnish and install loam and seed, mulch, or other backing and/or adjacent material specified including tree pits and grass areas; and all other work not included for payment elsewhere.

SPECIAL NOTES ON EXCLUSIONS:
The following items are not included for payment under this item; sidewalks installed to replace sidewalks damaged by the Contractor during construction; 4-in sidewalks; pedestrian ramps; and the driveway in front of the River Street Fire Station.

**Item 2524.3 – 6-Inch Cement Concrete at Pedestrian Ramps and Intersections**

**METHOD OF MEASUREMENT:**
Measurement for 6-inch Cement Concrete at Pedestrian Ramps and Intersections shall be based on the square yards installed, complete, within the payment limits, as shown on the Contract Drawings or as required by the Engineer.

**BASIS OF PAYMENT / INCLUSIONS:**
Payment for 6-inch Cement Concrete at Pedestrian Ramps and Intersections shall be based on the square yards of 6-inch Cement Concrete at Pedestrian Ramps and Intersections installed complete for this item in the proposal. Under the square yard price for this item, the Contractor shall furnish all labor, materials, tools, equipment, and incidentals required for the installation of 6-in Cement Concrete Pedestrian Ramps as detailed and where indicated or required by the City or Engineer. The work includes, but is not limited to; remove, transport, stack, protect, and reset all parking meters, signs or other items obstructing the construction of the sidewalk; excavate, removal and disposal of pedestrian ramps; furnish, install, grade, compact and test compaction of gravel sub-base and sub-grade; raise and adjust gate boxes, frames and covers and other castings; furnish and install Cement Concrete complete with micro-fiber, expansion joints, and formwork; finish the Concrete; furnish and place the curing compound; protect the concrete after placement; furnish and place penetrating liquid concrete sealer; remove and dispose of formwork; reinforcing; backfilling; furnish and install loam and seed, mulch, or other backing and/or adjacent material specified including tree pits and grass areas; and all other work not included for payment elsewhere.

SPECIAL NOTES ON EXCLUSIONS:
The following items are not included for payment under this item; sidewalks installed to replace
sidewalks damaged by the Contractor during construction; 4-in sidewalks; and 6-in sidewalks at driveways.

**Item 2524.4 – 6-Inch Reinforced Concrete Driveway at Fire Station**

METHOD OF MEASUREMENT:  
Measurement for 6-inch Reinforced Concrete Driveway at Fire Station shall be based on the square yards installed, complete, within the payment limits, as shown on the Contract Drawings or as required by the Engineer.

BASIS OF PAYMENT / INCLUSIONS:  
Payment for 6-inch Reinforced Concrete Driveway at Fire Station shall be based on the square yards of 6-inch Reinforced Concrete Driveway at Fire Station installed complete for this item in the proposal. Under the square yard price for this item, the Contractor shall furnish all labor, materials, tools, equipment, and incidentals required for the installation of 6-inch Reinforced Concrete Driveway at Fire Station as detailed and where indicated or required by the City or Engineer. The work includes, but is not limited to; remove, transport, stack, protect, and reset all parking meters, signs or other items obstructing the construction of the sidewalk; excavate, removal and disposal of sidewalk; furnish, install, grade, compact and test compaction of gravel sub-base and sub-grade; raise and adjust gate boxes, frames and covers and other castings; furnish and install Cement Concrete complete with reinforcement, expansion joints, and formwork; finish the Concrete; furnish and place the curing compound; protect the concrete after placement; furnish and place penetrating liquid concrete sealer; remove and dispose of formwork; reinforcing; backfilling; furnish and install loam and seed, mulch, or other backing and/or adjacent material specified including tree pits and grass areas; and all other work not included for payment elsewhere.

SPECIAL NOTES ON EXCLUSIONS:  
The following items are not included for payment under this item; sidewalks installed to replace sidewalks damaged by the Contractor during construction; 4-in sidewalks; and 6-in sidewalks at driveways and pedestrian ramps excluding the Fire Station driveway.

**Item 2524.5 Wire Cut Bricks on 4-In Hot Mix Asphalt (Sidewalks)**

METHOD OF MEASUREMENT:  
Measurement for Wire Cut Bricks on 4-inch Hot Mix Asphalt Base (Sidewalks) shall be based on the square yards installed, complete, within the payment limits, as shown on the Contract Drawings or as required by the Engineer.

BASIS OF PAYMENT / INCLUSIONS:  
Payment for Wire Cut Bricks on 4-inch Hot Mix Asphalt Base (Sidewalks) shall be based on the square yards of Wire Cut Bricks on 4-in Hot Mix Asphalt Base installed complete for this item in the proposal. Under the square yard price for this item, the Contractor shall furnish all labor, materials, tools, equipment, and incidentals required for the installation of Wire Cut Bricks on 4-in Hot Mix Asphalt Base (Sidewalks) as detailed and where indicated or required by the City or Engineer. The work includes, but is not limited to; remove, transport, stack, protect, and reset all parking meters, signs or other items obstructing the construction of the sidewalk; furnish, install, grade, compact, and test compaction of gravel sub-base and sub-grade; raise and adjust gate
boxes, frames and covers, and other castings; removal and disposing existing bricks or concrete; furnish and install hot mix asphalt base; compaction of the hot mix asphalt base; protect the asphalt after placement; furnish and install wire cut bricks; furnish and install iron edge with spiral galvanized steel spikes; furnish and install ¾” sand-cement setting bed; applying asphalt tack coat and neoprene modified asphalt tack coat; sweeping with dry sand/ cement mix; compaction of bricks; backfilling; furnish and install loam and seed, mulch, or other backing and/or adjacent material specified including tree pits and grass areas; and all other work not included for payment elsewhere.

SPECIAL NOTES ON EXCLUSIONS:
The following items are not included for payment under this item; brick installed to replace bricks damaged by the Contractor during construction.

**Item 2524.6 --- Remove and Reset/Relocate Granite Curb (Straight and Curved)**

METHOD OF MEASUREMENT:
Measurement for Remove and Reset/Relocate Granite Curb (Straight and Curved) shall be based on the linear feet of granite curb removed and reset installed, complete, within the payment limits, as shown on the Contract Drawings or as required by the Engineer. Payment will be made only after the curb has been reset.

BASIS OF PAYMENT / INCLUSIONS:
Payment for Remove and Reset/Relocate Granite Curb (Straight and Curved) shall be based on the linear feet of granite curb removed and reset or relocate complete for this item in the proposal. Under the linear foot price for this item, the Contractor shall furnish all labor, materials, tools, equipment, and incidentals required to remove and reset and/or relocate existing granite curb as detailed and where indicated or required by the City or Engineer. The work includes, but is not limited to; saw cut; excavate, remove, transport, stack, protect and reset straight and curved granite curb; furnish, install, grade, compact and test compaction of gravel sub-base and sub-grade; modifications to the existing granite curb; furnish and install Cement Concrete; point the granite curb; backfilling; furnish and install loam and seed, mulch, or other backing material specified; and all other work not included for payment elsewhere.

SPECIAL NOTES ON EXCLUSIONS:
The following items are not included for payment under this item; granite curb removed and reset to accommodate the Contractor’s means and methods; new curb to replace curb damaged by the Contractor; new granite curb; and removing and resetting granite curb transition for pedestrian ramps.


Item 2524.7 --- Remove and Discard Granite Curb (Straight and Curved)

METHOD OF MEASUREMENT:
Measurement for Remove and Discard Granite Curb (Straight and Curved) shall be based on the linear feet of granite curb removed and from the project limits. Payment will be made only after the curb has been removed from the project site.

BASIS OF PAYMENT / INCLUSIONS:
Payment for Remove and Discard Granite Curb (Straight and Curved) shall be based on the linear feet of Granite Curb removed from an existing alignment and discarded. Under the per linear foot price for this item, the Contractor shall furnish all labor, materials, tools, equipment, and incidentals required to remove and dispose of existing granite curb as detailed and where indicated or required by the City or Engineer. The work includes, but is not limited to; saw cut; excavate, remove and transport, existing damaged or unsalvageable straight and curved granite; backfilling; and all other work not included for payment elsewhere.

SPECIAL NOTES ON EXCLUSIONS:
The following items are not included for payment under this item; granite curb removed and discarded to accommodate the Contractor’s means and methods; and disposal of existing granite curbing.

Item 2524.8 --- New Granite Curb Type VA4 (Straight and Curved)
Item 2524.81 --- New Granite Curb Type VA4 (Curved)

METHOD OF MEASUREMENT:
Measurement for New Granite Curb Type VA4 (Straight and Curved) shall be based on the linear feet of granite curb installed, complete, within the payment limits, as shown on the Contract Drawings or as required by the Engineer.

BASIS OF PAYMENT / INCLUSIONS:
Payment for New Granite Curb Type VA4 (Straight and Curved) shall be based on the linear feet of Granite Curb (straight and curved) installed complete for this item in the proposal. Under the per linear foot price for this item, the Contractor shall furnish all labor, materials, tools, equipment, and incidentals required to install new granite curb as detailed and where indicated or required by the City or Engineer. The work includes, but is not limited to; saw cutting; excavation; furnish, install, grade, compact and test compaction of gravel sub-base and sub-grade; furnish and install new granite curb (straight and curved); install curbing at shallow depths as required; furnish and install cement concrete; point the granite curb; backfilling; furnish and install loam and seed, mulch, or other backing material specified; and all other work not included for payment elsewhere.

SPECIAL NOTES ON EXCLUSIONS:
The following items are not included for payment under this item; granite curb removed and reset to accommodate the Contractor’s means and methods; new curb to replace curb damaged by the Contractor; new granite transition curb at pedestrian ramps, driveways, and curb corners; and
removing and resetting granite curb.

**Item 2524.9 --- New Granite Curb Type VA4 Transition (Straight and Curved)**

**Item 2524.91 --- New Granite Curb Type VA4 Transition (Curved)**

**METHOD OF MEASUREMENT:**
Measurement for New Granite Curb Type VA4, Transition (Straight and Curved) shall be based on the linear feet of granite transition curb installed, complete, within the payment limits, as shown on the Contract Drawings or as required by the Engineer.

**BASIS OF PAYMENT / INCLUSIONS:**
Payment for New Granite Curb Type VA4, Transition Curb (Straight and Curved) shall be based on the linear feet of Granite Transition Curb (straight and curved) installed complete for this item in the proposal. Under the per linear foot price for this item, the Contractor shall furnish all labor, materials, tools, equipment, and incidentals required to install new granite transition curb at pedestrian ramps as detailed and where indicated or required by the City or Engineer. The work includes, but is not limited to; remove existing damaged and unsalvageable curb; saw cutting; excavation; furnish, install, grade, compact, and test compaction of gravel sub-base and sub-grade; furnish and install new granite transition curb at pedestrian ramps (straight and curved); furnish and install cement concrete; point the granite curb; backfilling; furnish and install loam and seed, mulch, or other backing material specified; and all other work not included for payment elsewhere.

**SPECIAL NOTES ON EXCLUSIONS:**
The following items are not included for payment under this item; granite curb removed and reset to accommodate the Contractor’s means and methods; new curb to replace curb damaged by the Contractor; new granite transition curb corners and curb corners; furnishing imported gravel sub-base; and removing and resetting granite curb.

**Item 2524.10 --- New Granite Curb Type VA3 for Raised Crosswalks**

**METHOD OF MEASUREMENT:**
Measurement for New Granite Back Curb Type VA3 for Back of Sidewalks and Raised Crosswalks shall be based on the linear feet of granite curb installed, complete, within the payment limits, as shown on the Contract Drawings or as required by the Engineer.

**BASIS OF PAYMENT / INCLUSIONS:**
Payment for New Granite Back Curb Type VA3 for Back of Sidewalks and Raised Crosswalks shall be based on the linear feet of Granite Curb installed complete for this item in the proposal. Under the per linear foot price for this item, the Contractor shall furnish all labor, materials, tools, equipment, and incidentals required to install new granite back curb as detailed and where indicated or required by the City or Engineer. The work includes, but is not limited to; saw cutting; excavation; furnish, install, grade, compact and test compaction of gravel sub-base and sub-grade; furnish and install new granite back curb (straight); furnish and install cement concrete; point the granite curb back curb; backfilling; furnish and install loam and seed, mulch, or other backing material specified; and all other work not included for payment elsewhere.
SPECIAL NOTES ON EXCLUSIONS:
The following items are not included for payment under this item; granite curb removed and reset to accommodate the Contractor’s means and methods; new curb to replace curb damaged by the Contractor; new granite transition curb at pedestrian ramps, driveways, and curb corners; and removing and resetting granite curb. This item includes the raised curbing located between and curbing.

**Item 2524.11 --- New Beveled Curb (Straight and Curved)**

METHOD OF MEASUREMENT:
Measurement for New Beveled Curb (Straight and Curved) shall be based on the linear feet of granite curb installed, complete, within the payment limits, as shown on the Contract Drawings or as required by the Engineer.

BASIS OF PAYMENT / INCLUSIONS:
Payment for New Beveled Curb (Straight and Curved) shall be based on the linear feet of Granite Curb installed complete for this item in the proposal. Under the per linear foot price for this item, the Contractor shall furnish all labor, materials, tools, equipment, and incidentals required to install new granite back curb as detailed and where indicated or required by the City or Engineer. The work includes, but is not limited to; saw cutting; excavation; furnish, install, grade, compact and test compaction of gravel sub-base and sub-grade; furnish and install new granite back curb (straight); furnish and install cement concrete; point the granite back curb; backfilling; furnish and install loam and seed, mulch, or other backing material specified; and all other work not included for payment elsewhere.

