SPECIAL PROVISIONS

BELMONT AND WATERTOWN
Roadway Reconstruction and Related Work (Including Traffic Signals)
On a Section of Trapelo Road/Belmont Street

Labor participation goals for this project shall be 15.3% for minorities and 6.9% for women for each job category. The goals are applicable to both contractor's and subcontractor's on-site construction workforce. Refer to document 00820 for details.

SCOPE OF WORK

All work done under this contract shall be in conformance with the Massachusetts Highway Department *Standard Specifications for Highways and Bridges* dated 1988, the *English Supplemental Specifications* dated February 25, 2010, and the *Standard Special Provisions* contained in this book; the *2010 Construction Standard Details (English Edition)*, the *1996 Construction and Traffic Standard Details* (as relates to traffic standard details only); the *2009 Manual on Uniform Traffic Control Devices* with *Massachusetts Amendments*; the *1995 Construction and Traffic Standard Details*; the *1968 Standard Drawings for Traffic Signals and Highway Lighting*; the 1990 Standard Drawings for Signs and Supports; the latest edition of *American Standard for Nursery Stock*; the Plans and these Special Provisions.

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The work to be done under this Contract consists of full depth construction, pavement resurfacing, roadway drainage, sidewalk construction, relocation/installation of utility poles including MBTA poles, construction of traffic signals and the installation of signs, pavement markings and incidental work along the Trapelo Road/Belmont Street corridor in the Towns of Belmont and Watertown. The Contractor would be required to coordinate work with the MBTA which operates an electric trolley bus service along the Trapelo Road/Belmont Street corridor.

The pavement shall be in accordance with Section 450 Quality Assurance for Hot Mix Asphalt and Section 455 Superpave Hot Mix Asphalt Specifications

MBTA COORDINATION

It is brought to the Contractor's attention that the MBTA runs three transit systems within the project area:

- The commuter rail system that crosses under Lexington Street and Trapelo Road in Waverley Square and has a station in Waverley Square

- The diesel bus line #554 that runs between Waverley Square and Waltham traveling along Lexington Street and using Trapelo Road and Church Street with a stop on Trapelo Road

- The electric trolley line #73 that runs from Harvard Square and Waverley Square using Belmont Street and Trapelo Road. This is the line that will be most affected by the construction work and inversely will have the most affect on the construction work.

During the rush hours the electric trolleys that run along Trapelo Road and Belmont Street operate at five-minute intervals and have 14 stops in the eastbound direction and 15 stops in the westbound direction. The MBTA runs its transit systems on quarterly schedules. The Contractor is required to obtain these schedules and be familiar with the MBTA operations.

The Power System - The electric trolleys are powered by unsheathed high voltage direct current wires that are suspended about eighteen feet above the roadway surface. These wires are supported over the roadway by a "catenary" system consisting of pairs of steel poles spaced at intervals of about 100 feet. This system extends from the Cambridge City line to Waverley Square. The unsheathed electric cables are supported over the roadway by a steel cable suspended between the pair of steel "catenary" poles on either side of the roadway. They are fed by electric cables that are usually carried on top of the steel poles on one side of the roadway. In the commercial areas these "feeder" cables are usually in an underground system. No Construction equipment or personnel can come within ten feet of the overhead power cables, sheathed or unsheathed, or five feet of the support wires, while the system is energized. The Contractor shall note that the MBTA power system is de-energized every Sunday when the MBTA operates diesel busses along this route. If the power system needs to be de-energized for any time other than Sundays the MBTA will de-energize it for a three month period on three-month intervals coinciding with their quarterly schedules. For this project the MBTA plans to de-energize the power on the overhead catenary line on Trapelo Road between Benton Square (the intersection of Trapelo Road and Belmont Street) and Waverley Square (Trapelo Road between Lexington Street and White Street) during the entire period of active construction using heavy equipment. Furthermore, the MBTA will also de-energize the power on the overhead catenary line on Belmont Street between the Cambridge City line and Benton Square during the period that the MBTA's summer schedule is in effect. This is a major inconvenience to the daily users of this line and the number of system closing must be kept to a minimum. The contractor must schedule his work to minimize the number of system closings and coordinate very closely with the MBTA's Power Division and inform them of the need to de-energize the system at least six weeks in advance of the beginning of the quarterly schedule that the contractor needs it closed for. The Contractor will also need to justify the closing. Prior to submitting his request to the MBTA he must have it reviewed and approved by the Engineer. The contact at the MBTA for the de-energizing of the power system shall be Katherine Berlin, 617-222-6133 or Jack Martin, 617-222-3199

Bus Stops – No two adjacent bus stops in a particular direction can be closed at the same time. The bus stops at Waverley Square and Benton Square (except Summer schedule) cannot be closed and will need to be relocated as approved by the Engineer and the MBTA. The MBTA shall be notified one week in advance of any planned closing of a bus stop. The contractor shall install signs at the bus stops that will be closed at least two days in advance of the proposed closing or relocation. The signs design of the signs shall be approved by the MBTA. The contact at the MBTA for the closing of bus stops shall be Karen Burns 617-293-2097.

SUBSECTION 7.17 – TRAFFIC ACCOMMODATIONS

The Contractor shall do no work that will restrict traffic or close existing travel lanes during the weekday peak hourly volumes which occur between the hours of 7:00 AM to 8:30AM and 3:30 PM to 6:00 PM.

Upon commencement of construction, the Contractor shall submit the required work schedule to the Resident Engineer for distribution to the Towns of Belmont and Watertown.

TRAFFIC MANAGEMENT

The following conditions shall be followed unless otherwise required by the Engineer.

- At all times the Contractor shall maintain a minimum of one lane two-way travel on all streets, except where otherwise instructed or approved by the Engineer.

- At all times the Contractor shall keep one sidewalk open to pedestrians on either side of the street within the limits of the project.

- Reconstruction of intersections shall be carried out in a way such that all existing turning movements are maintained for local traffic.

- Pedestrian access shall be maintained to all abutting properties except for very short periods of time that are not to exceed one hour. When it is necessary to deny access to a property, the owner shall be informed at least 48 hours in advance.

- As there is no overnight parking allowed on the streets of Belmont and Watertown, vehicular access to the private drives shall be maintained from 5:00 PM to 6:00 AM. Access to commercial driveways shall be maintained for the full extent of the individual facilities operating hours.

- Work involving fire hydrants shall be done in accordance with instructions from the Town of Belmont and the Town of Watertown Public Works Departments.

- Alternating fire hydrants shall be kept operative at all stages of the construction, unless otherwise required in writing by the Engineer. No fire hydrant shall be out of order for more than 4 hours.

UTILITY WORK

The Contractor shall not violate the 10-foot clearance perimeter around the overhead wire of the catenary system when the system is energized. Furthermore, a 5-foot clearance perimeter is required to be adhered to around all elements of the catenary support system when energized. See the Traffic Management Plans for a graphical representation of the clearance requirements.

Immediately following execution of this contract, the Contractor must arrange for completion of all underground utility works within the first segment of the work likely to interfere with the construction process in that segment, prior to commencement of the roadway work. Where utility works interfaces with the roadway work, the Contractor shall carry out his work concurrently and in conjunction with the utility companies involved with the project so as to provide for all possible cooperation towards the satisfactory completion of the work with minimum delay and inconvenience.

It should be noted that all underground utility work within a particular segment must be completed before the milling and overlay of the roadway in that segment can begin unless otherwise approved by the Engineer.

The contractor will be installing underground structures and pipes close to existing MBTA catenary

poles. The contractor will be required to support MBTA poles in place during excavation for drainage lines and structures. The MBTA Power Dept. will need to review and approve the proposed support method prior to use. The cost of this work will be considered incidental to the cost of installing the structure, pipe, etc.

The Contractor is hereby made aware of the fact that there is an old, fragile 56" MWRA water supply conduit under the eastbound curb lane of Trapelo Road between Mill Street and Pleasant Street that turns across the westbound lanes of Trapelo Road and continuing along Pleasant Street. This line has a very shallow cover of between 24 and 30 inches according to record plans. The MWRA also has a smaller (20 inch) line in Common Street crossing Trapelo Road. The cover of the MWRA line in the north leg of Common Street has as little cover as 2.6 feet according to record plans. The cover of the MWRA line in the couth leg of Common Street is as little as 2.5 feet according to record plans. Profiles of these lines should be obtained from the MWRA prior to doing any work near them The Contractor must apply for an MWRA 8(m) permit at least three months prior to doing any work within 20 feet of these lines

Existing utility information shown on the drawings is believed to be correct as of the date of the field survey but such information is not guaranteed and must be verified by the Contractor for exactness.

SUBSECTION 8.03 – PROSECUTION OF WORK

All underground utility work in the area must be completed in any one roadway segment before roadway milling can begin on that segment. The project shall be broken up into no less than five approximately equal length segments unless approved otherwise by the Engineer and the Town.

Prior to milling and paving of the HMA Intermediate Course, all public and private castings within the affected roadway area shall be adjusted to a grade below the existing surface of the roadway. The distance in inches from the existing pavement surface to the top of the adjusted casting shall be such that the casting is about one inch below the finished milled surface grade. A detail of this initial adjustment of the castings in the roadway is included in the construction drawings. The intention is that the milling operation will expose these casting but the castings will not be so deep that they will need to be worked on prior to the placing of the HMA Intermediate Course. The castings of the MWRA water manholes, the MBTA manholes (when the system is energized), and the Belmont Municipal Light Department manholes shall be adjusted to below grade not more than three days before the surface is milled as the various utilities need access to these manholes at all times.
The pavement milling is to be performed over the full width without castings or obstructions.

The paving of the HMA Intermediate Course shall be over the entire milled surface without castings protruding above the intermediate surface for good compaction.

Immediately after the HMA Intermediate Course is in place the castings of the MWRA water manholes, the MBTA manholes (when the system is energized), and the Belmont Municipal Light Department, and catch basing castings shall be adjusted to the intermediate course grade followed by the other castings (water, sewer, gas, telephone) at the direction of the Engineer.

Utility trench backfill shall have 96% compaction per specifications. Excavation must be squared-off at the end of each day.

All utility castings shall be raised above the intermediate course grade to the proposed surface grade within two (2) weeks of the placement of surface course material is and not before two weeks. Raised castings are a major inconvenience to the public; therefore, no work on this project shall be allowed to proceed until surface course placement has begun unless otherwise required by the Engineer.

The method of construction described above shall be maintained until the completion of the project. Intermediate course material shall be placed when there is sufficient distance to permit efficient placement operations. The surface course shall not be allowed to be placed until after the entire project has been completed to intermediate course level or as directed by the Engineer.

CONSTRUCTION STAGING AND SCHEDULING

General Construction Stages

1. New Utility Installation

a. Within one month of the Contractor's notice to proceed notify all private utilities of the preliminary schedule and what is expected of them and when relative to the adjusting and relocating of their facilities within the project area.

b. Excavate test pits at locations identified on the plans and at all other suspect locations to determine if a conflict exists between the new drainage installation and the existing utility. Prepare a profile of the proposed drainage line showing the crossing of each of the existing utilities and identifying any problems or need for changes in the proposed drainage system or the alignment of the existing utility. Report the results back to the Engineer. The Engineer will instruct the Contractor as to the need to revise the plan for the proposed utility or have the existing utility relocated.

c. If the decision is to relocate the existing utility the Contractor shall initiate this effort. The Contractor will relocate any public utilities (drainage, water, sewer, MBTA) and give the private utilities (electric, cable, gas, telephone) and quasi public utilities (Belmont Municipal Electric Department) at least two months advance notice of the date they need to have their utility relocated.

d. Utility trenches shall be repaired as shown on the plans.

2. Utility Work prior to Milling

a. Within one month of the Contractor's notice to proceed notify all private utilities of the preliminary schedule and what is expected of them and when relative to the adjusting and relocating of their facilities within the project area.

b. Notify all private utilities again within one month of the date their castings in the roadway will need to be adjusted.

c. Adjust all existing drainage, water, sewer, MBTA, and MWRA, castings to below grade as detailed on the plans.

3. Roadway Milling

a. Mill roadway, half width at a time, the length of which shall be determined by the Contractor's ability to mill within a day's time. During the first half of the day operations, mill half of the roadway, and make the area suitable for traffic, while maintaining one lane of traffic in each direction.

b. During the second half of the day, switch traffic to the previously milled portion of roadway and repeat the sequence on the remaining section of roadway.

c. In residential areas parking will be restricted on both sides of the street during the milling operation. In the business areas parking will be eliminated only on one side of the roadway at a time except during the morning rush hour when parking will be eliminated on both sides of the street. Milling operations in the business areas will start at 7:00 AM.

d. Only as much milling will be done in a week as can be overlaid with intermediate course material that same week.

4. Pavement Repair

a. Repair existing pavement base in accordance with Section 450 Quality Assurance as required by the Engineer.

5. Intermediate Course

a. Pave HMA Superpave Intermediate Course.

6. Utility Work

a. After the Intermediate Course has been compacted, adjust all castings to the new intermediate surface grade as directed by the Engineer and as hereinbefore specified.

7. Sidewalks and Islands

a. Reset and relocate existing curbing and install new curbing.

b. Construct sidewalks and raised islands

8. Utility Work

a. Advise the private utilities at least one month in advance of their need to have their castings adjusted to finish grade within a specified two week period.

b. Adjust all public castings in the roadway to finish grade.

c. Perform and complete the above work in the two weeks immediately preceding the placement of the surface course

9. Surface Course

Pave HMA Superpave Surface Course.

NOTICE TO OWNERS OF UTILITIES

Written notice shall be given by the Contractor to all public service corporations or officials owning or having charge of publicly or privately owned utilities of his intention to commence operations affecting such utilities at least one week in advance of the commencement of such operations, and the Contractor shall at that time file a copy of such notice with the Engineer.

NAME	CONTACT PERSON	TELEPHONE
MassDOT District 4	Patricia A. Leavenworth	(781) 641-8300
519 Appleton Street	District Highway Director	
Arlington, MA 02476		
MassDOT District 4	Ray Stinson	(781) 641-8471
519 Appleton Street	Utility/Constructability Eng	ray.stinson@mhd.state.ma.us
Arlington, MA 02476		
Town of Belmont	Glenn R. Clancy, PE	(617) 993-2650
Department of Public Works, Eng'g	Town Engineer	
19 Moore Street		
Belmont, MA 02478		
Belmont Fire Department	David L. Frizzell	(617) 993-2200
299 Trapelo Road	Fire Chief	
Belmont, MA 02478		
Belmont Police Department	Ben Mailhot	(617) 993-2538
460 Concord Avenue	Traffic Safety Officer	
Belmont, MA 02478		
Town of Belmont	Michael R. Bishop	(617) 993-2700
Water Department		
19 Moore Street		
Belmont, MA 02478		
Belmont Highway Department	Peter Castanino	(617) 993-2680
19 Moore Street		
Belmont, MA 02478		
Belmont Municipal Light Dept	Jim Palmer	(617) 993-2817
40 Prince Street		
Belmont, MA 02478		

Watertown Public Works	Jay Pelletier	617-972-6420
124 Orchard Street		
Watertown, MA 02472		
Watertown Water Department	Steve Sampson	(617) 972-6420
124 Orchard Street		
Watertown, MA 02472		
MWRA - (Water Division)	Ralph Francesconi	(617) 305-5827
2 Griffin Way		
Chelsea, MA 02150		
Fire Alarm - Watertown Wire Dept	Steve Sampson	
124 Orchard Street		
Watertown, MA 02472		
Dept of Conservation & Recreation	Donald Guidoboni	(617) 626-1491
251 Causeway Street	Dir. Of Permitting	
Boston, MA 02114	Attn: Paul Trzcinski	
Verizon	Karen Nunes	(508) 991-3522
1166 Shawmut Ave.		
New Bedford, MA 02756		
National Grid Gas	Melissa Owens	(781) 907-2845
40 Sylvan Road, 2nd Floor,E. Wing		
Waltham, MA 02451		
NSTAR Electric	Steven Owens	(781) 441-8709
One NStar Way – SUM SE 310		
Westwood, MA 02090		
NStar Communications	Andrew Balta	(781) 441-3492
One NStar Way, NE 220		
Westwood, MA 02090		
Above Net Communications	Neil Bresnahan	(781) 760-3034
4 Powderhouse Road		
Medfield, MA 02052		
Comcast	Jean MacLaren	(603) 695-1461
676 Island Pond Road		
Manchester, NH 03109		
MBTA	James Duncan	(617) 222-4465
32 Cobble Hill Road		
Somerville, MA 02145		

MBTA (Power Division)	Jack Martin	(617) 222-3199
500 The Arborway		
Jamaica Plain, MA 02130		
MBTA (Transportation Division)	Kevin Kwok	(617) 222-6133
21 Arlington Avenue		
Charlestown, MA 02129		
MBTA (Safety Division)		
21 Arlington Avenue		
Charlestown, MA 02129		
MBTA	Ed Hunter	(617) 222-3117
10 Park Plaza – Room 6720		
Boston, MA 02116		
Mass Bay Commuter Railroad Co.	James Merrill	(617) 222-3614
32 Cobble Hill Road		
Somerville, MA 02143-4431		
US Postal Service	Christopher Cadorette	(617) 489-4201
405 Concord Avenue		
Belmont, MA 02478		

The latest contacts can be found at:
http://www.mhd.state.ma.us/WebApps/utilities/select.asp?t=BELMONT&d=4&c=27 and
http://www.mhd.state.ma.us/WebApps/utilities/select.asp?t=WATERTOWN&d=6&c=315.

The Contractor shall make it's own investigation in order to assure that no damage to existing structures, drainage lines, traffic signal conduits, etc., will occur. The Contractor shall notify "MASS DIG SAFE" and procure a DIG SAFE number for each location prior to disturbing existing ground in any way. The "Dig Safe" call center number is 1-888-344-7233.

PROTECTION OF MWRA UNDERGROUND FACILITY

The Contractor is advised of the existence of two critical MWRA water lines within the project corridor. There is a 56" aqueduct in Trapelo Road between Mill Street and Pleasant Street and a 20" water supply line in Common Street. The Contractor must prepare an 8(m) permit three months prior to any work proposed within 20 feet of these lines.

DESIGNER / PROJECT MANAGER

DESIGNER
BSC Group, Inc.
Mr. Peter J. Briere, PE
(617) 896-4331

PROJECT MANAGER
MassDOT
Albert Miller
(617) 973-7862

PRE-BID SITE VISIT AND COORDINATION WITH MBTA

MBTA operates an electric trolley bus system on Trapelo Road and Belmont Street from Waverley Square to the Cambridge city line. There are live electric overhead wires along greater section of the corridor that should be taken into consideration during construction. The Contractor is required to visit the site to become familiarized with the site conditions and account for the presence of the overhead wires in the construction methods. The Contractor would be required to coordinate with the MBTA if any work is within 10 feet of MBTA overhead wires. Where the nature of work requires power shut downs, the Contractor shall liaise with the MBTA and the Engineer to schedule such work.

NOTICE TO TOWN TREE WARDEN

All existing trees within the right of way fall under the jurisdiction of either the Town of Belmont's Tree Warden, Tom Walsh, (617)-993-2690 or the Town of Watertown's Tree Warden, Chris Hayward, (617)-972-6426. The Contractor shall provide to the Tree Warden the name and certification number of the arborist who will be in charge of roadside tree protection for review and approval at least thirty (30) days prior to the start of work. See roadside tree protection section for additional requirements. Contractor's arborist shall conduct a site walk with the Tree Warden, prior to starting work; to review protection procedures and other tree related issues.

NOTICE TO TOWN US POSTAL SERVICE

All existing postal mail boxes within the right of way fall under the jurisdiction of the United States Postal Service and no person(s)/company are allowed to remove or relocate any postal boxes because of the safety and sanctity of the mail. Also there is a safety issue concerning the public if the boxes are not lagged down to the ground properly. The mail in the boxes belongs to the Postal Service and must not be touched by anyone other than a Postal Service employee. There are approximately 40 postal boxes that will need to be moved out of the way to allow the work to proceed and then reinstalled went the work requiring the removal of the postal box is complete. The US Postal Service will remove and reset these boxes and it is the Contractor's responsibility to coordinate the work with the Belmont Office of the US Postal Service. The initial contact for the Contractor will be Christopher Cadorette at 617- 489-4201. The Contractor shell notify Mr. Cadorette of the tentative schedule of the work within one week of its notice to proceed and notify Mr. Cadorette or whoever he assigns at least one week in advance of the date that a postal box will need to be removed. The exact lead time will be determined by the US Postal Service.

PRESERVATION OF ROADSIDE GROWTH
(Supplementing Subsection 8.08)

The Contractor shall consult with the Town Tree Warden, Watertown or Belmont depending on the location of the tree, prior to removing any tree not designated on the plans to be removed or to disturb the grade underneath the canopy of trees along the project.

It shall be the Contractor's responsibility to provide adequate protection of trees within the work site through the full duration of the construction period. Maintenance and protection responsibilities shall include all portions of the tree and shrub, both above and below ground.

The Contractor shall take all measures to avoid grading within the drip line of existing trees to remain. Because some work will require disturbance within the drip line of many trees, the Contractor shall provide the services of a Massachusetts Certified Arborist, approved by the Engineer, during excavation work to provide root pruning and other services required to ensure the continued health of the trees. The cost of the Certified Arborist shall be incidental to the Tree

Protection and Pruning Items of these Special Provisions.

If damage occurs to an existing tree designated for protection during execution of the work, the Contractor's arborist shall review the damage and recommend repair procedures to the Engineer. The Contractor's Arborist shall be responsible for a detailed diary of all concerns or issues pertaining to tree injury, root injury, root excavation, limb removal, or the like.

Tree paint shall not be used.

For trees designated for protection, which as a result of damage, are determined by the Engineer to be unsafe and/or non-recoverable, the Contractor shall be required to replace the damaged tree(s), at no additional cost. Unless stipulated by the Engineer, the replacement trees shall measure, at a minimum, 2- inch to 2.5- inch caliper size, and shall replicate in the aggregate the equivalent caliper inches of the damaged tree(s) removed. Tree replacement, as required, shall include the furnishing of all labor, materials, equipment, tools, and transportation required to perform all operations required to complete tree replacement. The work shall include, but is not limited to: removal and disposal of all damaged tree material including stumps as applicable, installation of replacement trees, one year bonded guarantee, and maintenance.

Refer to Item 102.5 Roadside Tree Protection for additional requirements.

PROVISIONS FOR TRAVEL

Before starting any work under this Contract, the Contractor shall develop a Schedule of Operations as provided in Subsection 8.02. The work schedule shall include a plan of construction procedures and the safety measures that shall be used during the prosecution of the work as set forth in Section 850 of the Standard Specifications for Highways and Bridges.

As required by the Engineer, uniformed traffic police shall be employed for the protection and maintenance of traffic. Reasonable facilities shall be provided by the Contractor for the convenient and safe passage of pedestrians and vehicles through the project, and also to and from properties abutting the site of improvement. Particular care shall be exercised at all times to establish and maintain such methods of procedure as will not create hazards of an unusual nature. The prosecution of work on any roadway which would interfere with the existing flow of traffic shall be limited to approximately one-half the roadway width at any one time. At least one lane in each direction shall be kept open at all times. One lane, two-way traffic shall require prior written approval by the Engineer. In such instances, two police officers will be required to control traffic. No detouring of traffic shall be allowed without the Engineer's permission.

DISPOSAL OF EXCESS MATERIAL

Surplus materials obtained from any type of excavation, and all existing and other materials not required to be removed and stacked or needed for use on the project, as determined by the Engineer, shall become the property of the Contractor and disposed of subject to the regulations and requirements of local authorities governing the disposal of such materials, at no additional compensation.

MATERIAL TO BE STACKED

The Contractor shall carefully remove, transport and stack such materials at the following location:
Traffic Signal Equipment – On site to be picked up by the Belmont Municipal Light Department
Signs – On site to be picked up by the Belmont Public Works Department.

Catenary Poles – To be delivered to the MBTA at 500 Arborway, Jamaica Plain, or Alford Street in Charlestown, per MBTA decision.
Curbing, Edging, and Street Furniture – On site to be picked up by the Belmont Department of Public Works

The Contractor shall request from the Town and the MBTA a receipt for all materials received.

TRAFFIC SHOP DRAWINGS

It is intended that shop drawings not be required for traffic control signal materials and equipment that are on the Department's current "Approved List", except as indicated below. The Contractor, however, shall submit a list of the manufacturer's designations (catalog number, model number or revision number) for all equipment to be used in the installation of the traffic control signal system for which shop drawings are not required. This form, to be submitted by the Contractor, is to be titled "Traffic Signal Equipment Submittal List."

The following traffic signal items require shop drawing approval:

a. Mast Arms

Within fifteen (15) days after receipt of an approved shop drawing for any item, the Contractor shall provide the Engineer with written proof that he/she has ordered such approved materials required on the subject contract and a written confirmation that such order has been approved or released from fabrication, along with the expected delivery schedule from the manufacturers of the item. This delivery schedule shall be appropriate for timely completion of this project.