SPECIAL NOTES ON EXCLUSIONS:
The following items are not included for payment under this item; granite curb removed and reset to accommodate the Contractor’s means and methods; new curb to replace curb damaged by the Contractor; new granite transition curb at pedestrian ramps, driveways, and curb corners; and removing and resetting granite curb.

**Item 2524.12 --- Granite Curb Corner Type A**

METHOD OF MEASUREMENT:
Measurement for Granite Curb Corner Type A shall be based on the unit “Each” of granite curb corners installed, complete, within the payment limits, as shown on the Contract Drawings or as required by the Engineer.

BASIS OF PAYMENT / INCLUSIONS:
Payment for Granite Curb Corner Type A shall be based on the unit “Each” Granite Curb Corner installed complete for this item in the proposal. Under the unit “Each” price for this item, the Contractor shall furnish all labor, materials, tools, equipment, and incidentals required to install new granite curb corners as detailed and where indicated or required by the City or Engineer. The work includes, but is not limited to; saw cutting; excavation; furnish, install, grade, compact and test compaction of gravel sub-base and sub-grade; furnish and install new granite curb corner; furnish River Street Reconstruction and Streetscape Project CURBS, WALKS AND DRIVEWAYS

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and install cement concrete; point the granite curb corner; backfilling; furnish and install loam and seed, mulch, or other backing material specified; and all other work not included for payment elsewhere.

**Item 2524.13--- Cast-in-Place Detectable Tile**

**METHOD OF MEASUREMENT:**
Measurement for Cast-in-place Detectable Tile shall be based on the square footage of detectable tile installed, complete, within the payment limits, as shown on the Contract Drawings or as required by the Engineer.

**BASIS OF PAYMENT / INCLUSIONS:**
Payment for Cast-in-place Detectable Tile shall be based on square feet of Cast-in-place Detectable Tile installed complete for this item in the proposal. Under the Each price for this item, the Contractor shall furnish all labor, materials, tools, equipment, and incidentals required to install detectable tiles as detailed and where indicated or required by the City or Engineer. The work includes, but is not limited to; furnish install cast iron detectable warning panels; and all other work not included for payment elsewhere.

**Item 2524.14 – Stamped Concrete Truck Apron**

**METHOD OF MEASUREMENT:**
Measurement for Stamped Concrete Truck Apron shall be based on the square yard installed, complete, within the payment limits, as shown on the Contract Drawings or as required by the Engineer.

**BASIS OF PAYMENT / INCLUSIONS:**
Payment for Stamped Concrete Truck Apron shall be based on the square yards of Stamped Concrete Truck Apron installed complete for this item in the proposal. Under the square yard price for this item, the Contractor shall furnish all labor, materials, tools, equipment, and incidentals required for the installation of Stamped Concrete Truck Apron as detailed and where indicated or required by the City or Engineer. The work includes, but is not limited to; remove, transport, stack, protect, and reset all parking meters, signs or other items obstructing the construction of Stamped Concrete Truck Apron; excavate, removal and disposal of sidewalk; furnish, install, grade, compact and test compaction of gravel sub-base and sub-grade; raise and adjust gate boxes, frames and covers and other castings; furnish and install Cement Concrete complete with reinforcement, micro-fiber, expansion joints, scoring, and formwork; finish the Concrete; furnish and place the curing compound; protect the concrete after placement; furnish and place penetrating liquid concrete sealer; remove and dispose of formwork; reinforcing; backfilling; furnish and install loam and seed, mulch, or other backing and/or adjacent material specified including tree pits and grass areas; and all other work not included for payment elsewhere.
**Item 2524.15 --- Removeable False Curb Utility Cover**

**METHOD OF MEASUREMENT:**
Measurement for Removeable False Curb Utility Cover shall be based on the unit “Each” of Removeable False Curb Utility Cover installed, complete, within the payment limits, as shown on the Contract Drawings or as required by the Engineer.

**BASIS OF PAYMENT / INCLUSIONS:**
Payment for Removeable False Curb Utility Cover shall be based on the unit “Each” for Removeable False Curb Utility Cover installed complete for this item in the proposal. Under the Each price for this item, the Contractor shall furnish all labor, materials, tools, equipment, and incidentals required to furnish and install new Removeable False Curb Utility Covers as detailed and where indicated or required by the City or Engineer. The work includes, but is not limited to; saw cutting; excavation; furnish, install, grade, compact and test compaction of gravel subbase and sub-grade; furnish and install new Removeable False Curb Utility Cover; furnish and install cement concrete; adjust the Removeable False Curb Utility Cover; backfilling; furnish and install loam and seed, mulch, or other backing material specified; and all other work not included for payment elsewhere.

**SPECIAL NOTES ON EXCLUSIONS:**
The following items are not included for payment under this item; granite curb removed and reset to accommodate the Contractor’s means and methods; new Type VA 4 granite curb; and removing and resetting granite curb.

END OF SECTION 02524
### SECTION 16135

ROADWAY LIGHTING INFRASTRUCTURE

| 16135.1 | 2-INCH ELECTRICAL CONDUIT *(SINGLE)* CONCRETE ENCASED (LIGHTING) | LINEAR FOOT |
| 16135.2 | 4-INCH ELECTRICAL CONDUIT *(DOUBLE)* CONCRETE ENCASED (LIGHTING) | LINEAR FOOT |
| 16135.3 | ELECTRIC HANDHOLE (LIGHTING) – MUNICIPAL STANDARD | EACH |
| 16135.4 | LIGHT STANDARD FOUNDATION (STANDARD PRECAST) | EACH |
| 16135.5 | SHALLOW FOUNDATION (SHALLOW PRECAST) | EACH |
| 16135.6 | SELUX FOUNDATION (STANDARD PRECAST) | EACH |
| 16135.7 | GROUND ROD 8-FT LONG | EACH |
| 16135.8 | ACORN LUMINAIRE AND POLE | EACH |
| 16135.9 | PENDANT LUMINAIRE AND POLE (1 AND 2 HEAD) | EACH |
| 16135.10 | CONTEMPORARY LUMINAIRE AND POLE | EACH |
| 16135.11 | REMOVE AND STACK EXISTING STREET LIGHT | EACH |
| 16135.12 | REMOVE AND DISPOSE EXISTING STREET LIGHT | EACH |
| 16135.13 | REMOVE AND RELOCATE EXISTING STREET LIGHT | EACH |
| 16135.14 | WIRE TYPE 7 NO. 1/0 GENERAL PURPOSE | LINEAR FOOT |
| 16135.15 | WIRE TYPE 7 NO. 6 GENERAL PURPOSE | LINEAR FOOT |
| 16135.16 | WIRE TYPE 7 NO. 8 GENERAL PURPOSE | LINEAR FOOT |
| 16135.17 | WIRE TYPE 7 NO. 10 GENERAL PURPOSE | LINEAR FOOT |
| 16135.18 | LIGHTING CONTROL EQUIPMENT | EACH |
| 16135.19 | TUBMAN UNDER BENCH LIGHTING | LINEAR FOOT |
PART 1 - GENERAL

1.1 Summary

A. Work includes the furnishing and installation of street lighting fixtures and poles, removal and relocation of existing street lights, light pole foundations, conduit, handholes, and wiring at locations indicated in the Contract Documents. Per City of Cambridge Standards, all conduits in sidewalks and roadways shall be concrete encased. Conduits in parks and conduits from handhole to pole base shall be direct buried. This work shall be performed in accordance with the Massachusetts Electrical Code and as required in the Contract Documents.

B. Work required to furnish and install handholes and light pole foundations for lighting shall be in accordance with Section 801 of the Mass DOT Standard Specifications and as required in the Contract Documents.

C. Work required to furnish and install ground rods and wiring shall conform to the requirements of Section 813 of the Mass DOT Standard Specifications and as required in the Contract Documents.

D. Conduits between lighting control enclosures or utility manhole to electric hand holes or lighting control enclosures shall be 2 inches, or as indicated on the drawings.

E. Conduits between hand holes and light bases, structures, or receptacles shall be 2 inches, or as indicated on the drawings.

PART 2 - PRODUCTS

2.1 Lighting Control Enclosure

A. Enclosure shall be aluminum, weatherproof traffic controller type cabinet, including a pull box base with a heavy-duty Neoprene gasket around the door opening. Lettering cast in the door shall read “Street Light Control Cabinet City of Cambridge”. Enclosure shall house the distribution panel, lighting contactor, electric meter, GFI receptacle, 2’ LED light at the top of the cabinet and other necessary equipment for a complete functioning lighting control system. The housing shall be furnished with a sheet of ¾” plywood, primed and painted, mounted against back wall and a permanently mounted grounding bus.

B. The street lighting enclosure shall remain unpainted unless otherwise directed.

C. Refer to Cambridge Electrical Department (CED) Street Lighting Specifications for further details.

2.2 Lighting Panelboard

A. Panelboard shall be 120/240-volt single-phase and shall have a minimum 10,000 ampere interrupting capacity, bolt on type, molded case circuit breakers in the quantities and sizes required. Panelboards shall be General Electric.
B. A three-phase service may be allowed with city approval.

C. The meter socket shall be mounted on the exterior of the enclosure and conduit to be the meter socket shall not enter the streetlight enclosure. Any exposed conduit shall be steel conduit.

D. Minimum service size shall be 200 amperes. 120/240 volt unless otherwise approved.

E. The streetlight enclosure shall have one 20 amp – GFI duplex receptacle and on P.C. porcelain lamp holder with 100-watt bulb.

F. Lighting shall be controlled by a single photocell installed at the nearest fixture to the streetlight control cabinet, as shown on the plans or as directed in the field. Photocell shall be considered incidental to 2.1

G. Lighting contactor shall be sized a minimum of 100 amperes. The contactor shall be manufactured by General Electric.

2.3 Electric Conduit

A. Rigid non-metallic conduit and fittings shall be high-quality polyvinyl chloride conduit (PVC). PVC conduit shall be heavy-wall Type 40, shall conform to industry standards and Commercial Standard CS207-60, shall be listed by Underwriters' Laboratories for direct burial underground use, and shall conform to or exceed all property requirements of UL651 and NEMA TC-2, 1970. All conduit shall be furnished with plain ends.

B. Concrete for encasement shall be 3,000 psi / 3/8 inch / 565 per MassDOT Standards.

2.4 Handholes

A. Handhole units for lighting shall be 13”W x 24”L x 18”D polymer concrete and shall otherwise meet the requirements of The City of Cambridge Electrical Department Specifications. Covers shall be clearly marked “LIGHTING”. Handholes shall be PG Style Quartzite as manufactured by Hubbell, or approved equivalent product.

B. Refer to CED Street Lighting Specifications for further details.

2.5 Light Foundations (Standard Precast)

A. Precast units shall meet the requirements of Mass DOT Standard Specifications Section M4.02.14, except concrete shall be 5,000 psi at 28 days.

B. Steel reinforcing bars shall be deformed bars rolled from new billet steel conforming to the requirements of ASTM A615, Grade 60.

C. The Contractor shall provide 2” rigid galvanized steel conduit to stub out of base.

D. Anchor bolts arrangement for installation of light pole shall be coordinated with light pole manufacturer. The City will not be responsible for delays or additional cost caused by any
mismatch between precast light base and light poles.

2.6 Light Standard Foundation (Cast in Place)

A. Concrete shall meet the requirements of MassDOT Standard Specifications section 901, and shall be 1 ½” aggregate with 565 cement with a minimum compressive strength at 28 days of 4,000 psi.

B. Steel reinforcing bars shall be deformed bars rolled from new billet steel conforming to the requirements of ASTM A615, Grade 60, epoxy coated.

C. The Contractor shall provide 2” rigid galvanized steel conduit to stub out of base.

2.7 Lamp Posts and Luminaires

A. Light poles, arms and luminaires shall match the City of Cambridge standards and specifications except as modified herein and on the drawings. Note that the type 2A (“Acorn”) poles on this project have a smaller diameter base than the City Standard

B. Contractor shall furnish and install all lamp posts and luminaires as indicated and as specified on the drawings.

C. The Contractor shall also furnish an additional five (5) Type 2A poles for use as spares and shall deliver these to the Cambridge Electrical Department storage facility.

D. A weather resistant GFCI duplex receptacle shall be factory-installed on each roadway pole where indicated on the drawings. The duplex GFI receptacle shall be a ground fault circuit interrupting type, full gang size, polarized, duplex, parallel blade, U grounding slot, specification grade, rated at 20 amperes, 125 Vac and have screw terminals (use of push-in terminals is not acceptable). Receptacle cover plate shall be weatherproof in-use cover with NEMA 3R with cord in place spring-loaded cast aluminum cover door that meets current MEC standards. Receptacle shall be supplied from the factory with a quick-disconnect connector at the receptacle and shall have sufficient length of wire to reach 18” out of handhole in pole base (provided by Contractor).

2.8 Ground Rod

A. An 8 foot long, 3/4 inch copper-clad ground rod shall be provided for all light control enclosures, and handholes. The minimum size grounding conductor shall be No. 4 AWG with an approved type connection at each ground rod and light fixture foundation. All steel conduit where used shall be bonded. The grounding conductor shall be continuous and where connections are made, pressure connectors suitable for the purpose shall be used. The conductor shall provide connection between the associated handhole cover frame and the ground rod and between the handhole ground rod and the lighting pole foundation. This connection will be made with an exothermic weld.