FINE TUNING, ADJUSTMENT AND TESTING PERIOD
(Supplementing Subsection 5.11)

Prior to the start of fine tuning period, the Contractor shall notify the Engineer in writing of the starting date.

SERVICE CONNECTIONS

The Contractor shall be responsible for the payment of all fees for services rendered in conjunction with service connections by utility companies under this project. The cost thereof shall be included in the lump sum price scheduled in the Proposal.

BOUNDS

The Contractor shall exercise due care when working around all existing bounds which are to remain. Should any damage to a bound result from the actions of the Contractor, it shall be replaced and/or realigned by the Contractor as required by the Engineer. No compensation shall be due the Contractor for materials and labor required to re-establish the bound in its proper location.

CONSTRUCTION SAFETY

The Contractor shall supply safety vests to his personnel and require that they be worn while working in or near the roadways of this Project. The cost of furnishing such vests shall be included in the lump sum price, and all such vests shall remain the property of the Contractor.

SHEETING AND BRACING

The Contractor shall furnish, place, and remove all sheeting and bracing required to support the sides of all trenches or other excavations for this Project.

The Contractor shall be solely responsible for the safety of the work people and the adjacent facilities from danger of caving and sliding, and all work to be done shall be in strict accordance with the Department of Labor, Occupational Safety and Health Administration regulations and suggested practices for construction excavation and/or other applicable codes and regulations. Special precautions shall be taken to guard against any damage to or settlement of pavements, buildings, walls, pipes, ducts or other structures and facilities which are adjacent to the work.

The cost of providing and removing sheeting, shoring and bracing shall be considered included in the lump sum price for the contract, and no additional compensation shall be allowed therefore.

GUARANTEE OF TRAFFIC SIGNAL SYSTEM AFTER FINAL ACCEPTANCE

The Contractor shall diagnose (trouble-shoot) the traffic control signal system and pay the cost of replacing any part of the traffic signal control equipment found to be defective in workmanship, material or manner of functioning within six months from date of final acceptance of all the installations under this Contract. This requirement does not affect the one-year warranty period on equipment specified in Subsection 815.20 of the Standard Specifications.

Upon the completion of the Project, and acceptance of the Project by MassDOT, the Contractor shall turn over all guarantees and warranties to the MassDOT/Town.

MAINTENANCE OF TRAFFIC SIGNALS

It shall be the responsibility of the Contractor to provide all labor, equipment, and material required for the total maintenance of all existing and proposed traffic signal control equipment, excluding damage by accidents, unless otherwise specified under Subsection 7.17 “Traffic Accommodations,” in which case Subsection 7.17 will govern.

The Contractor shall inspect all existing traffic signal locations for operational status before accepting the responsibility of their maintenance. Those signals that have defective equipment at the time of inspection shall be repaired with all costs borne by the Town of Belmont.

These provisions shall apply to all signalized locations included as a part of this Contract from the date of written notice given to the Engineer that the Contractor shall work on or adjacent to an existing signal until the date when the Engineer shall recommend acceptance of the completed Project. This written notice must be given before the Contractor may proceed with any work on a specific traffic signal location. For the purpose of these Special Provisions, the phrase “traffic signal control equipment” is intended to include, but is not limited to, controllers, signal housings, supporting structures, cabinets, wires, conduit, detectors, interconnect cable and all other ancillary equipment used for traffic control.

The cost of maintenance of signals shall be deemed to be included in the lump sum price of the Contract, and no additional payments shall be made therefore.

RECORD OF EXISTING CONDITIONS

The contractor shall prepare a digital record of the existing conditions of from the curbline to ten feet outside the roadway layout to help in settling disputes with the abutters, the Towns, and the utility companies. The record can be by digital photograph or video camera but needs to be thorough enough to record the existing conditions in detail from all angles as viewed from the sidewalk. At least three copies will be prepared with one given to the Engineer and one to the Designer.

CONTRACTOR QUESTIONS AND ADDENDUM ACKNOWLEDGEMENTS

Prospective bidders are required to submit all questions to the Construction Contracts Engineer by 1:00 P.M. on the Thursday before the scheduled bid opening date. Any questions received after this time will not be considered for review by the Department.

Contractors should email questions and addendum acknowledgements to the following email address massdot-specifications@mhd.state.ma.us. Please put the MassDOT project file number and municipality in the subject line.

BID BONDS

All bid bonds submitted to the Cashier's Office should read (in part) "… are held and firmly bound unto The Massachusetts Department of Transportation."

MASSHIGHWAY TO MASSDOT NAME CHANGE

The following definitions in Section 100 of the Standard Specifications for Highways and Bridges are revised as follows:

(Amend definition of Department)

1.17 –Department Effective November 1, 2009, St. 2009, c. 25 abolishes the Massachusetts Department of Highways and all assets, liabilities, and obligations become those of the Massachusetts Department of Transportation ("MassDOT). Anywhere in this contract the terms Commission, Commonwealth, Department of Public Works, Department, Massachusetts Highway Department, MassHighway, Party of the First Part, or any other term intending to mean the former Massachusetts Department of Highways is used, it shall be interpreted to mean MassDOT or applicable employee of MassDOT unless the context clearly requires otherwise. Furthermore, MassDOT by operation of law inherited all rights and obligations pursuant to any contract, and therefore parties to this contract hereby acknowledge and agree that its terms shall be liberally construed and interpreted to maintain the rights and obligations of MassDOT. Furthermore, the parties hereby acknowledge and agree that the transfer of all rights and obligations from the Massachusetts Department of Highways to MassDOT shall not have the effect of altering or eliminating any provision of this contract in a manner that inures to the detriment of MassDOT.

(Add a definition for MassDOT)

1.46 – MassDOT The Massachusetts Department of Transportation, a body politic and corporate, under St. 2009, c. 25 "An Act Modernizing the Transportation Systems of the Commonwealth", as amended.

ENGINEERING DIRECTIVES

Contractors can access MassDOT, Highway Division Engineering Directives at:
http://www.massdot.state.ma.us/highway/publications.aspx

MATERIALS OPTIONS

In the case of all option items listed in the proposal, the Contractor shall inform the Engineer of her/his option prior to the installation of the material. Once the option is designated, all material for the work shall remain the same throughout the job.

OPTIONS

Item

Item Number	Item Description	Unit
645.142	42 Inch Chain Link Fence (PTR) Vinyl Coated (Line Post Option)	Foot
645.148	48 Inch Chain Link Fence (PTR) Vinyl Coated (Line Post Option)	Foot
645.172	72 Inch Chain Link Fence (PTR) Vinyl Coated (Line Post Option)	Foot

APPROVED EQUIVALENT (Supplementing Subsection 5.03 and Section 6.00)

For any materials named or described in these specifications, an approved equivalent to that named or described in the said specifications may be furnished.

CONTRACTOR/SUBCONTRACTOR CERTIFICATION – CONTRACT COMPLIANCE (Revision 03-23-10)

Pursuant to 23 C.F.R. § 633.101 *et seq.*, the Federal Highway Administration requires each contractor to "insert in each subcontract, except as excluded by law or regulation, the required contract provisions contained in Form FHWA–1273 and further requires their inclusion in any lower tier subcontract that may in turn be made. The required contract provisions of Form FHWA–1273 shall not be incorporated by reference in any case. The prime contractor shall be responsible for compliance by any subcontractor or lower tier subcontractor with the requirements contained in the provisions of Form FHWA–1273." The prime contractor shall therefore comply with the reporting and certification requirements provided in MassDOT's CONTRACTOR/SUBCONTRACTOR CERTIFICATION Form (DOT-DIST-192) certifying compliance with 23 C.F.R. § 633.101 for each subcontract agreement entered into by the contractor. The contractor shall provide a fully executed original copy of said CONTRACTOR/SUBCONTRACTOR CERTIFICATION Form to MassDOT upon execution of any subcontract agreement. Failure to comply with the reporting and certification requirement of the CONTRACTOR/SUBCONTRACTOR CERTIFICATION Form may result in action against the prequalification status of the prime contractor with MassDOT.

SUBSECTION 4.04 CHANGED CONDITIONS.

This Subsection is revised by deleting the two sequential paragraphs near the end that begin "The Contractor shall be estopped…" and "Any unit item price determined …" (1/6/2006).

BIDDERS LIST

Pursuant to the provisions of 49 CFR 26.11 all official bidders will be required to report the names, addresses and telephone numbers of all firms that submitted bids or quotes in connection with this

project. Failure to comply with a written request for this information within 15 business days may result in a recommendation to the Prequalification Committee that prequalification status be suspended until the information is received.

The Department will survey all firms that have submitted bids or quotes during the previous year prior to setting the annual goal and shall request that each firm report its age and gross receipts for the year.

BUY AMERICA PROVISIONS (23 CFR 635.410)

(Supplementing Subsection 6.01 Source of Supply and Quality)
Federal law 23 CFR 635.410 requires that all manufacturing processes, including application of the coating, for steel and iron materials to be permanently incorporated in Federal-aid highway construction projects must occur in the United States. Coating includes all processes which protect or enhance the value of a material to which the coating is applied.

Foreign steel and iron may be used if the cost of the materials as they are delivered to the jobsite does not exceed 0.1% of the total contract cost or $2,500 whichever is greater.

PROMPT PAYMENT AND RELEASE OF RETAINAGE TO SUBCONTRACTORS

The Contractor agrees to pay each subcontractor under this prime contract for satisfactory performance of subcontract work not later than 10 business days from the receipt of each payment the prime contractor receives from the Department. Failure to comply with this requirement may result in the withholding of payment to the prime contractor until such time as all payment due under this provision has been received by the subcontractor(s) and/or referral to the Prequalification Committee for action which may affect the Contractor's prequalification status.

The Contractor further agrees to make payment in full, including retainage, to each subcontractor not later than 10 business days after the subcontractor has completed all of the work required under its subcontract.

ROADWAY FLAGGER (Supplementing Subsection 4.06)

MassDOT reserves the right to provide certified Roadway Flaggers who are MassDOT employees, at the discretion of the Engineer. The Contractor shall not be charged nor compensated for the use of MassDOT employee flaggers. Should the substitution of MassDOT employee flaggers result in the elimination or reduction of payable hours for Item 850.41 Roadway Flagger, the provisions of Section 4.06 Increased or Decreased Contract Quantities shall not apply. This item shall not be subject to renegotiation for any reason under Section 4.06 regardless of whether or not this item overruns or underruns.

ARCHITECTURAL ACCESS BOARD TOLERANCES

The Contractor is hereby notified that they are ultimately responsible for constructing all project elements in strict compliance with the current AAB/ADA rules, regulations and standards.

All construction elements in this project associated with sidewalks, walkways, wheelchair ramps and curb cuts are controlled by 521CMR - Rules and Regulations of the Architectural Access Board (AAB).

The AAB Rules and Regulations specify maximum slopes and minimum dimensions required for construction acceptance. There is no tolerance allowed for slopes greater than the maximum slope nor for dimensions less than the minimum dimensions.

Contractors shall establish grade elevations at all wheel chair ramp locations, and shall set transition lengths according to the appropriate table in the Construction Standards (or to the details shown on the plans).

All wheelchair ramp 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.

SUBSECTION 8.10 DETERMINATION AND EXTENSION OF CONTRACT TIME FOR COMPLETION (TIME EXTENSIONS)

Replace this Subsection with the following:

A. General

It is an essential part of all contracts that contractors shall perform the Work fully, entirely and in an acceptable manner within the contract duration.

The contract duration is based upon the requirements of public convenience and the assumption that the Contractor will prosecute the Work efficiently and with the least possible delay, in accordance with the maximum allowable working time, as specified in the Contract.

The contract duration has been carefully considered and has been established for reasons of importance to the Department. The contract duration will be enforced and it is understood that the Contractor accepted this concept at the time of the submission of the bid. The timing of the Notice to Proceed (NTP) has been taken into account in the determination of the contract duration and the timing of the issuance of the NTP shall not, by itself, be a reason for a time extension.

An extension of contract time will be granted only if entitlement to a time extension has been clearly demonstrated to the satisfaction of the Engineer by a documented time entitlement analysis, performed in accordance with the requirements of Subsection 8.02.E.8 - Time Entitlement Analysis.

B. Requests for Additional Contract Time (Time Extensions)

In response to a request for a time extension, an extension of contract time may be granted for demonstrated delays resulting from only one, or, in the case of concurrent delays, a combination of the following causes:

1. Extra Work

Each extra work order (EWO) proposal shall include an evaluation of the impact of the EWO on contract time, expressed in calendar days. If there is no impact to the contract time as a result of the EWO, the EWO shall indicate this by stating that zero (0) calendar days of additional time is being requested. The need for a time extension as a result of the EWO must be clearly demonstrated by a documented time entitlement analysis (TEA) performed by the Contractor in accordance with the requirements of Subsection 8.02.D.8. A documented preliminary TEA supporting the EWO proposal shall be submitted to the Engineer as part of the EWO proposal. Also see Subsection 4.03 – Extra Work and Subsection 4.05 – Validity of Extra Work.

2. Department-Caused Delays

If any part of the Work is delayed or suspended by the Department, the Contractor will be granted a time extension to complete the Work or any portion of the Work only if entitlement to this time extension has been clearly demonstrated by a documented time entitlement analysis. Department-caused delays shall not include delays to or suspensions of the Work that result from the fault or negligence of the Contractor. Also see Subsection 8.05 – Claim for Delay or Suspension of the Work.

3. Increased Quantities
Increased quantities of work may be considered as the basis for a time extension only if the requirements of Subsection 4.06 - Increased or Decreased Contract Quantities are met. The time allowed for performance of the Work will be increased based on increased quantities only if entitlement to this time extension has been clearly demonstrated by a documented time entitlement analysis. A decrease in quantities shall also require a time entitlement analysis to determine if a deduction of contract time is warranted.

4. Delays Not Caused by Contractor Fault or Negligence
When delays occur due to reasonable causes beyond the control and without the fault or negligence of the Contractor, including, but not restricted to: "Acts of God"; war, whether or not declared, civil war, insurrection, rebellion or revolution, or to any act or condition incident to any of the foregoing; acts of the Government; acts of the State or any political subdivision thereof; acts of other contracting parties over whose acts the Contractor has no control; fires; floods; epidemics; abnormal tides (not including Spring tides); severe coastal storms accompanied by high winds or abnormal tides; freezing of streams and harbors; abnormal time of Winter freezing or Spring thawing; interference from recreational boat traffic; use of beaches and recreational facilities for recreational purposes during the Summer season; abnormal ship docking and berthing; unanticipated use of wharves and storage sheds; strikes, except those caused by improper acts or omissions of the Contractor; extraordinary delays in delivery of materials caused by strikes, lockouts, wrecks, and/or freight embargoes; a time extension will be granted only if entitlement to a time extension has been clearly demonstrated by a documented time entitlement analysis.

An "Act of God" as used in this subsection is construed to mean an earthquake, flood, cyclone, hurricane, tornado, or other cataclysmic phenomenon of nature beyond the power of the Contractor to foresee and/or make preparations against. Additional consideration may be given to severe, abnormal flooding in local rivers and streams that has been reported as such by the National Weather Service. Rain, wind, snow, and/or other natural phenomena of normal intensity, based on National Weather Service reports, for the particular locality and for the particular season of the year in which the Work is being prosecuted, shall not be construed as an "Act of God" and no time extension will be granted for the delays resulting there from.

Within the scope of acts of the Government, consideration will be given to properly documented evidence that the Contractor has been delayed in obtaining any material or class of labor because of any assignment of preference ratings by the Federal Government or its agencies to defense contracts of any type.

5. Delays Caused by Public Service Corporations, Municipal Departments or Other Third Parties
If any part of the Work is delayed by public service corporations, municipal departments or other third parties, a time extension will be granted only if entitlement to a time extension has been clearly demonstrated by a documented time entitlement analysis. Also see Subsections 5.05 - Cooperation by Contractor, 5.06 - Adjacent Contracts and 8.04 - Removal or Demolition of Buildings and Land Takings.

C. Time Extension Determination

1. When the Contractor submits a request for a time extension, placing the Department on notice of a delay due to any of the causes listed in Subsection 8.10.B, it shall be submitted in writing to the Engineer within fifteen (15) calendar days after the start of the delay. No time extension will be granted if a request for a time extension is not filed within fifteen (15) calendar days after the start of the delay.

A documented preliminary time entitlement analysis (TEA) supporting the request for a time extension and meeting the requirements of Subsection 8.02.E.8 shall be submitted to the Engineer no later than fifteen (15) calendar days after the request for a time extension is submitted to the Engineer or thirty (30) calendar days after the start of the delay. A documented final TEA shall be submitted to the Engineer no later than fifteen (15) calendar days after the end of the delay. During the time between the preliminary and final TEAs, the delay shall be documented in statused contract progress schedules submitted in accordance with the requirements of Subsection 8.02.E.5.

2. No time extension will be granted for any delay or any suspension of the Work due to the fault of the Contractor.

3. No time extension will be granted if the request for a time extension is based on any claim that the originally established contract duration was inadequate.

4. Time extensions will only be granted for delays, including concurrent delays, to activities affecting contract milestones, the contract completion date and/or other critical path activities as demonstrated to the satisfaction of the Engineer by a detailed time entitlement analysis that clearly states the number of calendar days of extra time being requested.

5. The probable slowdown or curtailment of work during inclement weather and winter months has been taken into consideration in determining the contract duration and therefore no time extension will be granted, except as defined in Subsection 8.10.B.4.

6. Any work restriction related to weather, permit conditions, community accommodation, traffic or any other restriction specified in the Contract or reasonably expected for the particular locality and for the particular season of the year in which the Work is being prosecuted must be considered in the analysis of each individual time extension and shall not be considered, in itself, justification for an extension of time.

7. Any time entitlement analysis prepared for the purpose of requesting a time extension shall clearly indicate any proposed overtime hours or additional shifts that are incorporated in the schedule. The Engineer shall have final approval over the use of overtime hours and additional shifts and shall have the right to require that overtime hours and/or additional shifts be used to minimize the duration of time extensions if it is determined to be in best interest of the Department to do so.

D. Disputes

Any dispute regarding whether or not a time entitlement analysis demonstrates entitlement to a time extension, the number of days granted in a time extension or any other question of fact arising under this subsection shall be determined by the Engineer.

The Contractor may dispute a determination by the Engineer by filing a claim notice within fourteen (14) calendar days after the Contractor's request for additional time has been denied or if the Contractor does not accept the number of days granted in a time extension. The Contractor's claim

notice shall include a time entitlement analysis that sufficiently explains the basis of the time-related claim. Failure to submit the required time entitlement analysis with the claim notice shall result in denial of the Contractor's claim.

SUBSECTION 4.03 EXTRA WORK

Replace this Subsection with the following:

The Contractor shall do any work not herein otherwise provided for when and as ordered in writing by the Engineer, such written order to contain particular reference to this Subsection and to designate the work to be done as Extra Work.

Unless specifically noted in the Extra Work Order, Extra Work will not extend the time of completion of the Contract as stipulated in Subsection 8.10.

The determination of the Engineer shall be final upon all questions concerning the amount and value of Extra Work (except as provided in Subsection 7.16).

Payment for Extra Work will be provided in Subsection 9.03.

WARM-MIX ASPHALT (WMA)

The SUPERPAVE Hot Mix Asphalt Mixture shall be modified using a Warm-Mix Asphalt (WMA) additive capable of lowering plant production temperatures to below 260° F. Warm Mix Asphalt additives reduce compactive effort and permit lower production temperatures than conventional hot mix asphalt.

The WMA additive shall be a product listed on the Northeast Asphalt User Producer Group (NEAUPG) website (http://www.superpave.psu.edu/NEAUPG.html) or the WMA additive must be an approved equal.

No WMA foaming technology will be permitted which requires the mechanical injection of steam or water into the liquid asphalt. The WMA additive must be compatible with polyphosphoric acid modified and polymer modified asphalts and the HMA producer's HMA anti-stripping agents. The WMA additive shall be introduced in accordance with the Manufacturer's dosing rates and approved blending methods.

All Work done under this Item shall conform to the provisions of Sections 450 and 455. In addition to the provisions of Sections 450 and 455, laboratory prepared samples that have been manufactured at specified temperatures with and without the WMA additive shall be submitted to MassDOT at least 45 days prior to placement for testing. These samples shall be subject to testing for moisture damage and rutting. Preparation of these samples shall be coordinated with the MassDOT.

The WMA Manufacturer shall have an on-site representative at the beginning of paving operations. The Manufacturer's representative shall be available for additional consultation during the remaining Warm Mix production.

All costs associated with these provisions will be considered incidental. No additional compensation will be provided for the Manufacturer's representative, production of samples, the Warm Mix additive or other incidental costs.

ITEM 100.01 **SCHEDULE OF OPERATIONS – FIXED PRICE $82,500.00** **LUMP SUM**

The work under this item shall conform to the relevant provisions of Section 8.00 and Subsection 8.02 of the Standard Specifications revised as follows, the Plans, and the following:

SUBSECTION 8.02 SCHEDULE OF OPERATIONS - TYPE 2 ($10,000,001 - $50,000,000)

A. General Requirements

For Definition of Terms, see Subsection 8.02.B.

This Contract requires that a schedule control program be instituted by the Contractor to create a construction schedule that tracks and documents the progress of the Work from Notice to Proceed (NTP) through Final Acceptance.

This program requires the following schedule submittals to be made by the Contractor:

- Preliminary Schedule (first 120 Calendar Days after NTP)
- Contract Progress Schedules
- Short-Term Construction Schedules
- Summary Contract Progress Schedules
- Time Entitlement Analyses
- Recovery Schedules

The Contractor shall use computer software capable of preparing, statusing and revising Critical Path Method (CPM) schedules using precedence diagramming methods as approved by the Engineer.

The software shall be capable of printing activity reports and plotting CPM time-scaled logic diagrams, both of which shall be sortable by structures, facilities, subcontractors, submittals, deliveries, extra work orders and any other critical features of the Contract.
Within seven (7) Calendar Days after NTP, the Contractor shall submit to the Engineer sufficient information demonstrating that the CPM software it proposes to use on the Contract is fully capable of producing the specified schedules and tracking tools. The Engineer shall notify the Contractor in writing within seven (7) Calendar Days after receipt of the Contractor's notification on software (within fourteen (14) Calendar Days after NTP) if there are any objections to the CPM software selected.

The Basis of Payment for this work is shown in Subsection 8.02.F.

B. Definition of Terms

Activity - An element in the Contract Progress Schedule describing a discrete part of the Work and establishing the time required for completing that part of the Work.

Baseline Contract Progress Schedule - The initial version of the Contract Progress Schedule, accepted by the Department, with or without comments, and showing the Contractor's plan for completion of the Work within the Contract Time in effect at the start of the Contract.

Calendar Day - Any day of the year, regardless of whether or not work is performed by the Contractor, which day of the week on which it falls, or whether or not it is a holiday.

Critical Path - Any continuous sequence of activities in the Contract Progress Schedule that controls achievement of a Contract Milestone and/or the Contract Completion Date.

Construction Schedule - The Schedule which shows the Contractor's approach to planning, scheduling, and execution of the Work, referred to herein as the Contract Progress Schedule.

Contract Milestone - A Contract Milestone is a significant and key instant of time with a zero (0) duration that highlights progress made on the project. Contract Milestones are specified in Subsection 8.03 - Prosecution of Work or elsewhere in the Contract Documents.

Contract Progress Meeting - A weekly or every other week schedule meeting to review the progress on the Short-Term Construction Schedule, including, but not limited to, the actual completion percentage, a comparison of actual dates with early dates, and any additional information deemed pertinent for a full and complete discussion of the Short-Term Construction Schedule. See also Subsection 8.02.E.6.

Contract Progress Schedule - The Contract Progress Schedule shows how the Work is to be completed from Notice to Proceed through Final Acceptance. Contract Progress Schedules may be Baseline, Revised, or Statused versions. See also Subsections 8.02.E.3 through 8.02.E.5.
Contract Progress Schedule of Record - The Contract Progress Schedule of Record is the latest Contract Progress Schedule accepted by the Engineer and is the official schedule of the project.

CQE - Contract Quantity Estimate or pay estimate that occurs every two (2) weeks. Also known as the progress payment.

CPM - Critical Path Method is a computerized construction project planning and scheduling process where a construction project schedule’s critical path is the longest chain or path of activities leading to project completion.

Delays - Any slippage of the Early Dates in the Contract Progress Schedule which forecast a slippage in the Contract Milestone and/or the Contract Completion Date.

Early Completion Schedule - A CPM schedule showing completion of the Work ahead of the Contract Completion Date specified in Subsection 8.03 - Prosecution of Work or elsewhere in the Contract Documents.

Early and Late Dates - Early start or completion times and late start or completion times for the performance of activities in the Contract Progress Schedule.