2.9 Wiring

A. The minimum size wire from the circuit breaker to all hand holes shall be Three (3) 1/0 A.W.G. type THHN copper. 1 Black, 1 White, and 1 Red, 1/0 A.W.G. THHN copper. Green
for grounding conductor

B. The minimum size wire from the handholes to each light fixture luminaire, shall be two No. 10 A.W.G. type THHN copper for each service and one No. 10 A.W.G. type THHN copper for grounding. 1 Black, 1 White and 1 Green for grounding conductor

C. The minimum size wire from the handholes to each receptacle mounted at top of light pole, shall be two No. 10 A.W.G. type THHN copper for each service and one No. 10 A.W.G. type THHN copper for grounding. 1 Black, 1 White and 1 Green for grounding conductor

D. The minimum size grounding conductor from handhole or light fixture to ground rod shall be No. 4 AWG THHN copper with an approved type connection at each ground rod and light fixture.

E. Wires shall be continuous where practicable and where splices are made pressure connectors suitable for the purpose shall be used.

2.10 Lighting Control Equipment

A. The astronomic timer switch shall be rated 125 VAC, 1-pole, 20 Amp and be manufactured by Tork, paragon or equal

B. The photocell shall be rated 125 VAC, 20 Amp and be manufactured by Tork or equal.

PART 3 - EXECUTION

3.1 Electrical Conduit

A. The Perimeter of the paved area to be removed for conduit installation shall be sawcut.

B. The depth of excavation shall be sufficient to allow passing the conduit beneath curb as necessary and encasing the conduits as specified herein and as shown on the plans. Conduits shall have a minimum of thirty inches (30") of cover in the public way. Any deviation from this requirement must be approved by the City of Cambridge Electrical Department and Engineer prior to installation.

C. A 6-inch wide magnetic marker tape shall be placed approximately 2-feet above underground conduit. This tape shall be colored and serve as a warning device to personnel who may be involved in future excavations that electrical cable is located below and should be avoided if possible. It will serve as a general warning that hand digging is required beyond this point in order that the rigid non-metallic conduit below the tape is not damaged or otherwise penetrated.

D. PVC conduit shall be jointed by means of solvent cement joints. Conduit shall be cut square and deburred. All surfaces shall be wiped clean and dry. Using a natural bristle brush of width about equal to conduit size, the Contractor shall apply a coat of cement to the outside of the conduit end. (Note: Cement should be flowed on and not brushed out). Conduit and coupling shall then be firmly pressed together and the fitting turned a quarter turn to distribute the cement
evenly. The time elapsed between applying the cement and completing the joint should not exceed 60 seconds. All conduit and fittings shall be watertight.

E. All conduits shall be free of foreign materials prior to the installation of conductors.

F. A polypropylene or nylon pull rope shall be installed in all empty conduits.

G. Conduits shall be sealed after installation, prior to placing concrete encasement and installing conductors.

3.2 Handhole

A. In general, the locations of lighting handholes are shown diagrammatically on the drawings. In general, it is the intent that a lighting handhole with ground rod be located at or near each proposed light installation.

B. Handhole must be installed prior to the streetlight control cabinet for the service connection. No conductors other than the service entrance conductors shall be permitted in this handhole.

C. Each lighting installation shall be fused in the handhole associated with the fixtures. Fusing shall be provided by means of an in-line fuse holder, Tron HEB Series Single Pole Breakaway or approved equal, 5 ampere fuse. No fusing shall be allowed in the base of light poles.

3.3 Light Standard Foundation (Precast)

A. All foundations shall be installed at the location as shown on the plan except as approved deviations are required to meet field conditions. All locations must be approved by the Engineer prior to installation.

B. Contractor to coordinate with the City of Cambridge Electrical Department for type of anchor bolts to be used for securing the existing light poles to the precast foundations.

C. All foundations will be set plumb and true to grade.

D. The Contractor shall carefully mark the proposed location of the concrete foundation and then shall determine if any utilities or underground or overhead obstruction will prevent the installation at these locations. Similar marking shall be done for the conduit runs to the foundation. If such an obstruction is evident, the Contractor shall request permission from the Engineer to move or adjust the location of the foundation.

E. If no obstruction is apparent at the proposed foundation location, the Contractor shall make an excavation in order to install the foundation as detailed on the drawings, to be accomplished with hand digging. Mechanical excavating equipment may be used if approved by the Engineer. The Contractor must provide a compacted 6-inch cushion of gravel borrow under the foundation and shall backfill using acceptable excavated material or gravel borrow compacted in 6-inch layers around the foundation. A compaction of 95% for the backfill material of the excavation is required.
F. The backfill shall be thoroughly compacted by tamping with a pneumatic hammer equipped with a round dirt tamping pad with a minimum diameter of 6-inches driven by an air compressor with a minimum of 100 psi pressure.

G. The use of an impactor attachment on a standard backhoe with a dirt tamping pad may substitute for the pneumatic hammer with the permission of the Engineer. Use of a vibrator type compactor around pre-cast foundations or handholes is prohibited.

H. If the Contractor encounters no difficulty in the excavation and the soil conditions are suitable to support the foundation, the Contractor shall install the pre-cast concrete foundation. The top of the foundation must be level and installed as indicated on the detail plans. If difficulty is encountered in excavation due to underground obstructions, ledge, rock or when, in the opinion of the Engineer, the soil conditions require, the Contractor may install an approved precast short foundation or cast-in-place foundation with the approval of the Engineer.

I. Where foundations are placed adjacent to straight sections of roadway curb, the bolts and face of foundation shall be parallel with the face of the curb. When adjacent to curved curb, the bolts may be adjusted with the approval of the Engineer to allow proper placement of the pole when installed.

3.4 Lighting Standard Foundation (Cast in Place)

A. The top of the pedestal and foundation must be level and installed as indicated on the detail plans which will be provided by the Engineer prior to installation. If difficulty is encountered in the excavation due to underground obstructions, the Contractor shall submit a request for information detailing the obstruction encountered. A bond break shall be provided between the footing and adjacent materials.

3.5 Installation of Lighting Fixtures

A. Furnish and install a complete lighting system, including conduit, wire, outlet boxes, lighting fixtures with lamps, receptacles, and switches as required.

C. Where job conditions require locations different from those shown to avoid equipment, etc., such changes shall be made without additional cost to the Owner.

C. All fixtures shall be furnished complete with sockets, wiring, trims, hangers, frames, lamps, etc.

D. Install luminaires with the correct optical system orientation, socket position and inclination angle to meet the specified photometric requirements. Align luminaires vertical and perpendicular (or tangent) to the centerline of the street, install new lamps, and clean luminaire components of all construction dirt and dust and fingerprints prior to final completion.

Handle lighting fixtures carefully to prevent breakage, denting or scoring of fixtures' finishes. Do not install damaged lighting fixtures. Replace with undamaged units and return damaged units to equipment manufacturer. Install luminaire, fusing and wiring complete. Install a
wattage identification sticker inside the pole handhole. No other identifying numbers except the manufacturer's nameplate shall be installed on the poles or arms or luminaries.

F. Splices and junctions shall be made only in pole handholes and underground handhole junction boxes. Perform no more splices than needed. Do not splice or junction any wires that continue through a pole or junction box, in other words, those conductors without a termination to the adjacent pole. Use Junction box as a pulling point only. Cable pulled through poles or junction boxes shall be marked per the following paragraph and shall have sufficient loop to extend 18" beyond handhole or junction box lid for future maintenance but shall not be spliced. All splices in junction boxes shall be made waterproof by a UL listed heat shrink splice cover. All splices and junctions shall be considered incidental to the pay item.

G. Install a tie wrap type permanent wire marker on each and every pair of conductors passing through every junction box or pole handhole (bundle circuit pairs together). Mark controller number, circuit letter and pole number on each tie wrap and designate home runs as encountered. Install markers in each pole handhole.

3.6 3.5 Ground Rod

A. Use exothermic-welded connectors for outdoor locations, but if a disconnect-type connection is required, use a bolted clamp.

3.6 Wiring

A. The Contractor shall be required to furnish and install all materials, equipment and labor necessary to completely wire and operate the street lighting system. All materials and wiring procedures shall conform to the specifications contained herein and to the requirements and standard practices of the Section 800 and the following:

All wire and connectors shall conform to the standards of the National Electrical Manufacturers Association or the Underwriters' Laboratories, Inc., whichever is applicable. All materials and workmanship shall conform to the requirements of the Mass Electrical Code, Standards of the American Society for Testing and Materials, and any local ordinances that may apply. Wherever any reference is made to the standards mentioned above, the reference should be construed to mean the standard that is in effect on the day the Notice to Proceed to the Contractor for the work is dated. Wire sizes shall be based on American Wire Gage (AWG), as applied to copper conductors.

B. Runs of wire and cable from the handholes to each light fixture shall be continuous with no splices except as required for branch connections. Splices, where required, shall be made in the handholes with compression type fittings suitable for the application. Shop drawings of the compression splice fittings shall be submitted for approval, by the Engineer, prior to any order being placed.

C. No wire shall be drawn into any conduit until all work that may cause damage to the wire is complete.
D. All wire terminals, taps and splices shall be made secure with connectors, splicing materials and methods as hereinafter specified.

E. All incoming wires and outgoing wires in lighting load centers, handholes and poles shall be banded as indicated on the contract drawings.

3.7 Grounding

A. Coatings and rust on conduits and grounding rods shall be removed at the location where the ground fittings are to be installed.

B. The bare copper conductor shall be connected to the continuous insulated bonding lead, which shall be identified with green plastic marking tape as noted in the specifications. Bonding leads for lighting fixtures on poles shall be an insulated #10 AWG, marked green, which shall be extended to the nearest handhole and interconnected to the bare copper ground wire in the handhole of gauge shown on the contract drawings and the pig tail conductor shall be connected to the ground rod. The ground wire shall also connect to the ground lug on the handhole frame and be bonded to the handhole cover.

C. A conductor with the same insulation of the power leads shall be installed in all conduits as a continuous bond wire. All bonding leads from fixtures, pole, control boxes, fittings and ground rods shall be connected to the continuous insulated bonding lead which shall be identified with green plastic marking tape as noted in the specifications.

D. All grounding shall conform to the applicable provisions of the National Electrical Code.

E. Field Tests

1. Upon the completion of each wiring system, and before any connection is made to operating equipment, the Contractor shall perform, in the presence of the Engineer, the following tests of each circuit to determine whether the installations are in acceptable working order.

   a. Tests for continuity

   b. Tests for ground

   c. Tests for insulation resistance (Megger Test) from circuit wires to ground, and between circuit wires.

2. Tests for ground shall be performed in accordance with the relevant provisions of Section 813 of the Standard Specifications. The entire electrical wiring system shall be tested for continuity, grounds, resistance to ground, insulation, shorts and opens. This shall be done by means of a megohm meter test.

3. After installation of the wiring system is complete with the required splices, the lamp ballast primary shall be disconnected, and each circuit shall be tested with a 1000 volt megger. Tests on each circuit shall be between each conductor. When the measured value is less than 200 megohms between two conductors, the Contractor shall locate the point...
or points at fault, make proper corrections, and then demonstrate by further test the elimination of such faults.

4. These tests shall be performed in the presence of the Engineer.

5. The test results shall be submitted to the Engineer for review and approval. If any results are questionable or inconsistent, the Contractor shall repeat the tests and make any necessary corrections at the request of the Engineer. No wiring system will be accepted until these are satisfactorily performed and approved.

6. The Contractor shall furnish the Engineer with a report of the megohm-meter readings for a permanent project record.

7. All tests and any necessary repairs or replacements that are indicated by the Engineer to produce a fault-free system will be performed at the Contractor's expense.

F. Warranties

1. The Contractor shall provide a performance warranty for six months on the entire work performed under this contract including the performance of all equipment and components of the roadway lighting system specified. The performance warranty responsibility of the contractor shall commence after official acceptance by the city of Cambridge or the Engineer.

2. NOTE: The Contractor shall be completely responsible for all maintenance, repairs and replacement of damaged equipment during the functional test and throughout the performance warranty period.

3. If within 48 hours after notification by the Engineer of a malfunction, and the Contractor fails to make such repairs as necessary, the Engineer will undertake repairs of which all costs are to be SS-113 borne by the Contractor. The cost of any maintenance necessary, except electrical energy, shall be at the Contractor's expense and will be considered as included in the price paid for the contract item involved and no additional compensation will be allowed therefore.

3.7 Remove and Relocate Existing Street Light

A. Removal of existing street light, heads, poles and their accessories shall be done in a manner that will not damage the material.

B. Poles and bases shall be separated from one another without damage to either unit. The shaft shall be unscrewed from base.

C. Underground foundations, and other materials not reused shall be removed and properly disposed of.

D. Any damages to the street lights that are to remain operational shall be fully restored at no additional cost to the Owner.
E. Anchor bolt installation per manufacturer’s recommendations

F. The Contractor shall exercise extreme caution when working near existing trees. The Contractor shall exercise extreme caution when removing and stacking the existing luminaires so as not to damage them.

3.8 Removal and Disposal of Existing Light Fixtures

A. The Contractor shall coordinate with City of Cambridge before starting any work. The work shall include disconnecting wiring, removing and stacking of luminaires at the Town’s DPW Yard, removal and disposal of poles, foundations, conduit and hand holes no longer required for proposed installations, and repairing the disturbed area to match surrounding surfaces. In special case, the existing foundation and the like can be left in place, as approved by the Engineer. The Contractor shall exercise extreme caution when working near existing trees. The Contractor shall exercise extreme caution when removing and stacking the existing luminaires so as not to damage them.

PART 4 – COMPENSATION

**Item 16135.1 2-Inch Electric Conduit (Single) Concrete Encased (Lighting)**

**Item 16135.2 4-Inch Electric Conduit (Double) Concrete Encased (Lighting)**

**METHOD OF MEASUREMENT:**
Measurement for payment for Items 16135.1 and 16135.2 will be based on the linear foot of each individual conduit installed, regardless of the configuration (as an example, a two-conduit duct bank would be two times the length to capture both individual conduits) –as indicated in the Contract Documents or as otherwise required by the Engineer.

**BASIS OF PAYMENT:**
Payment for work under Items 16135.1 through 16135.2 will be based on the unit price bid for this item in the proposal and shall include full compensation for all labor, materials, equipment, and any other incidental costs necessary for the satisfactory completion of this work including but not limited to removal and disposal of the existing conduit within limits of trench; abandonment of existing conduit and wiring; saw cutting the roadway and/or sidewalk; excavation of existing pavement and gravel in roadway areas and asphalt, brick and concrete sidewalk pavements; disposal of construction debris (existing sidewalk, concrete, brick, asphalt, etc.), compaction and backfilling with suitable fill, furnish and install conduit, formwork and concrete for concrete encasement; and all other work not included for payment elsewhere.

No separate payment shall be made for marking tape, pull rope, concrete, or any incidental materials, but all costs in connection therewith shall be included in the Contract unit price per foot for these Items.

**NOTES ON EXCLUSIONS:**
Disposal of any excavated soil not suitable for re-use is not included for payment under this item and shall be paid for separately.
**Item 16135.3 Electric Handhole (Lighting) – Municipal Standard**

**METHOD OF MEASUREMENT:**
Item No. 16135.3 will be measured by the unit Each installed complete, which price and payment shall constitute full compensation for complete compliance with requirements of this item, including all labor, equipment, materials, tools, incidental work, excavation, backfill, compaction and construction methods.

**BASIS OF PAYMENT:**
Payment for work under these items shall constitute full compensation for sawcutting; excavation of existing pavement and gravel in roadway areas and asphalt, brick and concrete sidewalk pavements; disposal of construction debris (existing sidewalk, concrete, brick, asphalt, etc.), compaction and backfilling with suitable fill, furnish and install handhole and appurtenances; removal of existing handhole and conduit, and all other work not included for payment elsewhere.

**NOTES ON EXCLUSIONS:**
Disposal of any excavated soil not suitable for re-use is not included for payment under this item and shall be paid for separately.

**Item 16135.4 Light Standard Foundation (Standard Precast)**
**Item 16135.5 Shallow Standard Foundation (Cast in Place)**
**Item 16135.6 Selux Foundation (Standard Precast)**

**METHOD OF MEASUREMENT:** Item No. 16135.4 through 16135.6, will be measured by the unit Each installed complete, which price and payment shall constitute full compensation for complete compliance with requirements of this item, including all labor, equipment, materials, tools, incidental work, excavation, backfill, compaction and construction methods.

**BASIS OF PAYMENT:**
Payment for work under these items shall constitute full compensation for sawcutting; excavation of existing pavement and gravel in roadway areas and asphalt, brick and concrete sidewalk pavements; disposal of construction debris (existing sidewalk, concrete, brick, asphalt, etc.), compaction and backfilling with suitable fill, furnish and install precast foundation, and all other work not included for payment elsewhere.

**NOTES ON EXCLUSIONS:**
Disposal of any excavated soil not suitable for re-use is not included for payment under this item and shall be paid for separately.
**Item 16135.7 Ground Rod – 8-FT Long**

**METHOD OF MEASUREMENT:**
Measurement for payment for Item 16135.7 will be based on each ground rod installed as indicated in the Contract Documents or as otherwise required by the Engineer.

**BASIS OF PAYMENT:**
Payment for work under Items 16135.7 will be based on the unit price bid for this item in the proposal and shall include full compensation for all labor, materials, tools, equipment, and any other incidental costs necessary for the satisfactory completion of this work including and all other work not included for payment elsewhere.

**Item 16135.8 Acorn Luminaire and Pole**  
**Item 16135.9 Pendant Luminaire and Pole (1 and 2 Head)**  
**Item 16135.10 Contemporary Luminaire and Pole**

**METHOD OF MEASUREMENT:**
Measurement for payment for Items 16135.8 through 16135.10 will be based on each Light assembly installed as indicated in the Contract Documents or as otherwise required by the Engineer.

**BASIS OF PAYMENT:**
This work shall be measured for payment for each Item, installed, wired and lamped in place, which price shall include all materials, labor, and equipment for a complete and accepted installation.

Note: The quantities shown on the Section 00300 “Form for General Bid” do not include the required spare Type 2A poles specified herein. These shall be considered incidental to the work of this Section and will not be measured or paid for separately.

**Item 16135.11 Remove and Stack Existing Street Light**  
**Item 16135.12 Remove and Dispose Existing Street Light**  
**Item 16135.13 Remove and Relocate Existing Street Light**

**METHOD OF MEASUREMENT:**
The Contractor shall coordinate with City of Cambridge before starting any work. The work shall include disconnecting wiring, removing and stacking of luminaires at the City’s DPW Yard, removal and disposal of poles, foundations, conduit and hand holes no longer required for proposed installations, and repairing the disturbed area to match surrounding surfaces. In special case, the existing foundation and the like can be left in place, as approved by the Engineer.

**BASIS OF PAYMENT:**
Payment for work under this Item shall be at the Contract Unit Price bid per Each, which price shall constitute full compensation for the complete removal of existing streetlights, any charges for disconnection. Luminaires shall be removed and stacked. Poles and other items of the existing light system shall be removed and discarded.
**Item 16135.14 Wire Type 7 No. 1/0 General Purpose**
**Item 16135.15 Wire Type 7 No. 6 General Purpose**
**Item 16135.16 Wire Type 7 No. 8 General Purpose**
**Item 16135.17 Wire Type 7 No. 10 General Purpose**

**METHOD OF MEASUREMENT:**
Measurement for payment for Items 16135.13 through 16135.16 will be based on the linear foot of wiring installed as indicated in the Contract Documents or as otherwise required by the Engineer.

**BASIS OF PAYMENT:**
Payment for work under Items 16135.13 to 16135.16 will be based on the unit price bid for this item in the proposal and shall include full compensation for all labor, materials, tools, equipment, and any other incidental costs necessary for the satisfactory completion of this work including installation of wire and cable runs; splices with compression type fittings; installation of circuit breakers; and all other work not included for payment elsewhere.

**Item 16135.18 Lighting Control Equipment**

**METHOD OF MEASUREMENT:**
Measurement for payment for Items 16135.17 will be based on the each control item installed as indicated in the Contract Documents or as otherwise required by the Engineer.

**BASIS OF PAYMENT:**
Payment for work under Items 16135.17 will be based on the unit price bid for this item in the proposal and shall include full compensation for all labor, materials, tools, equipment, and any other incidental costs necessary for the satisfactory completion of this work including installation of wire and cable runs; splices with compression type fittings; installation of circuit breakers; and all other work not included for payment elsewhere.

**Item 16135.19 Tubman Under Bench Lighting**

**METHOD OF MEASUREMENT:**
Measurement for payment for Items 16135.18 will be based on linear feet of Ribbon Lighting installed as indicated in the Contract Documents or as otherwise required by the Engineer.

**BASIS OF PAYMENT:**
This work shall be measured for payment by linear feet of strip lighting installed, wired and lamped in place, which price shall include all materials, labor, and equipment for a complete and accepted installation.

END OF SECTION 16135
Appendix N –

MBTA License for Entry
1. **The License for Entry**
   The Massachusetts Bay Transportation Authority, a body politic and corporate and a political subdivision of the Commonwealth of Massachusetts, established and existing pursuant to Chapter 161A of the Massachusetts General Laws, with a usual place of business at 10 Park Plaza, Boston, Massachusetts (the “MBTA”), hereby grants to (Contractor Name), a business, with a usual place of business at Street, Town/City, State, Zip (“Licensee”), the right and privilege to enter onto the Premises (as defined in Section 2.5 below) solely to conduct the Scope of License (as defined in Section 2.6 below), subject to the terms and conditions of this License for Entry.

2. **General Conditions**
   Among the terms and conditions of this License for Entry are included the following General Conditions:

   2.1 **Effective Date:** June 17, 2022
   
   2.2 **Licensee:** (Contractor Name)
   
   2.3 **Term:** From the Effective Date to June 16, 2023; except that the MBTA may terminate this License for Entry with thirty (30) days written notice.
   
   2.4 **Fees:**
   
   Administrative Fee: $1,000.00 paid with the application for this License for Entry.
   
   License Fee: $1,000.00 to be paid contemporaneously with the execution of the License for Entry.
   
   Design and Construction Plan Review Fee: $1,600.00 paid in accordance with Section 4.1(h) below.
   
   2.5 **Premises:** Those certain areas of the Carl Barron Plaza in Central Square, over the southerly portion of the MBTA Red Line tunnel and Central Square station in Cambridge, Massachusetts, as more fully described/shown in Exhibit A, attached hereto and incorporated herein, but only to the extent that use of such property is reasonably necessary to permit Licensee to conduct the activities described in Section 2.6 below.
   
   2.6 **Scope of License:** Subject to, and in accordance with, the terms and conditions of this License for Entry, Licensee may access the Premises to perform the construction of utility and surface improvements, in accordance with the terms and conditions of this License for Entry and the plans and/or documentation attached as Exhibit A. No other investigations or activities
of any kind may be performed on the Premises or any other property of the MBTA. Licensee shall have the right to permit its employees, contractors, and agents to use the Premises as permitted hereunder and acting by and through Licensee, subject to all of the terms and conditions of this License for Entry.

Licensee understands and agrees to the following terms and conditions:

1. Licensee shall adhere to the terms and conditions of the MBTA’s Operations Department’s correspondence dated May 16, 2022, hereto attached as Exhibit C and incorporated herein by reference.

2. Licensee shall adhere to the terms and conditions of the MBTA’s Safety Department’s correspondence dated March 28, 2022, hereto attached as Exhibit D and incorporated herein by reference.

3. Licensee shall adhere to the terms and conditions of the MBTA’s System Wide Accessibility Department’s correspondence dated March 30, 2022, hereto attached as Exhibit E and incorporated herein by reference.

4. Licensee shall adhere to the terms and conditions of the MBTA’s Transit Oriented Development Department correspondence dated May 13, 2022, hereto attached as Exhibit F and incorporated herein by reference.

In the event of a conflict between the conditions stated in this Section 2.6 and other provisions of this License for Entry, whichever provisions are more restrictive of Licensee or impose a higher standard on Licensee shall control.

2.7 Notices: The MBTA:

The MBTA Real Estate Department
Massachusetts Bay Transportation Authority
10 Park Plaza, Suite 5720
Boston, Massachusetts 02116
Attn: Chief Real Estate Officer

and

MBTA Transit-Oriented Development Group
Massachusetts Bay Transportation Authority
10 Park Plaza, Suite 5170
Boston, Massachusetts 02116
Attn: Deputy Chief of Transit-Oriented Development

and
3. **Consideration**  
The rights contained in this License for Entry are granted for good and valuable consideration, the sufficiency of which is hereby acknowledged.

4. **Terms and Conditions of License for Entry**  
This License for Entry is subject to the following terms and conditions:

4.1 **Scope of Activity**  
(a) **Scope of Activity:**  
The Scope of Activity is the Scope of License (Section 2.6) as modified by the terms of this License for Entry, including, without limitation, Exhibit B attached hereto and incorporated herein. Licensee shall minimize the disruption to and alteration of the Premises and, as soon as possible after each entry onto the Premises, shall return the Premises to the condition existing immediately prior to the initiation of the Scope of Activity and entry hereunder; except as specifically authorized under the Scope of License.

Except pursuant to an approved Access Plan, defined in Exhibit B, attached hereto and incorporated herein, or in case of emergency, Licensee shall provide at least ten (10) days’ prior written notice of its desire to enter the Premises to the MBTA’s applicable operations department(s), including the MBTA Red Line Operations Department, in accordance with this License for Entry at the address(es) noted above. The MBTA may have an observer present at all times when Licensee is present on the Premises. See Exhibit B for required notice from Licensee when Licensee needs access because of an emergency. Licensee shall do all work in accordance with the Plan described in Exhibit B.

(b) **Utilities:**  
Licensee acknowledges that there may be surface and subsurface utilities on and adjacent to the Premises and agrees to exercise extreme caution in performance of the Scope of Activity. Licensee shall comply with Massachusetts General Laws, Chapter 82, Section 40 (said statute also known as the “Dig Safe” law) and the
regulations promulgated pursuant thereto including but not limited to the Code of Massachusetts Regulations, more particularly, 220 CMR 99.00 et seq. To the extent the MBTA, or parties acting on behalf of the MBTA, locate and mark utilities in the rights of way and appurtenant thereto, Licensee shall be responsible for payment to such parties for such services which may include, but not be limited to, locating and marking utilities, facilities and appurtenances thereto serving the railroad and transit line(s) or used in connection with services or operations of the MBTA. Any damage to any utilities on or near the Premises caused by Licensee shall be the sole responsibility of Licensee. If Licensee does not immediately repair any utilities it has damaged, the MBTA, without being under any obligation to do so and without waiving Licensee’s obligation hereunder, may repair any utilities damaged by Licensee immediately and without notice in case of emergency. In the event the MBTA exercises such right, Licensee shall pay to the MBTA immediately upon demand all of the MBTA’s cost of performing such repairs plus a fee equal to twenty-five percent (25%) of the MBTA’s cost of performing such repairs to reimburse the MBTA for its administrative costs.

(c) Subordination to the MBTA’s Operating Requirements:
The work permitted hereby shall be subordinate to the requirements of the MBTA in maintaining and operating a transportation system and may be stopped or delayed, at any time, in response to each requirement. The MBTA shall not be responsible for any damages incurred by Licensee as a result of any such work stoppage, delay or required relocation.