Extra Work Order. A Contract Modification adding money and associated necessary time to the Contract. See also Subsection 8.10.B.1.

Final Acceptance - Full and complete satisfaction of the Contract Requirements, consisting of completion and acceptance of all physical work and submission and acceptance of all contractually-

required reports and other documentation. See also Subsection 5.11.

Float - Float shall be defined as the amount of time between when an activity can start or finish (Early Start or Early Finish Date) and when an activity must start or finish (Late Start or Finish Date.) Float is further defined as the amount of time any given activity or path of activities may be delayed before it will affect the Contract Time. Float belongs to the project and is a shared commodity between the Department and the Contractor and is not for the exclusive use or benefit of either party. Either party has full use of the float until it is depleted. The float may be claimed by whichever party first demonstrates a need for it, i.e., that any activities on the critical path, where float equals zero, any Contract Milestones and/or the Contract Completion Date have been delayed. The Contractor shall demonstrate this need in a Time Entitlement Analysis meeting the requirements of Subsection 8.02.E.8.

Fragnet - a mini-schedule or sub-network containing a logically-linked group of activities or durations that illustrate a distinct event or period of time in the Contract Progress Schedule. Fragnets are typically used as the schedule portion of a Time Entitlement Analysis (TEA) and are required to be submitted as part of a TEA. See also Subsection 8.02.E.8.

Logic Diagram - A logic diagram is a type of construction project schedule that shows the progression of the work as a network where activities are linked by arrows with the tail of the arrow connected to the predecessor activity and the head of the arrow connected to the successor activity. Logic diagrams may be either time-scaled or non-time-scaled.

NTP - Notice to Proceed. A letter sent to a contractor after Contract Award by the Director of Contracts and Records containing the contractual start and completion dates. The date of this letter is referred to as the NTP Date.

Pay Estimate - See CQE.

Preliminary Schedule - The Preliminary Schedule is a summary-level Contract Progress Schedule that shows how the Contractor plans to perform the Work for the first one hundred and twenty (120) Calendar Days of the Contract on a detailed basis and how it plans to perform the remaining portion of the Work from Notice to Proceed to Final Acceptance on a less-detailed basis. See also Subsection 8.02.D.

Recovery Schedule - A Recovery Schedule is a detailed Revised Contract Progress Schedule that changes the Contract Progress Schedule of Record to show how the Contractor plans to recover from or make up the contract time lost on the project's critical path due to a delay. See also Subsection 8.02.E.9.

Revised Contract Progress Schedule - A Revised Contract Progress Schedule incorporates activities, logic ties, and relationships added to or deleted from the Contract Progress Schedule of Record based on a Time Entitlement Analysis accepted by the Engineer. See also Subsections 8.02.E.4 and 8.02.E.8.

Short-Term Construction Schedule - A Short-Term Construction Schedule details the daily work activities for a thirty-five (35) Calendar Day period, the two (2) weeks prior to the Contract Progress Meeting and the three (3) weeks following the meeting in a bar chart format. The daily activities shall correspond to the Contract Progress Schedule activities, but shall be at a greater level of detail. See also Subsection 8.02.E.6.

Statused Contract Progress Schedule - A Statused Contract Progress Schedule is a monthly update of

the Contract Progress Schedule of Record. See also Subsection 8.02.E.5.

Substantial Completion - Substantial Completion occurs when either the Work has been completed except for work having a Contract Price of less than one (1) percent of the adjusted Total Contract Price or substantially all of the Work has been completed and opened to public use, except for minor incomplete or unsatisfactory work items that do not materially impair the usefulness of the Work. See also Subsection 7.15 - Claims Against Contractors for Payment of Labor, Materials and Other Purposes.

Summary Contract Progress Schedule - A Summary Contract Progress Schedule is a separate and distinct schedule based upon the internal coding of the Contract Progress Schedule. This coding shall allow a summary-level Contract Progress Schedule to be produced that identifies major physical classes, structures, facilities, and/or or other elements of the Work as discussed in Subsection 8.02.E.1. See also Subsection 8.02.E.7.

Time Entitlement Analysis (TEA) - A method of schedule delay analysis that shows the impacts of a particular delay by arranging the affected activities in a timeline of when the delay occurred. This allows the effect of a particular event or delay to be determined and illustrated. Fragnets are typically used as the schedule portion of a Time Entitlement Analysis (TEA) and are required to be submitted as part of a TEA. See also Subsection 8.02.E.8.

Work Day - Any day of the week on which work is performed by the Contractor, including Saturdays and Sundays, but excluding holidays observed by the Contractor.

C. Schedule Reviews

The Engineer will respond to each schedule submittal within fifteen (15) Calendar Days of receipt providing comments and disposition that either accepts the schedule or requires revision and resubmittal.

Schedules shall be resubmitted within fifteen (15) Calendar Days after receipt of the Engineer's comments.

The Engineer's comments will address whether items of the Work have been omitted, if activity durations are reasonable or that the means, methods, timing and/or sequencing of the Work are practicable. The planning, scheduling, and execution of the Work and the accuracy of their representation in the Contract Progress Schedule shall remain the sole responsibility of the Contractor.

The Contractor shall not be relieved from its responsibility for satisfactorily completing the Work within the specified Contract Time due to its failure to submit an acceptable Contract Progress Schedule.

Failure to submit schedules as and when required could result in the withholding of full or partial pay estimate payments by the Engineer.

D. Preliminary Schedule

The Preliminary Schedule shall be submitted to the Engineer within twenty-one (21) Calendar Days

after Notice to Proceed.

The Preliminary Schedule shall be a summary-level Contract Progress Schedule that shows the Work being completed in accordance with the Contract Milestones contained in Subsection 8.03 – Prosecution of Work or elsewhere in the Contract Documents. It shall incorporate the Contractor's detailed work activities for the first one hundred and twenty (120) Calendar Days of the Contract. The portion of the Preliminary Schedule addressing the remainder of the Work shall be in sufficient detail and content, including logic ties and durations, to show the Contractor's general plan for completion of the Work in accordance with the Contract Milestones.

At a minimum, the Preliminary Schedule, as well as all subsequent schedules described in Subsection 8.02.E, shall clearly define the progression of the Work from Notice to Proceed to Final Acceptance by using separate activities for each of the following items:

1) Notice to Proceed

2) Each component of the Work

3) Procurement of permit modifications by the Contractor or the Engineer

4) The preparation and submission of shop drawings and other required submittals, the duration of which shall be determined by the Contractor

5) The review and return of shop drawings and other required submittals, the duration of which shall be a minimum of thirty (30) Calendar Days, unless otherwise approved by the Engineer

6) Items to be paid, such as, engineering work, permanent materials and equipment (material on hand), such as unfabricated structural steel (raw materials), equipment procurement, and equipment delivery to the site or storage location

7) Interfaces with adjacent work, utility companies, other public agencies, sensitive abutters, and/or any other third party work affecting this Contract

8) Interim Milestones listed in Subsection 8.03 - Prosecution of Work or elsewhere in the Contract Documents

9) The critical path, clearly defined and labeled

10) Float shall be clearly identified as defined in Subsection 8.02.B

11) Substantial Completion per the requirements of Subsection 7.15 - Claims Against Contractors for Payment of Labor, Materials and Other Purposes

12) Punchlist Completion Period

13) Physical Completion per the requirements of Subsection 5.11 - Final Acceptance

14) Documentation Completion per the requirements of Subsection 5.11 - Final Acceptance

15) Final Acceptance per the requirements of Subsection 5.11 - Final Acceptance

The work activities identified for the first one hundred and twenty (120) Days shall be in sufficient detail to support the pay estimate for that period, including all activities which the Contractor is required to perform or plans to perform and for which the Contractor intends to receive payment as specified in Subsection 9.01 – Measurement of Quantities.

The Preliminary Schedule shall be prepared and submitted in accordance with Subsections 8.02.E.1 and 8.02.E.2.

The Preliminary Schedule shall be valid for one hundred and twenty (120) Calendar Days after Notice to Proceed. The Preliminary Schedule will be superseded and replaced by the Baseline Contract Progress Schedule following its acceptance by the Engineer. If the Baseline Contract Progress Schedule not be accepted by the Engineer within one hundred and twenty (120) Calendar Days after Notice to Proceed, the Contractor shall revise the Preliminary Schedule to include the additional work activities that have occurred during the time period that has elapsed after the previous time period of one hundred and twenty (120) Calendar Days after Notice to Proceed, status the schedule as required by Subsection 8.02.E.5 and resubmit it no less than every two (2) weeks until the Baseline Contract Progress Schedule is accepted by the Engineer. This revised, statused Preliminary Schedule shall be called the Statused Preliminary Schedule. For Baseline Contract Progress Schedule requirements, see Subsection 8.02.E.3.

No pay estimate shall be approved by the Engineer until the Preliminary Schedule has been submitted to the Engineer, unless otherwise agreed to by the Engineer.

E. Contract Progress Schedules

1. Requirements for all Contract Progress Schedules

All Contract Progress Schedules listed in Subsection 8.02.A and described in Subsections 8.02.E.3 through 8.02.E.9 shall fully conform to the following requirements:

a. LOGIC: The Contract Progress Schedule shall divide the Work into activities with appropriate logic ties, to show; (i) the Contractor's overall approach to the planning, scheduling and execution of the Work, (ii) consistency with the requirements of this Subsection, (iii) the Contractor's approach to conformance with any sequences of Work required by the Contract Documents, including, but not limited to, Subsection 8.03 - Prosecution of Work and Subsection 8.06 – Limitations of Operations.

b. ACTIVITIES: The Contract Progress Schedule shall clearly and separately define the progression of Work from Notice to Proceed to Final Acceptance by using separate activities as described in Subsection 8.02.D.

c. EARLY AND LATE DATES: Early Dates consist of Early Start and Early Finish dates. The Early Start date is the earliest date an activity can start or commence. The Early Finish date is the earliest date an activity can finish or be completed. Late Dates consist of Late Start and Late Finish dates. The Late Start date is the latest date an activity can start without delaying or lengthening the duration of the project. The Late Finish date is the latest date an activity can finish or be completed without delaying or lengthening the duration of the project.

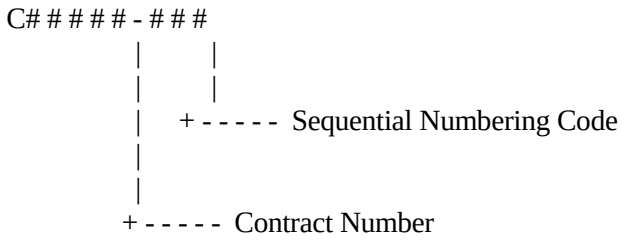
d. DURATIONS: Activity durations shall be in Work Days. Durations shall be regulated by a work breakdown structure (WBS) of physical elements of the Work determined by work discipline, station

number, or structure, which reflect the time the Contractor and/or Subcontractors require to perform the related work.

e. ITEMS TO BE PAID: The Contractor shall specifically identify in the Contract Progress Schedule all items of permanent materials and equipment (Materials On Hand) for which the Contractor intends to request payment, in accordance with Subsection 9.04 - Partial Payments, prior to the incorporation of such items into the Work.

f. ACTIVITY DESCRIPTIONS: The Contractor shall use standard activity descriptions in all Contract Progress Schedules that clearly describe the work to be performed using a combination of words, structure numbers, station numbers, bid item numbers, work breakdown structure (WBS) and/or elevations in a concise and compact label.

g. ACTIVITY IDENTIFICATION NUMBERS: The Contractor shall use the standard activity identification numbering system specified below for all activities in all Contract Progress Schedules:



- Contract Number - The first seven (7) characters of the activity identification number shall consist of a "C" for Contract followed by the five (5) digit Department contract number and ended with a dash.

- Sequential Numbering Code - The second set of characters in the activity identification number, the actual number of characters to be determined by the Contractor, shall consist of a sequential numbering system created by the Contractor denoting work breakdown structure (WBS), locations, station numbers, major areas of construction, structure types, structure designations, class of work, type of activity, bid item number, milestone number, phase of the Work and/or any other type of information that the Contractor wishes to include in its activity identification numbering code.

h. ACTIVITY CODES: The Contractor shall use all of the following sortable standard activity codes in all Contract Progress Schedules:

Code	Code Designation
DIST	MassDOT Highway Division District Number
TOWN	City / Town Name
MSNO	Contract Milestone Number Designation
BIDI	Bid Item Number Designation
STRUC	Type of Structure Designation
RESP	Organization Responsibility Code
OTHR	Other Field
PHAS	Phase of the Work or of the Construction Schedule

DIST – MassDOT Highway Division District Number: A one-digit code corresponding to the MassDOT Highway Division District in which the project is located:

1	MassDOT Highway Division District 1
2	MassDOT Highway Division District 2
3	MassDOT Highway Division District 3
4	MassDOT Highway Division District 4
5	MassDOT Highway Division District 5
6	MassDOT Highway Division District 6
S	MassDOT Highway Division Statewide

TOWN – City / Town Name: A four (4) letter code using the first four letters of the name of the city or town in which the project is located.

Example:

MANS	Mansfield

MSNO – Contract Milestone Number Designation: A two (2) digit code corresponding to the Contract Milestone number contained in Subsection 8.03 - Prosecution of Work that is at the end of the activity's sequence chain.

Example:

03	Milestone No. 3 – Substantial Completion

BIDI – Bid Item Number Designation: A seven (7) digit code corresponding exactly, including periods and spaces, to the bid item number with which the activity is associated.

Example:

975.3	Metal Bridge Railing
PCM	Activity added by Proposal or Contract Modification

PROJ – Primary Project Type: A one (1) or two (2) letter code corresponding to the primary project type or type of structure as shown below. Additional codes may be added by the Contractor as approved by the Engineer.

BC	Bridge Modification or Rehabilitation
BN	Bridge New
BR	Bridge Replacement
BP	Bike Path
CB	Catch Basin
D	Demolition
H	Highway Reconstruction (local road or state highway)
HI	Highway Reconstruction (interstate highway)
P	Painting
R	Resurfacing
S	Surfacing
TS	Traffic Signals
TU	Tunnels

U Utilities
V Vertical Construction (Chapter 149)

RESP – Organization Responsibility Code: A one (1) to five (5) digit code corresponding to the initials of the organization responsible for performing the work contained in the activity. Examples of this coding are:

MIW McGrath Iron Works
BCEC Bay City Electric Company
MBTA Massachusetts Bay Transportation Authority
CSX CSX Railroad Corporation
MDOT Massachusetts Department of Transportation Highway Division

OTHR – Other Field: A seven (7) digit code reserved for the exclusive use of the Engineer as required for coding miscellaneous items such as contract modifications, submittal activities, time and material work, force account work, or other category of work activity that may prove to need such coding during the progress of the Work.

XXX A description of something other than the above.

i. CALENDARS: Different calendars may be created and assigned globally, i.e., applying to all activities, or individually to each activity. Calendars define the available hours of work in each Calendar Day, Holidays and general or project-specific non-Work Days. Examples of non-Work Days include, but are not limited to:

- Winter Shutdown Period: December 1 thru March 15. This may be optional depending on any requirements that may be stated elsewhere in this Contract.
- Peak traffic hours on heavily traveled roadways
- Special requirements by sensitive abutters, railroads, utilities and/or other state agencies.
- Cape Cod Summer Roadway Work Restrictions: While these restrictions may be project-specific based on such factors as the exact location of the project, whether or not the roadway involved has a high traffic volume and/or is a main route, its proximity to beaches and other popular tourist attractions, and its overall impacts on traffic and tourism, they are generally enforced between Memorial Day and Labor Day, unless otherwise directed by the Engineer.
- Cape Ann Summer Roadway Work Restrictions: While there are no general restrictions for Cape Ann as there are for Cape Cod, project-specific restrictions may be enforced based on the same factors listed above for Cape Cod.
- Turtle and Fish Migration Periods and/or other in-water work restrictions: Project-specific
- Working over Waterways Restricted Periods: Project-specific
- Night-time paving and striping operations temperature restrictions: Project-specific

j. NOT TO BE USED: Unspecified milestones or constrained dates, scheduled work not required for the accomplishment of a Contract Milestone, use of activity durations, logic ties and/or sequences deemed unreasonable by the Engineer, delayed starts of follow-on trades, or use of float suppression techniques contrary to the provisions of Subsection 8.05 – Claim for Delay or Suspension of the Work shall not be used in the Contractor's Progress Schedule.

k. FLOAT: See Subsection 8.02.B.

l. THIS SECTION NOT USED.

2. Contract Progress Schedule Reporting and Submittal Requirements

All Contract Progress Schedules listed in Subsection 8.02.A and described in Subsections 8.02.E.3 through 8.02.E.9 shall be prepared and submitted in accordance with the requirements listed below.

Each Contract Progress Schedule submittal shall be uniquely identified.

Contract Progress Schedules shall be prepared using the computerized construction scheduling software described in Subsection 8.02.A and approved by the Engineer.

All Contract Progress Schedule submittals shall include each of the following documents, prepared in two formats; copied to three (3) compact discs (CD) and three (3) copies plotted on paper, for distribution as follows: one (1) copy each for the Boston Construction, District Construction and Resident Engineer's Offices:

a. Narratives

A Narrative is a written description of the schedule that shall:

(i) itemize and describe the flow of work for all activities on the Critical Path;

(ii) compare Early and Late Dates for activities on the Critical Path;

(iii) show progress highlights and quantify Work Days gained or lost versus the Contract Progress Schedule of Record;

(iv) describe the Contractor's plan, approach, methodologies, and resources to be employed for completing the various operations and elements of the Work;

(vi) itemize shifts, Holidays, and if multiple calendars are applied to the activities, uniquely identify each calendar.

b. Bar Charts

Time-scaled bar charts shall be prepared using a scale that yields readable plots and that meet the requirements of Subsection 8.02.E.1. Activities shall be linked by logic ties and shown on the Early Dates. Critical paths shall be highlighted and Total Float shall be shown for all activities. The paper plots of schedule Bar Charts shall be as follows:

24" X 36"-sized paper shall be used for Baseline Schedules, Revised Contract Progress Schedules and Recovery Schedules;

11" X 17" - sized paper shall be used for all other schedule types and Time Entitlement Analyses. These may be submitted as a .pdf file, if approved by the Engineer.

c. Time-scaled Logic Diagrams

Time-scaled logic diagrams shall be prepared using a scale that yields readable plots and that meet the requirements of Subsection 8.02.E.1. Activities shall be linked by logic ties and be shown on the Early Dates. Critical paths shall be highlighted and Total Float shall be shown for all activities. Paper plots of time-scaled logic diagrams shall be submitted as stated in Subsection 8.02.E.2.b - Bar Charts

d. Detailed Activity Schedule Comparisons

A Detailed Activity Schedule Comparison is a simple reporting tool in the format of a graphical report that will provide Resident Engineers with immediate, timely and up-to-date information. The Detailed Activity Schedule Comparison consists of an updated bar chart that overlays the previous time period's bar chart for an easily-read comparison of progress during the present and previous reporting periods. Simple instructions for creating Detailed Activity Schedule Comparisons appear on the MassDOT Highway Division website at: http://www.massdot.state.ma.us/Highway/

e. THIS SECTION NOT USED.

f. THIS SECTION NOT USED.

g. THIS SECTION NOT USED.

3. Baseline Contract Progress Schedule

The Baseline Contract Progress Schedule shall be due seventy-five (75) calendar days after Notice to Proceed. The Baseline Contract Progress Schedule shall only reflect the Work awarded to the Contractor and shall not include any additional work involving extra work orders or any other type of alleged delay.

The Baseline Contract Progress Schedule shall include all activities and content contained in the Preliminary Progress Schedule for the first one hundred and twenty (120) Calendar Days after NTP. Variations from the durations, logic, and work plan identified in the Preliminary Progress Schedule shall be limited to correction of errors in logic and/or addition of detail. All changes shall be clearly highlighted and identified and explained and justified in writing as part of the Contract Progress Schedule Narrative required in Subsection 8.02.E.2.a.

The Baseline Contract Progress Schedule shall be prepared and submitted in accordance with Subsections 8.02.E.1 and .2.

Once the Baseline Contract Progress Schedule has been accepted by the Engineer, with or without comments, it will represent the as-planned schedule for the Work. It shall then be known as the Baseline Schedule and shall be the Contract Progress Schedule of Record until such time as the schedule is updated or revised under Subsections 8.02.E.4 and .5.

Failure to submit a Baseline Contract Progress Schedule within seventy-five (75) Calendar Days after Notice to Proceed could result in withholding of full or partial payments by the Engineer. Beyond one-hundred and fifteen (115) Calendar Days after Notice to Proceed, no pay estimate will be approved by the Engineer until the Baseline Contract Progress Schedule has been submitted, unless otherwise agreed to by the Engineer.

4. Revised Contract Progress Schedules

Upon review and acceptance by the Engineer of revised activities and/or logic ties contained in Time Entitlement Analyses prepared in accordance with Subsection 8.02.E.8 or Recovery Schedules prepared in accordance with Subsection 8.02.E.9, these changes shall be incorporated into the next Statused Contract Progress Schedule as a Revised Contract Progress Schedule. A Revised Contract Progress Schedule shall be due with the pay estimate immediately following the Engineer's acceptance of the schedule changes.

Revised Contract Progress Schedules shall include a comprehensive listing of all activities added to or deleted from the Contract Progress Schedule of Record as well as a complete listing of all logic and activity relationship changes which have been made. All changes shall be clearly highlighted and identified and explained and justified in writing as part of the Contract Progress Schedule Narrative required in Subsection 8.02.E.2.a.

Revised Contract Progress Schedules shall be prepared and submitted in accordance with Subsections 8.02.E.1 and .2.

Once a Revised Contract Progress Schedule has been returned by the Engineer to the Contractor as "Resubmittal Not Required", it shall become the Revised Contract Progress Schedule of Record, meaning it shall be used for subsequent Statused Contract Progress Schedules.

Except as otherwise designated by a Contract Modification, no Revised Contract Progress Schedule that extends performance beyond the Contract Time and/or any Contract Milestone shall qualify as a Revised Contract Progress Schedule of Record.

5. Statused Contract Progress Schedules

Statused (Updated) Contract Progress Schedules shall be submitted by the Contractor along with the first pay estimate of each month.

A Statused Contract Progress Schedule shall consist of the following:

1. A Schedule Narrative consistent with Subsection 8.02.E.2.a.

2. A Summary Contract Progress Schedule consistent with Subsection 8.02.E.7.

Each Statused Contract Progress Schedule shall reflect updated progress to the status date and shall forecast the finish dates for in-progress activities and remaining activities, but shall not change any activity descriptions, durations, or sequences without the acceptance of the Engineer. Updated progress shall be limited to as-built sequencing and as-built dates for completed and in-progress activities. As-built data shall include actual start dates, remaining Work Days, and actual finish dates for each activity.

Statused Contract Progress Schedules shall be prepared and submitted in accordance with Subsections 8.02.E.1 and .2 along with the first pay estimate of the month, but no later than fourteen (14) Calendar Days after the pay estimate submittal.

Accepted Statused Contract Progress Schedules shall update and replace the Contract Progress Schedule of Record.

Statused Contract Progress Schedules submitted later than fourteen (14) Calendar Days after the pay estimate submittal will be deemed to be no longer useful and will not qualify for payment. However, failure to submit a Statused Contract Progress Schedule within any monthly period, whether on time or late, could result in the withholding by the Engineer of the remainder of the pay estimate payment due for that time period.

6. Short Term Construction Schedule

The Contractor shall provide a Short Term Construction Schedule that details the daily work

activities, including multiple shift work that the Contractor intends to conduct, in a bar chart format. The daily activities shall correspond to the Contract Progress Schedule activities, but shall be at a greater level of detail.

The Short- Term Construction Schedule shall be submitted at each Weekly or Bi-Weekly (every two (2) weeks) Contract Progress Meeting, but, regardless of the frequency of progress meetings, shall be submitted no less often than once every two (2) weeks. It shall display all work for a thirty-five (35) Calendar Day period: completed work for the two (2) week period prior and all planned work for the three (3) week period following the Contract Progress Meeting or the end of the previous two (2) week period.

The Contractor shall be prepared to discuss the Short Term Construction Schedule, in detail, with the Engineer in order to coordinate field inspection staff requirements, schedule of work affecting abutters, and corresponding work with affected utilities.

Short Term Construction Schedules shall be prepared and submitted in accordance with Subsections 8.02.E.1 and 8.02.E.2.

Failure to submit Short Term Construction Schedules at each Contract Progress Meeting could result in withholding of full or partial pay estimate payments by the Engineer.