(d) Environmental Cooperation:
If for any reason Licensee is not responsible for Hazardous Materials, defined below, on the Premises then Licensee agrees to cooperate with the MBTA in the determination of the party liable for the remediation of the Premises under applicable Federal and/or state law. Such cooperation may include the temporary adjustment of the rights granted to Licensee hereunder. The MBTA shall not be responsible for any damages incurred by Licensee as a result of such temporary adjustment. “Hazardous Materials” shall mean “oil” or “hazardous materials”, as those terms are defined in Massachusetts General Laws Chapter 21E (“Chapter 21E”) and the regulations promulgated pursuant thereto, the Massachusetts Contingency Plan, 310 CMR 40.0000 et seq. (the “MCP”).

(e) Remediation Obligation of Licensee:
Whenever by law or the terms of this License for Entry, Licensee is responsible for remediation of Hazardous Materials on MBTA property, Licensee, upon written demand of the MBTA, shall conduct, at Licensee’s sole cost and expense (or, at the MBTA’s election, reimburse the MBTA for the cost and expense incurred by the MBTA in connection with the MBTA’s conduct of), all response actions required by Chapter 21E and the MCP with respect to the Hazardous Materials (including the hiring of a Licensed Site Professional). Any such response action, if performed by Licensee, shall be performed in accordance with Chapter 21E, the MCP, any other applicable statutes and regulations, and in accordance with plans and specifications approved by the MBTA, shall be completed in a timely manner to the reasonable satisfaction of the MBTA, and shall allow the MBTA to use the Premises, and/or adjacent or contiguous property owned by the MBTA, for its present use and for any future transportation use. Licensee shall also be responsible for the reasonable costs incurred by the MBTA in hiring consultants (including a Licensed Site
Professional) to review, supervise and inspect any plans, specifications, proposed method of work, installation, operation and results.

(f) Notices of Project Commencement and Completion:
Upon commencement and completion of its work, Licensee shall provide written notice to the MBTA at each of the addresses listed in Section 2.7.

(g) Evidence of Financial Responsibility:
Prior to commencement of Licensee’s activities hereunder, Licensee shall provide evidence to the MBTA’s reasonable satisfaction that Licensee has sufficient financial resources available to discharge any anticipated obligations hereunder. Such resources may be in the form of Licensee’s net worth, insurance coverage, a bond or such other financial security as may be acceptable to the MBTA in form and amount.

(h) Plan Review Costs:
In addition to the Fees allocated in Section 2.4 above, Licensee shall also be responsible for any additional costs that may be incurred by the MBTA for Design and Construction Plan Review within thirty (30) days of being invoiced for same. Such costs and Fees are in addition to the Administrative Fee and the License Fee and are included within the Licensee’s indemnity obligations in Section 4.2(a) below.

(i) Settlement, Heaving or Lateral Movement
Licensee shall be responsible for any settlement, heaving or lateral movement caused to the roadbed, right-of-way and/or tracks, facilities and appurtenances of the MBTA, arising from or as a result of the Scope of License or other Licensee activities at the Premises for a period of two (2) years from the date of completion of the Scope of License, and Licensee agrees to pay the MBTA the full cost and expense of repair or restoration to the MBTA’s facilities, promptly upon receipt of invoices therefore.

4.2 Indemnification and Release of the MBTA
(a) Licensee shall indemnify, defend (at the option of the MBTA) and save the MBTA harmless from and against any and all liabilities, losses, damages, costs, expenses (including reasonable attorneys’ expenses and fees), causes of action, suits, claims, demands or judgments of any nature whatsoever including, without limitation, those related to Hazardous Materials that may be imposed upon, incurred by, or asserted against the MBTA by reason of any of the following occurrences:

(1) the activities of Licensee hereunder or the exercise by Licensee of any rights or privileges hereby granted; or

(2) the presence, discovery or revealing of any pre-existing Hazardous Materials on the Premises (or other property of the MBTA adjacent to the Premises) (i) which discovery is a result of Licensee’s activities hereunder; (ii) where said Hazardous Materials are present because of Licensee’s previous occupancies of the Premises, whether those occupancies were unauthorized or permitted pursuant to prior agreements between the parties; or (iii) where those pre-existing Hazardous Materials migrated from land now or previously owned, leased, occupied or operated by Licensee or for which Licensee is a potentially responsible party as defined under Chapter 21E; or
(3) the placement or accidental release of any Hazardous Materials onto the Premises (or other property of the MBTA adjacent to the Premises) by Licensee or its employees, agents, contractors or consultants or by the employees, agents, or consultants of Licensee’s contractors or subcontractors; or

(4) any use, condition or occupation of the Premises or any part thereof by Licensee; or

(5) any failure of Licensee to perform or comply with any of the terms hereof, or of any contracts, agreements or restrictions, statutes, laws, ordinances or regulations affecting the activities or any part thereof.

In subsection (2) above, Licensee’s previous occupancies of the Premises includes occupancies by the predecessors in interest of Licensee.

(b) Licensee has inspected the Premises and decided that the Premises are suitable for the uses Licensee contemplates. Licensee assumes all the risk of entry on to the Premises.

(c) Licensee hereby releases the MBTA from any responsibility for Licensee’s losses or damages related to the condition of the Premises, and Licensee covenants and agrees that it will not assert or bring, nor cause any third-party to assert or bring, any claim, demand, lawsuit or cause of action (whether by way of original claim, cross claim, counterclaim, contribution claim, indemnification claim, third-party claim or any other claim) (hereinafter “Claims”) against the MBTA, including, without limitation, claims for response actions, response costs, assessments, containment, removal and remedial costs, governmental oversight charges, including any overhead or response action costs incurred or assessed by DEP, fines or penalties, permit and annual compliance fees, reasonable attorney and expert fees, natural resource damages, property damages, including diminution in property value claims, and personal injury damages and damages related to a person’s death relating to, or arising from, the condition of the Premises.

Licensee shall obtain a written release of liability similar to the one in this Section 4.2(c) and including the language of Section 4.2(d) in favor of the MBTA from each of Licensee’s consultants and contractors before they enter onto the Premises.

(d) In clarification of the above release and covenants of defense and indemnification, and not in limitation of them, Licensee shall indemnify, defend (at the option of the MBTA) and save the MBTA harmless from and against any and all liabilities, losses, damages, costs, expenses (including reasonable attorneys’ expenses and fees), causes of action, suits, claims, demands or judgments related to the injury, illness or death of any employee of Licensee or of an employee of Licensee’s contractors or consultants; except if the “Claim” arose because of the MBTA’s grossly negligent or willful misconduct. It shall not be grossly negligent to allow access to the Premises that are in substantially the condition they were in when Licensee inspected the Premises before accepting this License for Entry.

(e) Licensee shall be notified, in writing, by the MBTA of the assertion of any claim against it that Licensee has agreed to indemnify above (the “Indemnified Claim”).
(1) If the MBTA decides to itself conduct the defense of an Indemnified Claim against it or to conduct any other response itself, Licensee shall reimburse the MBTA for all costs and expenses (including, without limitation, reasonable attorneys’ fees and expenses) incurred by the MBTA in connection with the MBTA’s defense of the Indemnified Claim against it and/or the conduct of all response actions, including, without limitation, those required by Chapter 21E and the MCP. The settlement or compromise of any Indemnified Claim shall not include the admission of guilt (or comparable plea), wrongdoing or negligence or the permitting or imposition of civil or criminal penalties or indictments, or the entering of consent decrees or orders of any kind by the MBTA on behalf of Licensee or any other action that would materially prejudice the rights of Licensee without Licensee’s express written approval. Licensee shall cooperate fully and promptly with the MBTA in the defense of any Indemnified Claim.

(2) If the MBTA decides to have Licensee defend the Indemnified Claim or handle the response action, the MBTA shall notify Licensee of that decision in writing and Licensee shall bear the entire cost thereof and shall have sole control of the defense of any Indemnified Claim and all negotiations for its settlement or compromise provided that the MBTA is fully indemnified by Licensee and provided further that the settlement or compromise shall not include the admission of guilt (or comparable plea), wrongdoing or negligence or the permitting or imposition of civil or criminal penalties or indictments, or the entering of consent decrees or orders of any kind by Licensee on behalf of the MBTA or any other action that would materially prejudice the rights of the MBTA without the MBTA’s express written approval. The MBTA shall cooperate with Licensee in the defense of any Indemnified Claim.

If any response action due to the presence of Hazardous Material or the threat of release of Hazardous Waste onto the Premises (or other property of the MBTA which abuts the Premises), is performed by Licensee, the response action shall be performed in accordance with Section 4.1 (e).

(f) Licensee and contractor shall provide to the MBTA financial assurance guaranteeing Licensee’s performance of the obligations of this License for Entry in a form satisfactory to the MBTA.

For purposes of this Section 4, Licensee shall include Licensee and its directors, officers, employees, agents, successors and assigns and the MBTA shall include the MBTA and its directors, officers, employees, agents, successors and assigns.

The provisions of Sections 4.1 and Section 4.2 shall survive the termination or expiration of this License for Entry.

4.3 Insurance
Prior to entry hereunder, Licensee and its consultants and contractors shall provide the MBTA with a certificate or certificates of insurance and shall, during the term hereof, renew and replace any expired certificate, evidencing the insurance of the activities permitted hereunder, and Licensee’s covenant of indemnification hereinabove, with companies that are reasonably acceptable to the MBTA, as stated below, in which the MBTA and others hereinafter specified are either additional
insureds as their interests may appear or named insureds and which provide minimum liability coverage as follows:

(a) **Commercial General Liability Insurance:**
Insuring Licensee, the MBTA, the Premises, and all activities of Licensee permitted pursuant to this License for Entry, as well as Licensee’s indemnification obligations contained herein, with minimum liability coverage for personal injury, bodily injury and property damage with limits not less than One Million Dollars ($1,000,000) per occurrence and Two Million Dollars ($2,000,000) in aggregate. Such insurance shall be written on an occurrence basis (as opposed to a claims made basis). This policy shall name the MBTA as an additional insured. This policy shall provide coverage on a primary and non-contributory basis for the MBTA. The policy shall contain a clause waiving the right of subrogation in favor of the MBTA. This policy must contain endorsement(s) or language, which must be stated on the certificate of insurance, providing coverage equivalent to the coverage provided by ISO form CG 24 17 10 01.

(b) **Workers’ Compensation and Employers’ Liability Insurance:**
Insuring all persons employed by Licensee in connection with any work done on or about the Premises with respect to which claims for death or bodily injury could be asserted against the MBTA, including (i) Workers’ Compensation Insurance providing statutory coverage as required by the Commonwealth of Massachusetts, and (ii) Employers’ Liability Insurance coverage with limits of not less than One Million Dollars ($1,000,000) per accident. Each of Licensee’s contractors, subcontractors, and consultants performing work on or about the Premises shall have similar policies covering their employees. All policies of insurance required by this Section 4.3 (b) must contain a clause waiving the right of subrogation in favor of the MBTA.

(c) **Automobile Liability Insurance:**
Automobile liability insurance with limits of not less than One Million Dollars ($1,000,000) covering all owned, non-owned, hired, rented or leased vehicles of Licensee and its subcontractors and consultants that are used in the activities permitted hereunder. Such insurance shall be written on an occurrence basis (as opposed to a claims made basis). This policy shall name the MBTA as an additional insured. This policy shall provide coverage on a primary and non-contributory basis for the MBTA. This policy must contain endorsement(s) or language, which must be stated on the certificate of insurance, providing coverage equivalent to the coverage provided by ISO form CA 20 70 10 01.

(d) **Umbrella Liability Insurance:**
Umbrella liability insurance with limits of not less than Ten Million Dollars ($10,000,000) providing excess coverage over all limits and coverage noted in paragraph (a) and paragraph (c) above. Such insurance shall be written on an occurrence basis (as opposed to a claims made basis). This policy shall name the MBTA as an additional insured. This policy shall provide coverage on a primary and non-contributory basis for the MBTA. The policy shall contain a clause waiving the right of subrogation in favor of the MBTA. This policy must contain endorsement(s) or language, which must be stated on the certificate of insurance, providing coverage equivalent to the coverage provided by ISO form CU 24 09 03 05.

(e) **Insurance during Construction and Installation:**
Licensee shall procure or cause to be procured builder’s all risk insurance during any period when a construction project is being undertaken by or on behalf of Licensee on the Premises.
(f) **Railroad and Transit Protective Liability Insurance:**

In the event that any work occurs within fifty (50) feet of an active right-of-way or if any work of any kind by Licensee poses a risk to foul an active right-of-way, Licensee shall procure Railroad Protective Liability Insurance insuring the MBTA and any company with operating rights on such right-of-way with limits of not less than Five Million Dollars ($5,000,000) for all damages arising out of bodily injuries to or death of one (1) person, and, subject to that limit for each person, a total limit of Ten Million Dollars ($10,000,000) for all damages arising out of bodily injury to or death of two (2) or more persons in any one (1) accident. The MBTA shall be a “first named insured” on the Railroad Protective Liability Insurance Policy. The MBTA shall be provided with an original policy of Railroad Protective Liability Insurance.

The MBTA may require reasonable increases in limits of the above insurance coverages from time to time. The required insurance coverages hereinbefore specified shall be placed with insurance companies licensed by the Massachusetts Division of Insurance to do business in the Commonwealth of Massachusetts and having a Best’s rating of A- or better, shall be kept in full force and effect at all times, shall be primary and non-contributory to any insurance or self-insurance maintained by the MBTA, and shall require that the MBTA be given at least thirty (30) days’ advance written notice in the event of any cancellation or non-renewal in coverage. All required policies of insurance shall not contain any exclusions for acts of terrorism, and shall fully cover any acts of terrorism. All such insurance as is required of Licensee shall be provided by or on behalf of all contractors, subcontractors and consultants to cover their operations performed. At the inception date of this License for Entry and throughout the term of this License for Entry, the MBTA shall be provided with certificates of insurance evidencing that such insurance policies are in place and provide coverage as required. Licensee shall be held responsible for any modifications, deviations, or omissions in the compliance with these requirements by any contractor, subcontractor or consultant of Licensee.