7. Summary Contract Progress Schedule

The Summary Contract Progress Schedule is not a separate, stand-alone schedule that must be formally submitted by the Contractor, unless requested by the Engineer, but is a schedule that is created using the internal coding of the detailed Contract Progress Schedule. The Contract Progress Schedule shall be coded such that a summary-level Contract schedule may be produced that identifies major physical classes, structures, facilities or other elements of the Work as discussed in Subsection 8.02.E.1. The durations of summary activities shall coincide with the Contract Time and Contract Milestones shown in Subsection 8.03 - Prosecution of Work. The activity descriptions for all summary-level activities shall be subject to the review and acceptance of the Engineer.

8. Time Entitlement Analysis

A Time Entitlement Analysis (TEA) consists of a descriptive narrative, prepared in accordance with Subsection 8.02.E.2.a, and an as-built CPM schedule, in the form of a fragnet, see Subsection 8.02.B - Definition of Terms, that has been developed from the project's Contract Progress Schedule of Record, see Subsections 8.02.E.3-5, and illustrates the impact that additional time, added to the Contract Progress Schedule of Record by a delay or an extra work order, has on the Contract Progress Schedule of Record's critical path, Contract Milestones, and/or Contract Completion Date. TEAs shall be used to determine the schedule impact of extra work orders. A TEA may also be referred to as a Proposal Schedule, a Time Impact Analysis or a Time Impact Evaluation.

TEAs shall incorporate all proposed activities and logic ties required to implement the extra work order or other schedule impacts as well as detailing all impacts on existing activities, logic ties, the critical path, Contract Milestones, and the Contract Completion Date. In addition, TEAs shall accurately reflect any changes made to activities, logic ties, and restraints, necessitated by the extra work order, for the completion of the remaining work.

Any TEA prepared for the purpose of requesting a time extension shall clearly indicate any proposed overtime hours or additional shifts that are proposed to be incorporated in the schedule. The Engineer

shall have final discretion over the use of overtime hours and additional shifts and shall have the right to require that overtime hours and/or additional shifts be used to minimize the duration of time extensions if it is determined to be in best interest of the Department to do so.

TEAs shall be prepared and submitted in accordance with the requirements of Subsections 8.02.E.1 and 2 and shall be based on the Contract Progress Schedule of Record for the time the delay starts.

TEAs shall be submitted as part of an extra work order submission, a request for a time extension or within fourteen (14) Calendar Days after a request for a TEA by the Engineer.

When accepted, the changes included in a TEA shall be incorporated into a Revised Contract Progress Schedule per the requirements of Subsection 8.02.E.4 and resubmitted to the Engineer.

Failure to submit a TEA within fourteen (14) Calendar Days of a request from the Engineer could result in withholding of full or partial pay estimate payments by the Engineer.

9. Recovery Schedules

The Contractor shall promptly report to the Engineer all schedule delays during the prosecution of the Work.

In addition, a Recovery Schedule shall be required whenever the Critical Path of the Contract Progress Schedule of Record exceeds the greater of:

a.) A delay of twenty (20) Calendar Days, or

b.) A delay equal to 5% of the Calendar Days remaining until the Contract Completion Date due to any of the three situations listed below:

1. If the contractor is behind schedule due to the fault of the contractor.

2. If the contractor anticipates becoming behind schedule due to the fault of the contractor.

3. When the delay is not the fault of the Contractor and the Department chooses to recover the lost time and requests a proposal to achieve that.

Recovery Schedules shall be prepared and submitted in accordance with Subsections 8.02.E.1 and .2 within fourteen (14) Calendar Days of any of the cases listed above.

Failure to submit a Recovery Schedule when and as required could result in withholding of full or partial pay estimate payments by the Engineer.

10. Disputes

All schedules shall be submitted, reviewed, dispositioned, and accepted in the timely manner specified in Subsection 8.02.C so as to provide the greatest possible benefit to the execution of this Contract.

Any dispute concerning the acceptance of a schedule or any other question of fact arising under this subsection shall be determined by the Engineer.

Pending resolution of any dispute, the last schedule accepted by the Engineer will remain as the Contract Schedule of Record as described in Subsections 8.02.E.3-5.

F. Basis of Payment

1. All required schedule-related work, including, but not limited to, computer software, schedule preparation and schedule submittals will be paid under Pay Item 100.01 as defined below.

2. Failure to submit schedules within the time periods stated elsewhere in this subsection could result in the withholding of full or partial Contract pay estimate payments by the Engineer.

3. A fixed price of $ 82,500 will be provided to the Contractor for the Project Schedule Submittal requirements contained herein. The Contractor is advised that this "fixed price" value is separated from what the Department considers to be the Contractor's general condition costs for payment purposes only. If the Contractor deems it necessary to include additional costs to provide all of the requirements of this section, these additional costs shall be included in the Contractor's general conditions. The fixed price payment item shall be earned as a fixed amount set by the Department at the time of the bid. Each bidder shall include this fixed price bid item value in the total bid value. Failure to do so will be grounds for the rejection of the bid.

4. Twenty percent (20%) of this pay item will be paid upon receipt by the Engineer of the Contractor's Baseline Schedule, prepared and submitted in accordance with Subsection 8.02.E.3.

5. The remaining eighty percent (80%) of this pay item will be paid in equal monthly installments distributed across the time remaining until the time that the payment occurring immediately after Substantial Completion has been made. This calculation will be subject to revision should Substantial Completion be delayed beyond the original calculation date.

PAY ITEM
100.01 SCHEDULE OF OPERATIONS - FIXED PRICE $82,500 LS

ITEM 102.3 SHRUB TRIMMING FOOT

GENERAL
The work to be done under this Item shall be done in conformance with the relevant provisions of Section 120 of the Standard Specifications, as directed by the Engineer, and the following:

The work to be done under this Item shall consist of the trimming of shrubs, as noted on the Plans, and as directed by the Engineer.

METHOD OF MEASUREMENT
Item 102.3 Shrub Trimming shall be measured by the foot, along the edge of the roadway, sidewalk, or limit of work, or as called out on the Plans.

BASIS OF PAYMENT
Item 102.3 Shrub Trimming will be paid for at the contract unit price, which price shall include all labor, materials, equipment, and incidental costs required to complete the work.

ITEM 102.4 HAND EXCAVATION ROOT ZONE SQUARE YARD

GENERAL
The purpose of this item is to prevent damage to underlying utilities during installation of trees and related improvements.

The work under this item shall include hand excavation and construction of protective measures for utilities, and shall conform to the relevant provisions of Sections 101, 102, and 771 of the Standard Specifications and the following:

EXAMINATION OF CONDITIONS
It shall be the responsibility of the Contractor to carefully identify, the depth of existing utilities. Excavate to the proposed grades with as little impact to existing utilities as is possible. Where conflicts between the proposed improvements and existing utilities occur the Contractor shall stop work immediately and contact the Engineer for a determination as to how to proceed.

METHOD OF MEASUREMENT
Item 102.4 Hand Excavation Root Zone will be measured for payment per square yard as called out on the plans, complete in place.

BASIS OF PAYMENT
Item 102.4 Hand Excavation Root Zone will be paid for at the contract unit price per yard, which price shall include all labor, material, excavation, equipment and incidental costs required to complete the work.

No separate payment shall be made for certified arborist, but all costs in connection therewith shall be included in the Contract unit price bid.

ITEM 102.5 ROADSIDE TREE PROTECTION EACH

GENERAL
The purpose of these items is to prevent damage to branches, stems and root systems of existing trees to remain and ensure their survival. Provisions under this item include steps to minimize disturbance and to construct protection measures for trees close to construction areas.

It shall be the responsibility of the Contractor and the Contractor's arborist to ensure adequate protection of all trees within the work site through the full duration of the construction period. Maintenance and protection responsibilities shall include all portions of the tree above and below the ground. See Preservation of Roadside Growth (supplemental Subsection 8.08) for additional information.

The work under this item shall conform to the relevant provisions of Sections 101 and 771 of the Standard Specifications and the following:

EXAMINATION OF CONDITIONS
The Contractor shall be solely responsible for judging the full extent of the work requirements, including, but not necessarily limited to any equipment and materials required for providing tree

protection.

Prior to execution of work the Contractor shall walk the entire length of the project with the Engineer, the Town Tree Warden's, and Massachusetts Certified Arborist retained by the Contractor.

SUBMITTALS

Incidental to this item, the Contractor shall provide to the Engineer one (1) copy each of "Standards for Pruning Shade Trees" of the National Arborist Association, 174 Route 101, Bedford, New Hampshire, 03102, and American National Standards Institute (ANSI) Standard Z-133.1, and A300 Standard Practices for Tree, Shrub, and Other Woody Plant Maintenance, Part 1: Pruning. These references shall be kept by the Engineer at his office for the length of the Contract.

Prior to start of work, the Contractor shall submit to the Engineer the name and certification number of the Massachusetts Certified Arborist referenced herein. Cost for Certified Arborist for all activities pertaining to this Item shall be incidental to this item.

TREE FENCING AND ARMORING

All existing trees within the limits of the work, which are marked on the Plans to be protected, shall be protected by snow fence, chain link fence or other acceptable device in order to avoid tree damage. The Contractor's arborist shall stake out the drip zones for review by the Engineer and the Town's Tree Warden. The tree protection barrier utilized by the Contractor shall be subject to the approval of the Engineer. The minimum height of the protective barrier for trees shall be 4 feet. Additionally, wooden slats shall be placed around the trunk as shown on the details. All trees that sustain bark, root, or trunk damage caused by the Contractor's work force during the course of the work shall be repaired immediately by an experienced Massachusetts Certified Arborist, with proper tools, and according to proper horticultural practices.

Bark, root, or trunk damage caused by the Contractor's work force during the course of the work shall be repaired immediately by an experienced Massachusetts Certified Arborist, with proper tools, and according to proper horticultural practices.

PROTECTION FROM STAGING

To avoid compaction of existing roots, the stockpiling of heavy equipment, debris or construction material within the protected tree root zone area and/or drip line of designated protected trees is strictly prohibited. No plants shall be used for crane stays, guys or their fastenings. Upon notification by the Engineer, any material placed in this unauthorized zone shall be removed immediately. If access is required in drip zones, a 4-inch depth of wood chips, seasoned at least one year, shall be installed to reduce compaction. If determined by the Engineer in consultation with the Tree Warden, that damage has occurred, the Contractor shall be required to undertake corrective measures including but not limited to aeration, fertilization, and watering.

The securing of signs, barricades, temporary wire, cable and other materials to trees is prohibited.

PRUNING

Branches broken or torn during construction shall be examined by the arborist and where required removed back to the nearest lateral branch. The cut shall be made at the branch collar. The indiscriminate lopping off of a damaged branch shall not be accepted. All pruning tools shall be cleaned between trees to reduce the spread of disease and insects.

PROTECTION FROM EXCAVATION

The Contractor shall take due care to protect aerial branches from damage while performing work within the site. All low branching trees shall be protected from equipment damage and disturbance. Alternative operations shall be utilized to preserve smaller trees where required.

During Examination Arborist shall determine the best method for excavation around existing tree roots based upon Massachusetts Arborist Association and the National Arborist Association standards of care.

Excavation in drip zone areas (beyond Hand Excavation Root Zone.) where major roots (3" or greater) are present shall minimize the tearing or ripping of tree roots. Roots shall first be cleanly severed as far from the trunk of the tree as possible prior to continuing with the excavation, or otherwise avoided to prevent damage to the root. Tree roots shall not remain exposed. Root ends shall be covered within two hours of exposure with soil or burlap and kept moist until the final backfill or grade is established. See also Item 102.40 Hand Excavation Root Zone.

The removal of existing sidewalk within the drip zone shall be conducted carefully. The existing subgrade material under the sidewalk shall be reused, if it is deemed appropriate by the Engineer, in order to avoid damage to the tree roots.

Root pruning shall be performed using tools and machines designed specifically for this purpose. The size and type of tools and machine used shall be governed by the referenced standards and as acceptable to the Engineer. Root pruning shall be completed prior to base or subgrade preparation.

Watering shall be provided for trees that in the opinion of the arborist have been compromised by root damage or if natural precipitation is not acceptable (less than 1 inch per week averaged over 1 month). Trees shall receive min. 50 gal. per week. Watering shall be by a slow flow method that will allow the water to percolate thoroughly into the soil. Methods shall be as approved by the Engineer.

Where required to repair damage to trees by the Contractors work, such care shall include but shall not necessarily be limited to trimming, irrigation and fertilizing. Contractor's Arborist, in conjunction with the Tree Warden, will inspect any trees suffering apparent significant damage for stability and vitality. For trees determined to be viable and stable, preservation care shall be provided as required herein.

METHOD OF MEASUREMENT

Item 102.5 Roadside Tree Protection will be measured for payment per each as called out on the plans, complete in place.