ALL CERTIFICATES OF INSURANCE PERTAINING TO THIS REQUEST (AS WELL AS RENEWAL CERTIFICATES) SHOULD DESCRIBE THE SITE THAT IS COVERED.

4.4 **Compliance with Laws**

Licensee shall comply with, and shall cause all work performed to comply with all federal, state, county, municipal and other governmental statutes, laws, rules, orders, regulations and ordinances.

Licensee shall also be responsible for obtaining any and all federal, state, and/or local permits and/or approvals necessary to carry out the activities permitted hereunder.

4.5 **Non-Exclusive Use**

The MBTA makes no representations or warranty, express or implied, that Licensee shall have sole or exclusive use of the Premises under this License for Entry. In the event other agreements, licenses, or easements have been or are granted, Licensee shall be responsible for coordinating its work and activities with that of other licensees and parties in interest. The MBTA shall not be liable for delays, obstructions, or like occurrences affecting Licensee, arising out of the work of the MBTA or other licensees or parties in interest.

Licensee’s rights herein are granted subject to easements and rights of record and existing leases and licenses.
4.6 **No Warranty**
Licensee accepts the Premises “As Is” and the MBTA makes no warranty, express or implied, as to the condition of the Premises.

4.7 **Termination**
At the termination of this License for Entry, Licensee agrees to restore the Premises promptly to the condition it was in at the commencement of the term hereof, and to remove all of Licensee’s personal property and debris from the Premises. Should Licensee not perform such restoration at the end of the Term, the MBTA may perform any and all necessary restoration at the sole expense of Licensee. Any personal property not so removed shall, at the option of the MBTA, either become the property of the MBTA or be removed by the MBTA and disposed of without any liability in the MBTA for such removal and disposition, all at the sole expense of Licensee.

4.8 **Assignment**
Licensee shall not, without the prior written consent of the MBTA, transfer or assign this License for Entry or any part hereof. Such consent may be withheld in the sole discretion of the MBTA. Any assignment made by Licensee without the prior written consent of the MBTA shall be rendered null, void and of no further force or effect.

5. **Notices**
All notices, demands, requests, consents, approvals and other instruments required or permitted to be given pursuant to the terms hereof (hereinafter “Notice”), shall be in writing and shall be deemed to have been properly given when deposited in registered or certified United States mail, postage prepaid, return receipt requested, addressed, as described in Section 2.7 or when delivered by messenger or overnight mail service to the correct addressee. Notice shall be deemed received when actually received or when the proffered Notice has been refused by the addressee. The signature of an employee, servant or agent of the addressee shall be determinative on the issue of actual receipt.

Licensee and the MBTA shall, at any time and from time to time, have the right to specify as their proper addresses for purposes of this License for Entry any other address or addresses giving fifteen (15) days' written notice thereof to the other party.

6. **Results**
If this License for Entry explicitly allows Licensee to conduct certain investigations on MBTA owned land, then if asked to do so by the MBTA in writing, Licensee agrees to provide to the MBTA, at no cost, a copy of the results of such investigations (including data and analysis) and all other work conducted under this License for Entry in both hard copy form and in a digital format specified by the MBTA regardless of whether the report was prepared by Licensee, its agent, consultant or contractor, or prepared on behalf of Licensee. All results and reports shall be provided to the MBTA within ten (10) days of Licensee's receipt of the written request of the MBTA. Licensee agrees to consult with the MBTA prior to contacting any governmental entity, regarding any information, results of analysis or reports regarding the Premises. Licensee shall give the MBTA a copy of any reports or notifications, including but not limited to release notifications, prior to submitting the same to any governmental entity.

7. **Default and Termination**

(a) **Termination for Non-Payment:**
In the event that Licensee shall neglect or fail to pay any sum herein specified to be paid upon the due date hereunder, Licensee shall be in default and the MBTA shall have the right at any time thereafter to terminate this License for Entry by giving Licensee two (2) weeks written notice of the MBTA’s decision to terminate for non-payment ("Termination Notice"). Licensee shall not be entitled to cure any such default by tendering payment after the expiration of the two (2) week grace period which starts upon Licensee’s, or Licensee’s servants, agents or employee’s receipt of (or refusal to accept) the MBTA’s Termination Notice. Any amount due hereunder that is not paid when due shall be charged to 1.5% per month and 18% per annum.

(b) Default of Terms and Conditions:
Licensee shall also be in default if Licensee:

(1) fails to perform or observe any of the other covenants or agreements contained in this instrument and on its part to be performed or observed, or

(2) makes any assignment for the benefit of creditors or files petition for relief under bankruptcy law, or

(3) has a bankruptcy petition filed against it that is not dismissed within sixty (60) days, or

(4) has its estate taken by process of law, proceeding in bankruptcy or insolvency or otherwise,

and if such defaults continue after two (2) weeks’ written notice given by the MBTA to Licensee to cure, the MBTA may terminate this License for Entry by written notice to Licensee and/or deny access to the Premises and expel Licensee and those claiming through or under Licensee and remove Licensee’s effects from the Premises without prejudice to any remedies which might otherwise be available for such breach of covenant, and, upon entry as aforesaid, the rights of Licensee created by this License for Entry shall terminate. Notwithstanding the preceding, if Licensee begins to cure a default as soon as possible within said two (2) week period and thereafter continues to pursue a cure with all due diligence, then the MBTA shall not terminate this License for Entry until and unless Licensee ceases to pursue a cure with all due diligence and has not in fact cured said default. Licensee agrees to pay any expense including reasonable attorneys’ fees incurred by the MBTA in enforcing any of Licensee’s obligations hereunder.

Notwithstanding the preceding, if the default is one that threatens the safety of the public or the ability of the MBTA to operate its transportation system, then it shall be considered an emergency default ("Emergency Default") and if Licensee does not affect an immediate cure, the MBTA may terminate the License for Entry upon reasonable notice and use self-help at the expense of Licensee and Licensee shall be responsible for such expenses as well as for a twenty-five percent (25%) administrative fee above the expenses.

In the event this License for Entry is terminated pursuant to this Section 7, the MBTA shall retain the License Fee as partial damages, without prejudice to its right to claim additional damages as a result of the breach.

8. Holding Over
If Licensee desires to continue the work defined in the Scope of Activity after the expiration or termination of this License for Entry, the resulting license shall be on a month-to-month basis and may be terminated by either party at any time by providing the other party with thirty (30) days prior written notice of termination. During the holding-over period, a monthly fee equal to three (3) times the equivalent monthly License Fee (calculated based on the length of the original term and the original License Fee established hereunder) shall be paid monthly in advance by Licensee to the MBTA. During such holding-over period, Licensee shall be bound by all applicable provisions of this License for Entry.

9. **Work in Harmony**
Licensee agrees that in any work performed in or about the Premises, it will employ only labor which can work in harmony with all elements of labor being employed by the MBTA.

10. **Promotional Material**
Licensee shall not, without the prior written approval of the MBTA, refer to the MBTA in any promotional matter or material, including, but not limited to advertising, letterheads, bills, invoices and brochures.

11. **Nondiscrimination**
With respect to its exercise of all rights and privileges herein granted, Licensee shall undertake affirmative action as required by Federal and state laws, rules and regulations pertinent to Civil Rights and Equal Opportunity unless otherwise exempted therefrom. Licensee agrees that it shall comply with any and all required affirmative action plans submitted pursuant to the directives of any Federal agency and in accordance with applicable federal law and applicable state laws, rules and regulations.

Licensee shall not discriminate against any person, employee or applicant for employment because of race, color, creed, national origin, age, sex, sexual orientation, disability, or military veteran status in its activities at the Premises, including without limitation, the hiring and discharging of employees, the provision or use of services and the selection of suppliers, contractors, or subcontractors.

Consistent with the law, Licensee shall use reasonable efforts to contact, encourage and utilize minority and female business enterprises in the procurement of materials and service under this License for Entry.

12. **Taxes**
Licensee shall be solely responsible for the payment of any taxes, levies, betterments or assessments, fees or charges, whether in existence on the date hereof or becoming applicable during the Term, which may be assessed against Licensee or the MBTA which are directly attributable to Licensee’s installations in, or use of, the Premises, or any personal property or fixtures of Licensee located thereon (collectively referred to as “Taxes”). Licensee shall pay all Taxes directly to the taxing authority before delinquency and before any fine, interest, or penalty shall become due or be imposed by operation of law for their nonpayment. Such payments shall constitute an additional License Fee hereunder.

Licensee may contest, in good faith for its own account and at its own expense, the validity or amount of any Taxes, provided Licensee shall indemnify the MBTA against any resulting loss, cost and expense. Licensee shall not permit a lien or encumbrance on the Premises by reason of failure to pay any Taxes.

13. **No Third-Party Beneficiaries**
This License for Entry shall not be construed to create any third-party beneficiary rights in favor of any other parties or any right or privilege for the benefit of any other parties.

14. **Entire Agreement**  
This License for Entry contains the entire agreement of the parties hereto with respect to the subject matter hereof, and no representations, inducements, promises, or agreements, oral or otherwise, between the parties hereto with respect to the subject matter hereof not embodied herein shall be of any force or effect.

15. **Governing Law**  
This License for Entry shall be construed and interpreted under and pursuant to the laws of the Commonwealth of Massachusetts, and the Massachusetts and Federal conflict of laws provisions shall not be applied if the result is that other than Massachusetts law shall govern.

16. **Successors and Assigns**  
The provisions of this License for Entry shall be binding on and inure to the benefit of the parties hereto and their respective successors and assigns.

17. **Limitation on Damages**  
The MBTA shall not be liable to Licensee for any loss of business or any indirect, incidental, special, consequential or exemplary damages or lost profits unless specified herein.

18. **No Waiver**  
No failure by the MBTA to insist upon strict performance of any term, covenant or condition hereof, or to exercise any right or remedy consequent upon a breach thereof shall constitute a waiver of any such breach or of any such term, covenant or condition. The acceptance by the MBTA of any amount less than the full amount due to the MBTA hereunder shall not be deemed a waiver by the MBTA of its right to collect the full amount due. The MBTA may deposit checks or drafts that state “final payment”, “payment in full” or the like without being deemed to have waived its right to receive all amounts due hereunder. Any waiver by the MBTA of any term, covenant or condition hereof shall not be effective unless such waiver is in writing.
[Signature Page Follows]
IN WITNESS WHEREOF, the parties hereto have caused this License for Entry to be executed as of the Effective Date.

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY, AS LICENSOR

By: _________________________________
Richard Henderson
Chief Real Estate Officer

(CONTRACTOR NAME), AS LICENSEE

By: _________________________________
Name: ______________________________
Title: ______________________________
(Duly Authorized Representative)
EXHIBIT A

PLAN OF PREMISES
NOTES:

1. ALL WORK SHALL BE IN CONFORMANCE WITH CAMBRIDGE WATER DEPARTMENT STANDARDS.

2. THE CAMBRIDGE WATER DEPARTMENT, CWD, WILL NOT ISSUE NEW WATER CONSTRUCTION PERMITS UNTIL ALL REQUIREMENTS FOR PREVIOUS (E.G., INITIAL CWD PERMIT) CWD PERMITS ARE MET; THESE REQUIREMENTS INCLUDE ACCURATE AND ELIGIBLE SWING TIE DIMENSIONS TO ALL NEW WATER MAIN GATE VALVES, TEES AND ELBOWS, REQUIRED W/C SIGN OFF'S ON THE CONTRACTOR'S COPY OF THE CWD DRAWINGS; PERMITTED WORK IS CAPTURED IN TEST DOCUMENTATION THAT INCLUDES MASSACHUSETTS STATE CERTIFIED INITIAL CHLORINATION AND BACTERIA TESTING OF NEW WATER MAIN WORK, AND PRESSURE TEST RESULTS OF NEW WATER MAIN WORK. THE CONTRACTOR IS HEREBY ADVISED, THAT THE CWD WILL NOT BE RESPONSIBLE FOR THE CONTRACTOR'S SLIP IN PROJECT SCHEDULE IF THESE REQUIREMENTS FOR PERMITS ARE NOT FOLLOWED.

3. UNLESS OTHERWISE NOTED, WATER MAINS SHALL BE INSTALLED WITH MINIMUM 5" COVER.

4. CONTRACTOR TO PROVIDE 1" CHLORINATION TAP AT ALL LOCATIONS WHERE PROPOSED WATER MAIN CONNECTS TO EXISTING WATER MAIN.

5. ALL ELBOWS, TEES, AND CONNECTIONS TO BE PROPERLY RETAINED PER THE CITY OF CAMBRIDGE WATER DEPARTMENT STANDARDS.

6. IF LOCATION OF EXISTING CURB STOP IS INACCESSIBLE FOR REPLACEMENT, CONTRACTOR TO COORDINATE WITH CWD TO DETERMINE LOCATION OF NEW CURB STOP PRIOR TO INSTALLATION.

7. ALL WATER SERVICE TO BE VERIFIED BY CONTRACTOR AND CONNECTED TO NEW WATER MAIN. EXISTING LEAD SERVICES IN THE STREET SHALL BE REMOVED AND REPLACED TO THE METER. CONTRACTOR SHALL CONDUCT TWO TEST PITS/PER LEAD SERVICE, ONE AT THE CONNECTION AT THE MAIN AND OTHER WITHIN 2 LF OF THE CONNECTION. ALL COPPER SERVICES AND SERVICES UNDER 1" IN DIAMETER SHALL BE REPLACED TO THE BACK OF SIDEWALK WITH 1" SERVICES. ADDITIONAL LOCATIONS TO BE VERIFIED BY THE CONTRACTOR IN THE FIELD.

8. FOR WATER SERVICES GREATER THAN 1" IN SIZE, CONTRACTOR TO INSTALL VALVE AT THE MAIN PER DETAILS. WATER SERVICES 1-1/4" IN SIZE SHALL BE REPLACED TO THE BACK OF SIDEWALK WITH 1-1/2" SERVICES. ADDITIONAL LOCATIONS TO BE VERIFIED BY CONTRACTOR IN THE FIELD.

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### Materials Legend

- **Role**: Reviewer
- **Role**: Project Manager
- **Role**: Designer
- **Role**: Contractor

### Tag Description Detail

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<td>3</td>
<td>Soil Filling Station</td>
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<td>Mass Avenue</td>
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<td>13</td>
<td>Bike Path</td>
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**City of Cambridge, MA**

**Date**: 2/14/2022

**Scale**: 1/3" = 1'-0"

**Sheet 3 - roadway/sidewalk plan 2**

**Source**: Central Massachusetts Water Authority

**Printed by**: 02/14/2022 11:50:32 AM

**File**: C:\PWWORK\EAST01\D1174456\7113XXX_LA(DESIGN)_L-5.00 CARL BARRON MATERIALS PLAN.DWG

**Plot**: 2/14/2022 11:50:32 AM

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**Materials**

- Paving
- Site Furnishings
- Street Furniture
- Street Furniture, Urban
- Street Furniture, Urban Lighting
- Warning Strip
- Accessible Curbs
- Bike Rack
- Bike Path

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**Sym Description**

- Granite Planters, Plaza
- Soil Filling Station
- River Street
- Mass Avenue
- Site Furnishings
- Street Furniture
- Street Furniture, Urban
- Street Furniture, Urban Lighting
- Warning Strip
- Accessible Curbs
- Bike Rack
- Bike Path

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**Sym**

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**Tag**

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**Precast Concrete Unit Pavers on Concrete Base (Scale 1"=1')**

1. **Preparation**: Prepare the subgrade with a compacted gravel base, compacted to 84-86% in 12" plantings for the extents.

2. **Concrete Footing Below**: Refer to structural drawings. Create a concrete base slab.

3. **CIVIL DRAWINGS**: Refer to civil drawings for the installation of ribbons, anchors, and expansion joints.

4. **Storm Drainage System**: Prepare a drainage plan for layout and connection to civil drawings for drainage system.

5. **Irrigation**: Prepare for irrigation, see plans for locations and layout.

6. **Metal Framing Members**: Refer to civil drawings for metal framing members.

7. **Precast Unit Pavers**: Preparations for Precast Unit Pavers on Existing Concrete Base.

8. **PAVER INTERFACE AT PLATFORM SEATING**: Plan view and section views for PAVER INTERFACE at platform seating.

9. **PAVER INTERFACE AT PLATFORM SEATING - SECTION B-B**

10. **PAVER INTERFACE AT PLATFORM SEATING - SECTION A-A**

11. **PARSONS INTERFACE AT PLATFORM SEATING**

12. **CONCRETE FOOTING BELOW**: Refer to Structural Drawings.

13. **PAVERS TO FACE OF STEEL BASE PLATE**

14. **HAUNCH FOUNDATION AT CONCRETE FACE**: Each way, see detail 5/ L-5.50.

15. **ANCHOR TUBE**: Refer to face of steel base plate.

16. **CONCRETE BASE SLAB**: Extend concrete base slab, 12" wide at edges wherever abutting uncurbed future.

17. **EXPANSION JOINTS**: At cast in joint with sealant, refer to structural drawings.

18. **TREE OPENING AT TOP OF PLATFORM**: See detail 5/ L-5.50.

19. **METAL FRAMING MEMBERS**: Refer to civil drawings for metal framing members.

20. **SCULPTURAL RIBBON**: Refer to civil drawings for sculptural ribbon.

21. **RIBBON ANCHORS TYP**: Refer to structural drawings for ribbon anchors.

22. **TREE OPENING AT TOP OF PLATFORM**: See detail 5/ L-5.50.

23. **HAUNCH FOUNDATION**: See detail 5/ L-5.50.

24. **ANCHOR TUBE**: Refer to face of steel base plate.

25. **CONCRETE BASE SLAB**: Extend concrete base slab, 12" wide at edges wherever abutting uncurbed future.

26. **EXPANSION JOINTS**: At cast in joint with sealant, refer to structural drawings.

27. **TREE OPENING AT TOP OF PLATFORM**: See detail 5/ L-5.50.

28. **METAL FRAMING MEMBERS**: Refer to civil drawings for metal framing members.

29. **SCULPTURAL RIBBON**: Refer to civil drawings for sculptural ribbon.

30. **RIBBON ANCHORS TYP**: Refer to structural drawings for ribbon anchors.

31. **TREE OPENING AT TOP OF PLATFORM**: See detail 5/ L-5.50.

32. **HAUNCH FOUNDATION**: See detail 5/ L-5.50.

33. **ANCHOR TUBE**: Refer to face of steel base plate.

34. **CONCRETE BASE SLAB**: Extend concrete base slab, 12" wide at edges wherever abutting uncurbed future.

35. **EXPANSION JOINTS**: At cast in joint with sealant, refer to structural drawings.

36. **TREE OPENING AT TOP OF PLATFORM**: See detail 5/ L-5.50.

37. **METAL FRAMING MEMBERS**: Refer to civil drawings for metal framing members.

38. **SCULPTURAL RIBBON**: Refer to civil drawings for sculptural ribbon.

39. **RIBBON ANCHORS TYP**: Refer to structural drawings for ribbon anchors.

40. **TREE OPENING AT TOP OF PLATFORM**: See detail 5/ L-5.50.
EXHIBIT B

SCOPE OF ACTIVITY

Subject to the terms and conditions in this License for Entry, Licensee, its agents, employees, contractors, subcontractors, and/or representatives are hereby granted a license to enter upon the Premises for the sole purpose as described in Section 2.6.

Licensee shall conduct all activities within the Premises in a safe manner and immediately notify the MBTA if any problem occurs which may result in a safety hazard. If any unsafe situation should occur, Licensee will correct the situation by eliminating any safety hazard immediately or, if the situation cannot be reasonably cured immediately, then in such longer time as is reasonably required, and in all such unsafe situations, the MBTA Railroad Operations Safety Procedures shall be followed.

Licensee shall submit a plan and detailed specifications (including the materials to be used) and the proposed methods of performing the work, or any part thereof (the “Plan”) to the MBTA. Licensee shall not enter the Premises until the Plan has been approved by the MBTA. Such approval may be withheld in the MBTA’s sole discretion. The Scope of Activity for said construction, installation, maintenance, operation and/or replacement will be more fully defined in the approved Plan, which approved Plan will automatically be incorporated herein by reference and made part of this License for Entry. Licensee shall also provide the MBTA with a detailed schedule of times when Licensee, its employees, contractors, subcontractors, or agents would like to be on the Premises to undertake the Scope of Activity (the “Access Plan”). The MBTA shall have full power to make a final determination of when Licensee may be on the Premises as it is necessary to coordinate the work of all those desiring or having the right to access the Premises.

Unless entry is made pursuant to an Access Plan approved by the MBTA, Licensee agrees to give, each time it desires entry, at least ten (10) days’ prior written notification to (except in cases of emergency when notice shall be given to the MBTA as quickly as possible) of its need to access the Premises for all work to be performed under this License for Entry by contacting the MBTA departments in accordance to Section 2.6 for access. Licensee understands that the more notice given to the MBTA the more likely it will be that Licensee can gain access at the times requested. Licensee shall present evidence of the required insurance coverage before each entry. In the case of an emergency, Licensee shall as soon as possible contact the MBTA Control Center 617-222-5278.

No activities permitted herein may be performed by Licensee except as approved in writing by the MBTA; and no method of testing, installation or construction shall be used by Licensee except with prior written approvals or written approvals received in the field from the MBTA’s representatives at the time the work is performed.

If at any time during the work of installation or connection, the MBTA should, in its sole and absolute discretion, deem flaggers, watchpersons, communications/signaling personnel, electric traction personnel, inspectors assigned to construction crews, and/or other measures, including but not limited to train re-routing, desirable or necessary to protect its operations, its property or its employees or other persons on or near the Premises, the MBTA shall upon notice to Licensee (where such notice is feasible) have the right to place such personnel, including personnel of the MBTA’s agents or to take such measures, at the sole cost and expense of Licensee. Such cost and expense shall include the current wages and fringe benefits due and owing to such personnel in and for the performance of such measures. Licensee hereby covenants and agrees to bear the full cost and expense thereof and to reimburse the MBTA within thirty (30) days of receiving an itemized, written invoice for such reimbursement. The
MBTA’s failure to furnish such personnel or take such measures shall not relieve Licensee of any obligation or liability it might otherwise have assumed, and shall not give rise to any liability to Licensee on the part of the MBTA. Upon being notified that the personnel or measures referred to in the first sentence of this paragraph have been deemed desirable or necessary by the MBTA, Licensee shall not commence or continue construction or repair measures, as the case may be, unless and until such personnel or measures are in place.

If Licensee shall deem any requirement for flagging or the like by the MBTA or one of their agents for supervision of the activity hereunder as unreasonable, Licensee shall nevertheless pay for such flagging and the like, but may take exception in writing thereto as an unreasonable requirement in each instance. The parties agree to review such exceptions at the times of billings for such services and attempt to adjust them as the MBTA may deem appropriate. This reimbursement is in addition to the License Fee and Administrative Fee required hereunder.

Licensee shall comply with all applicable MBTA Special Instructions dated April, 2003 and the current version of the MBTA Railroad Operations Directorate. To the extent that there is an irreconcilable conflict between the aforementioned requirements and this License for Entry, the terms and conditions contained in the MBTA Railroad Operations Directorate Procedures shall control unless the requirements in this License for Entry are more strict.

No individual, including representatives and employees of Licensee, may enter onto the Premises unless that individual has first attended the MBTA’s Roadway Worker Protection (“RWP”) class.
May 16, 2022

Mr. Brian Clarizia
Director of Licensing
Greystone Management Solutions
20 Park Plaza, Suite 1120
Boston, MA 02116

Subject: MRG File #17072 – City of Cambridge
Carl Barron Plaza, Cambridge, MA
MBTA Operations Review Comments

Dear Mr. Clarizia,

Per your request, the MBTA Operations Department has reviewed File #17072 dated 3/11/22, relative to the request by the City of Cambridge to construct utility and surface improvements at Carl Barron Plaza in Central Square, Cambridge, MA. As a result of our review, we would like to provide the following comments:

- The MBTA Power Department approves this canvass, with the attached conditions.
- The MBTA Maintenance of Way Department approves this canvass, with the attached conditions.
- The MBTA Signals Department has no objections or comments pertaining to this canvass.
- Red Line Operations approves this canvass, with the attached conditions.

Please see the attached documents. If you have any questions regarding this response, feel free to contact my office at (617) 222-6251.

Sincerely,

Erik J. Stoothoff, P.E.
Chief Engineer
MEMORANDUM

TO:    Steven Daley, Division Chief – Red Line  
       Jennifer Mecca, Deputy Chief of Transit-Oriented Development  
       John Connell, Director of Safety Engineering  
       Erik Stoothoff, Chief Engineer  
       Ray Martin – Deputy Director, Maintenance-of-Way  
       Jack Martin – Electrical Engineer (Power Department)  
       Thomas Ho – Signal Engineer  
       Laura Brelsford, Assistant General Manager of System Wide Accessibility

FROM: Brian Clarizia – Director of Licensing

DATE: 3/11/2022

RE: MBTA - 17072

Please Respond by April 10, 2022

Please review the attached information from City of Cambridge, requesting to perform the construction of utility and surface improvements, at Carl Barron Plaza in Central Square, over the southerly portion of the MBTA Red Line tunnel and Central Square station; and also abutting certain inbound escalators and stairs of Central Square station at street level, in Cambridge, MA.

A small portion of work will occur above the MBTA Red Line tunnel and adjacent to MBTA stairs/escalators, including water main replacement, and curb and sidewalk construction.

Most of the work over the Red Line Tunnel and Central Sq. Station will occur within the vicinity of the public way of Massachusetts Avenue.

Please advise us as to your concerns and any special conditions that may apply. Reference to the file number on all correspondence is helpful.


APPROVED: __________________________

APPROVED WITH CONDITIONS: 

______________________________  

(1) ____________________________

NOT APPLICABLE: __________________________

DENIED: (Please provide an explanation) __________________________
MEMORANDUM

TO: Erik Stoothoff
   Chief Engineer

FROM: Jack Martin
       Power Department Engineer

DATE: May 15, 2022

RE: MRG #17072- City of Cambridge
    Carl Barron Plaza, Central Square, Cambridge, MA
    MBTA Power Department Review

The MBTA Power Department has reviewed MRG File #17072 relative to the request, by the City of Cambridge, to construct utility and surface improvements at Carl Barron Plaza in Central Square, Cambridge, MA. As a result, we would like to provide the following comments.

1. The MBTA Power Department costs associated with the support of this work shall be the responsibility of the City of Cambridge. The MBTA Power Department will need to submit a force account depending on the level of effort required by the Power Department and a function number will need to be open to Areas 324, 341, and 371 of the MBTA Power Department.

2. The contractor/developer will need to coordinate any required power shutdowns of the Red Line at this location with the MBTA Power Department, MBTA Red Line Transportation, and the MBTA Planning and Scheduling Coordinator and provide adequate notice of these shutdowns.

3. Provide a schedule and the proposed work hours for this project.

4. Contact Mr. Tyler Scott for any utilities associated with the nearby Central Passenger Station. Mr. Scott can be reached at tscott@mbta.com and 617-222-5285. All proposed work should be coordinated with any utilities serving Central Passenger Station.

5. The developer/contractor will be responsible for any damage that occurs to existing MBTA utilities, including labor, materials, and any other MBTA costs associated with repairing the damaged utilities.

6. The City of Cambridge will need to discuss this project with the MBTA Capital Delivery Department to ensure that an MBTA Capital Delivery Project Manager is assigned to this project. Contact Ms. Christine Bresnahan to coordinate the assignment of an MBTA Project Manager. Ms. Bresnahan can be reached at cbresnahan@mbta.com and 617-222-3361.
If you have any questions regarding this response, please feel free to contact my office at (617) 222-3199.

JMM/jmm
(MRG #22-23)

cc: File
MEMORANDUM

To: Brian Clarizia – Massachusetts Realty Group
From: Quyen “Wayne” Chung - MBTA Engineering & Maintenance Engineer
Date: March 28, 2022
Subject: MBTA 17072 – City of Cambridge _Construction of Utility and Surface Improvements at Carl Barron Plaza – Redline Central Square Station

I have reviewed the application submitted by City of Cambridge requesting MBTA approval for the replacement of watermain and the construction of curb, pavement & concrete sidewalk in Central Square, Cambridge. A portion of this work are in the vicinity and on top of the MBTA Redline Tunnel.

Since this work will not impact our track directly; however, the excavation may potentially encounter the Redline Tunnel roof.

It is my recommendation that this work be allowed subject to these conditions:

- The contractor/licensee must stop the work and notify MBTA immediately if the tunnel roof or its waterproofing membrane is exposed/interfered.
- The contractor/licensee shall be responsible for any damage to the tunnel structure and waterproofing system including the repair, delay of service, etc...

Other departments may have conditions which must be followed by the licensee.

Quyen “Wayne” Chung – Engineer
MBTA Engineering & Maintenance
Brian,

MBTA Transit Signal Department has no comment for File MBTA-17072 regarding City of Cambridge request to construct utility and surface improvements at Carl Barron Plaza in Central Square that affects one southbound station entrance at street level and above the Red Line Tunnel.

Regards,

Thomas W. Ho
Signal Engineer
MBTA Signals and Communications
45 High Street, 3rd Floor
Boston, MA 02110

W. (617) 222-4427
F. (617) 222-6220
E. THo@mbta.com

Please consider the environment before you print this E-mail
MEMORANDUM

To: Brian Clarizia
   Director of Licensing
   Greystone – Massachusetts Realty Group

From: Steve Daley
       Division Chief- Red Line

Date: Monday, March 14, 2022

Subject: MBTA – 17072

With regards to the request # 17072 — City of Cambridge, requesting to perform the construction of utility and surface improvements, at Carl Barron Plaza in Central Square, over the southerly portion of the MBTA Red Line tunnel and Central Square station; and also abutting certain inbound escalators and stairs of Central Square station at street level, in Cambridge, MA.

- There will be no access allowed to the Red Line Right-of-Way.

- All contractors will be under the supervision of a Red Line Supervisor or Red Line Operations Construction Supervisor and/or any station personnel.

- All contractors understand that the MBTA can suspend all work at any time and limit the hours and/or timeframe(s) that work will be allowed to take place including the possibility of limiting hours to “non-revenue hours” or diversions.

- All diversions, if needed must be coordinated and approved by the MBTA Right-of-Way access committee.

- If it is determined that MBTA flagging support is required a force account must be established through the completion of the project.

- All contractors must coordinate a field visit with the Red Line Construction Supervisor to outline the exact scope of work to take place.
• All work must be approved by the Division Chief of Red Line Operations, and/or the Red Line Construction Supervisor.

• Station and/or Yard access will not be obstructed at any time unless under an approved condition with flagging support and/or other planned support.

• Train service will not be obstructed during revenue service.

• Extreme care must be taken as to not damage MBTA property or infrastructure.

• Any and all damage that may occur to the Red Line and MBTA equipment and infrastructure is the sole responsibility of the contractors.

• All contractors will provide their contact information for their designated liaison to Red Line Operations, who will be available throughout the course of the work.

• All contractors will provide contact information for their designated liaison to Red Line Operations, who will be available seven days a week, twenty four hours a day, during all phases of activities.
MEMORANDUM

TO: Steven Daley, Division Chief – Red Line
Jennifer Mecca, Deputy Chief of Transit-Oriented Development
John Connell, Director of Safety Engineering
Erik Stoothoff, Chief Engineer
Ray Martin – Deputy Director, Maintenance-of-Way
Jack Martin – Electrical Engineer (Power Department)
Thomas Ho – Signal Engineer
Laura Brelsford, Assistant General Manager of System Wide Accessibility

FROM: Brian Clarizia – Director of Licensing

DATE: 3/11/2022

RE: MBTA - 17072 Please Respond by April 10, 2022

Please review the attached information from City of Cambridge, requesting to perform the construction of utility and surface improvements, at Carl Barron Plaza in Central Square, over the southerly portion of the MBTA Red Line tunnel and Central Square station; and also abutting certain inbound escalators and stairs of Central Square station at street level, in Cambridge, MA.

A small portion of work will occur above the MBTA Red Line tunnel and adjacent to MBTA stairs/escalators, including water main replacement, and curb and sidewalk construction.

Most of the work over the Red Line Tunnel and Central Sq. Station will occur within the vicinity of the public way of Massachusetts Avenue.

Please advise us as to your concerns and any special conditions that may apply. Reference to the file number on all correspondence is helpful.


APPROVED: ________________________________

APPROVED WITH CONDITIONS: ________________________________

NOT APPLICABLE: ________________________________

DENIED: ________________________________
(Please provide an explanation)
MEMORANDUM

To: John Connell
   Director of Safety Engineering

From: Cameron Rogers
   System Safety Analyst

Date: March 28, 2022

Subject: MRG # 17072

MBTA Safety has received and reviewed the proposal from City of Cambridge requesting to perform the construction of utility and surface improvements, at Carl Barron Plaza in Central Square, over the southerly portion of the MBTA Red Line tunnel and Central Square station; and also abutting certain inbound escalators and stairs of Central Square station at street level, in Cambridge, MA.

This request was submitted to MBTA Safety via the Massachusetts Realty Group (MRG).

Based on the information submitted, MBTA Safety should deem the request to be “Approved with Conditions.” In addition to any and all conditions set forth by Red Line Operations, Transit-Oriented Development, Office of the Chief Engineer, Maintenance-of-Way, Power Department, Signal Department, and System Wide Accessibility, the following conditions shall be met:

1. All personnel working on MBTA property or with the potential to foul the MBTA Right of Way (ROW) must complete MBTA ROW training prior to beginning work. All personnel must have valid MBTA ROW ID cards on their person while working on or near the ROW.
2. All work must be coordinated with the MBTA Operations Control Center (OCC) and the Plans and Scheduling Department to ensure proper scheduling and flagging. Based on certain requirements, work may be deemed necessary for non-revenue hours.
3. Existing MBTA infrastructure, including underground utilities, must be protected during work.
4. Proper Personal Protective Equipment (PPE) must be worn on MBTA property at all times.
5. Continued and unrestricted pedestrian and employee access must be maintained.
6. Applicant must establish a secure work zone during construction to provide for passenger protection.
7. All material and equipment utilized during construction activities shall be easily moved to ensure worker safety and to avoid interference with operations, even during non-revenue hours.
8. Applicant must coordinate with MBTA Capital Delivery to ensure that the scope of the agreement or work does not interfere with other nearby MBTA projects.
9. Wall mounted signage and fixtures should not cause any structural damage to walls or obstruct security camera line of sight.
10. If at any time the MBTA deems the Applicant's activities as unsafe to its operations, infrastructure, customers, employees, or the general public, the Applicant must cease all work until safer conditions are established and approved by MBTA personnel.

If you have any questions or concerns, please feel free to contact me.
**Project Title:** River Street Infrastructure and Streetscape Project  
**Contract #:** City of Cambridge  
**Design %:** n/a  
**Delivery Type:** Electronic  
**SWA Log #:** 1328  
**Project Manager:** Brian Clarizia  
**Designer:** HDR  
**Review Date:** 03/30/22 – Reviewed by KQ  
**Follow Up Meeting?** No

<table>
<thead>
<tr>
<th>COMMENT</th>
<th>DRWG. NO.</th>
<th>SPEC. SECT.</th>
<th>REVIEWERS COMMENT</th>
<th>ACTION CODE</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td></td>
<td></td>
<td>System-Wide Accessibility (SWA) approves this project for the City of Cambridge River Street Improvement and Streetscape Project</td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td>General</td>
<td></td>
<td>The sidewalks, curb ramps, crosswalks, bus stops, signalized intersections such as APS, etc., if any, comply with all applicable regulations.</td>
<td></td>
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<tr>
<td>3.</td>
<td>General</td>
<td></td>
<td>Plans should include dashed outlines of ADA compliant turning radius and approach, such as, but not limited to turning radius in operator booth, approach of fare vending machines, clear floor space adjacent to benches.</td>
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<tr>
<td>4.</td>
<td>R. 1.07</td>
<td></td>
<td>All circulation intended to be the accessible routes and paths of travel must be stable, smooth and continuous hard surface areas. Pavers of any kind are not permitted in the path of travel.</td>
<td></td>
</tr>
</tbody>
</table>
May 13, 2022

Mr. Brian Clarizia  
Director of Licensing  
Massachusetts Realty Group  
20 Park Plaza, 11th Floor, Suite 1115A  
Boston, MA 02116

Re: MRG Request No. 17072  
City of Cambridge Utility Work, Central Square, Cambridge, MA

Dear Mr. Clarizia,

The MBTA Transit-Oriented Development Group has reviewed your March 11, 2022 request from the City of Cambridge for a license to construct utility and surface improvements at Massachusetts Avenue and River Street in Central Square, Cambridge, near the Red Line tunnel.

The work will include water main replacement, and curb and sidewalk construction, some of which will occur on Massachusetts Avenue above the Red Line tunnel and adjacent to certain inbound Central Square Station stairs and escalators.

This Department does not object to the proposed work; however, requires that the Applicant meet the following conditions.

1. Submit a Work Plan to the Transit Oriented Development (TOD) Group for review and acceptance at least five weeks prior to the start of work, identifying the means of protecting the tunnel and entranceways, and allowing for uninterrupted bus operations on Mass. Ave. through the construction period.

2. Coordinate with Red Line Operations, Bus Operations, Engineering & Maintenance, and Safety concerning notifications, scheduling, safety protocols, and ROW training for a pre- and post-construction tunnel photo survey and flagging services for the photo survey for which an MBTA Force Account Agreement shall be established through the TOD Group prior to commencing work.

3. Perform a pre- and post-construction photo survey of the Red Line tunnel in the area of construction and fifty feet on either side to monitor for any damage.

4. Any excavation within two feet of the tunnel roof shall be made using hand tools only.

5. Any repair to damaged tunnel waterproofing shall be made with an MBTA approved patch system only.

6. No load on the tunnel roofs shall exceed the AASHTO 20-HS loading.

8. Agree to terms and conditions governing access to the MBTA right-of-way, and assurance that there will be no interruptions to Red Line train movements or bus operations on Mass. Ave.

9. No work shall be permitted on and/or abutting MBTA property without an accepted Work Plan and submittals.

10. Any proposed change to the accepted Work Plan and submittals shall be brought to the attention of this office for review and acceptance prior to the work being performed.

11. All MBTA comments to the Work Plan and submittals shall be incorporated into a revised submittal or shall otherwise be resolved in writing to the satisfaction of this department.

12. MBTA reserves the right to stop work at any time if it is determined that the work poses unacceptable risk to MBTA customers, employees, operations, or infrastructure.

13. The Applicant shall bear all costs for MBTA personnel associated with the support of this project and may be required to enter into a Force Account Agreement to cover costs incurred by the MBTA, including MBTA TOD Project Office Staff and oversight by MBTA Capital Programs Support Field Staff for TOD.

14. The Applicant shall make any repairs to MBTA infrastructure necessitated by activities of the Applicant, which shall be performed by the Applicant at no cost to, and to the satisfaction of, the MBTA.

15. The Applicant will be responsible for any replacement transportation costs associated with any halt to MBTA services due to project activity.

This Department has no objections to this request subject to the conditions stated above. Any conditions that other MBTA Departments may have shall be incorporated with conditions stated above.

Please feel free to contact me at jmecca@mbta.com with any questions you may have.

Sincerely,

Jennifer Mecca, RA
Deputy Chief of Transit-Oriented Development

SELUX ANCHOR DETAIL

SHALLOW FOUNDATION AND ANCHORAGE DETAIL

12" ACORN PRECAST FOUNDATION DETAIL

1907 PRECAST FOUNDATION DETAIL

NOTES:
1. STRUCTURAL FASTENERS SHALL BE HOT DIPPED GALVANIZED AND CONFORM TO THE REQUIREMENTS OF AASHTO M232 (ASTM A153).

NOTES:
1 - CONCRETE 5000 PSI AT 28 DAYS
2 - REINFORCING: 6 - #6 VERTICALLY AND #4 TIES 12" O.C. HORIZONTALLY (NOT SHOWN)

381
ISSUED FOR BID