BASIS OF PAYMENT

Item 102.5 Roadside Tree Protection will be paid for at the contract unit price per each, which price shall include all labor, material, equipment and incidental costs required to complete the work. Excavation will be paid for separately under Items 102.4 Hand Excavation Root Zone, and Item 120 Earth Excavation.

No separate payment shall be made for certified arborist, but all costs in connection therewith shall be included in the Contract unit price bid.

ITEM 127. CONCRETE EXCAVATION CUBIC YARD

GENERAL

The work under this Item shall be done in conformance with the relevant provisions of Section 120, as required by the Engineer, and the following:

When encountered within the limits of roadway and trench excavation or as required by the Plans, reinforced or unreinforced cement concrete shall be removed and legally disposed off-site

METHOD OF MEASUREMENT

Concrete excavation will be measured by the cubic yard in its original encountered position by measuring the surface area of concrete to be removed and measuring the depth to be removed.

BASIS OF PAYMENT

Payment shall include all labor, tools, and equipment required to excavate, remove, and dispose off-site of the cement concrete.

ITEM 129.3 OLD PAVEMENT EXCAVATION CUBIC YARD

GENERAL

The work under this Item shall consist of the excavation of old pavement materials at the locations shown on the plans, as required by the Engineer, and the following:

The work to be performed under this Item shall conform to the relevant provisions of Section 120 of the Standard Specifications.

METHOD OF MEASUREMENT

Old pavement excavation will be measured in their original position by the cross section method, except where such measurement is impracticable, the volume shall be such other methods as the Engineer may determine.

BASIS OF PAYMENT

Old pavement excavation will be paid for at the Contract unit price per cubic yard of the type of excavation as defined hereinbefore.

ITEM 129.52 TRACK EXCAVATION – TWO RAILS FOOT
ITEM 129.54 TRACK EXCAVATION – FOUR RAILS FOOT

GENERAL

The work under this Item shall be done in conformance with the relevant provisions of Section 120, as required by the Engineer, and the following:

The work under this Item shall consist of the excavation, removal, and disposal of the existing steel tracks and concrete foundation with either two or four rails with approved pavement breaker and/or pavement saw, including the removal and discarding off-site of the rails, ties, drainage pipe, switches, sidings, and the concrete, brick or stone foundation materials.

METHOD OF MEASUREMENT

Item 129.52 Track Excavation – Two Rails and Item 129.54 Track Excavation – Four Rails will be measured by the linear foot in place by measuring the length to be removed. Disposal of any wooden ties shall be as described under Item 184.1 Disposal of Treated Wood Products.

BASIS OF PAYMENT

Item 129.52 Track Excavation – Two Rails and Item 129.54 Track Excavation – Four Rails will be paid for at the Contract unit price, per foot, which price shall include the removal and discarding of

steel rails, switches, sidings, drainage pipe, concrete, reinforced concrete, concrete ties, and all labor, tools, and equipment required to excavate, remove, and dispose off-site of the tracks and foundation. Disposal of any wooden ties will be paid for under the Item 184.1 Disposal of Treated Wood Products.

ITEM 153. CONTROLLED DENSITY FILL – EXCAVATABLE CUBIC YARD

GENERAL
Work under this item shall conform to the relevant provisions of Section 150 of the Standard Specifications and the following.

The Contractor is made aware that steel plates that are required are incidental and no additional payments will be required should plating be necessary for locations where the Engineer directs the use of CDF.

The work shall consist of furnishing and placing controlled density fill in areas where the required compaction is not practicable, in trenches adjacent to structures, and/or as required by the Engineer.

Controlled density fill shall meet the requirements of Sections M4.08.0 of the Standard Specifications for controlled density fill - Type 2E.

METHOD OF MEASUREMENT
Item 153. Controlled Density Fill-Excavatable will be measured per cubic yard complete in place.

BASIS OF PAYMENT
Payment for this item shall be at the Contract unit price per cubic yard, which price shall include material, labor, complete in place as directed by the Engineer.

ITEM 180.1 HEALTH AND SAFETY PLAN LUMP SUM

GENERAL
It is the Contractor's ultimate responsibility to ensure the health and safety of all the Contractor's employees and subcontracting personnel, the Engineer and his representatives, and the public from any on-site chemical contamination.

A check of electronic records maintained by the Massachusetts Department of Environmental Protection (DEP) revealed the presence of five oil and hazardous material (OHM) release sites proximal to the project route that have the potential causing contamination soil and groundwater within the project area.

- **Property, 1010 Pleasant Street, Belmont (RTN 3-2296 and 3-14403):** A release of diesel fuel to soil and groundwater was discovered during removal of an underground storage tank. Subsurface investigations revealed that soil contamination is localized to the rear of the property and that groundwater, which was encountered at depths between 9 and 18 feet below grade, flow to the south away from Pleasant Street. Contamination at this site is not expected to impact the reference project.

- **Mobil Service Station, 337 Pleasant Street, Belmont (RTN-3-0093 and 3-21120):** Leaking underground storage tank(s) released of petroleum products to soil and groundwater. Free-phase petroleum product was also encountered floating on groundwater. A groundwater recover and soil vapor extraction system are operated at the site. A well located in Brighton Street close to Pleasant Street is used for groundwater monitoring. Roadway work in the vicinity of this site must not

interfere with or cause damage to the remedial system for the Mobil station site. The well in Brighton Street should be preserved and protected from damage.

- **Frm. Gasoline Station, 768 Pleasant Street, Belmont (RTN-3-3494):** A release of waste oil.

- **Lenny's Service Station, 768 Pleasant Street, Belmont (RTN-3-4762):** A release of petroleum product to soil and groundwater occurred. Subsurface investigations indicate that soil contamination is localized at the rear of the property. Groundwater is assumed to flow to the south-southeast towards Pearson Brook and away from Pleasant Street. The contamination at this site is not expected to impact the project.

- **Getty Service Station, 350 Pleasant Street (RTN 3-18200):** Release of gasoline to the paved road surface.

- Detailed information on OHM releases at 359-363 Pleasant Street and 350 Pleasant Street was not obtained. However, available information suggests that the likelihood of impacts to OHM release sites located between 350 and 1010 Pleasant is low.

In areas where excavation work will be conducted to install new or replacement drainage structures and lines, the Contractor should be aware of possible OHM impacts due to contaminated soil and groundwater.

The Health and Safety Plan (HASP) shall be prepared by a Certified Industrial Hygienist or other experienced individual with the appropriate OSHA required training to prepare such a plan. It shall include the components required by OSHA 29 CFR 1910.120(b). The preparer's name and work experience shall be included as part of the Health and Safety Plan submittal. The plan shall be designed to identify, evaluate, and control health and safety hazards and provide for emergency response if needed. The Health and Safety Plan shall be a dynamic document with provision for change to reflect new information, new practices or procedures, changing site environmental conditions or other situations, which may affect site workers and the public. Health and safety procedures provided by the Contractor shall comply with all the appropriate regulations that address employee working conditions (e.g., OSHA, RCRA, CERCLA). In addition, guidelines of NIOSH, OSHA, USCG, EPA, etc., shall be followed. Equipment used for the purpose of health and safety shall be approved and meet pertinent standards and specifications of the appropriate regulatory agencies.

The Health and Safety Plan shall be submitted to the Engineer for approval at least four weeks prior to commencement of work. The review and acceptance of the plan by the Department does not relieve the Contractor of the responsibility for attaining the required degree of protection and training, or to comply with all laws, rules, regulations, standards or guidelines in effect during the execution of the contract.

A copy of the Health and Safety Plan shall be maintained on-site at all times by the Contractor. The on-site copy shall contain the signature of the Engineer and each on-site employee of the Department, Contractor and Subcontractors. The employee's signature on the Health and Safety Plan shall be deemed prima facie evidence that the employee has read and understands the plan. A copy of the plan with signatures shall be submitted to the Engineer at the conclusion of the Contract, or at the Engineer's request. Signature sheets shall be submitted monthly, or at the request of the Engineer.

BASIS OF PAYMENT

The work to be done under this Item will be paid at the Contract Lump Sum Price under Item 180.1 for the development and preparation of the HASP by a qualified individual.

ITEM 180.2 IMPLEMENTATION OF HEALTH AND SAFETY PLAN HOUR

GENERAL

For all construction activities, which require handling or exposure to potentially hazardous materials, the Health and Safety Plan shall specify an on-site Safety Officer. The Site Health and Safety Officer duties shall include, but are not limited to: implementation of the Site Health and Safety Plan, training, evaluating risks, safety oversight, determining levels of personnel protection required, and performing any required monitoring at the site. A Daily Log shall be kept by the on-site Safety Officer and provided weekly to the Engineer. This log shall be used to record a description of the weather conditions, levels of personnel protection being employed, monitoring data and any other information relevant to on-site safety conditions. The Site Health and Safety officer shall sign and date the Daily Log.

In the event that subsurface contamination is discovered during construction, the Site Safety Officer shall be present to oversee all handling, storage, sampling, and transport of such contaminated materials.

The level of protection, relative to respiratory and dermal hazards, required to ensure the health and safety of on-site personnel shall be stipulated in the Health and Safety Plan and will be subject to modification by the on-site Safety Officer based on changing site and weather conditions and the following factors: type of operation or activity, chemical compounds identified on-site, concentration of the chemicals, physical state of the hazardous materials, potential duration of exposure to hazardous materials, dexterity required to perform work, decontamination procedures, required personnel and equipment, and type of equipment to be utilized.

The Contractor shall be required to provide appropriate personnel protective equipment for anyone who is working in an area either containing or suspected of containing a hazardous environment. This work will include both individuals physically working in these areas and those directing the work of same. Contingencies for upgrading the level of protection for on-site workers will be identified in the Health and Safety Plan and the Contractor shall have the required materials/equipment on hand to implement the level of protection upgrade in a timely manner. Payment for this level of upgraded protection will be paid for under Item 180.3.

METHOD OF MEASUREMENT

Item 180.2 Implementation of the Health and Safety Plan will be measured for payment by the hour, per person, of implementing the plan.

BASIS OF PAYMENT

Item 180.2 Implementation of the Health and Safety Plan will be paid for at the contract unit price per hour, per person, of implementing the plan and shall include the cost of enforcement by an on-site Safety Officer. Personnel protective clothing and equipment below Level "C" shall be considered incidental to the project and shall be a cost borne by the Contractor.

ITEM 180.3 PERSONNEL PROTECTION LEVEL 'C' UPGRADE HOUR

GENERAL

The Contractor shall provide to all workers disposable, protective clothing appropriate to the hazard

level of the work. The protective equipment and its use shall be in strict compliance with the Health and Safety Plan (Item 180.1), and all appropriate regulations that address employee working conditions.

METHOD OF MEASUREMENT

Item 180.3 Personnel Protection Level 'C' Upgrade will be measured for payment by the hour, per person.

BASIS OF PAYMENT

Item 180.3 will be paid for at the contract unit price, per hour, per man, required in level 'C' personnel protection.

ITEM 180.4 MONITORING/HANDLING AND STOCKPILING OF CONTAMINATED SOILS CUBIC YARD

GENERAL

The On-Site Safety Officer or Environmental Consultant shall be responsible for evaluating soil with non-natural discoloration, petroleum or chemical odor, the presence of petroleum liquid or sheening on the groundwater surface or any abnormal gas or materials in the ground which are known or suspected to be contaminated with oil or hazardous materials. Soil suspected of gasoline contamination shall be field tested using the jar headspace procedures according to Department of Environmental Protection Bureau of Waste Site Cleanup Interim Policy #WSC-94-400 (Remedial Waste Management Policy for Petroleum Contaminated Soil) and the Bureau of Waste Prevention Policy #COMM-97-001 (Reuse and Disposal of Contaminated Soil and Massachusetts Landfills). The Engineer shall be contacted immediately when any results indicate contamination requiring soil removal or when contamination not detectable by on-site instrumentation is suspected.

The Contractor shall be required to supply all personnel and materials required to comply with this section and to support the anticipated levels of protection and monitoring described above.
Within limited areas of the project site, it is likely that excavated soils may be contaminated. Where possible, all soils originally in contact with groundwater will be replaced in the same trench up to the existing groundwater level. All soils determined to be contaminated by metals or petroleum products, through the monitoring/evaluation program will be stockpiled for disposal in accordance with all Massachusetts Department of Environmental Protection statutes, policies, and regulations.

The Environmental Consultant/Contractor shall be responsible for identifying a disposal/recycling facility and obtaining all permits, approvals, Bill of Lading, etc. prior to the removal of the contaminated soil from the site. Any soils contaminated with hazardous materials that are not of petroleum origin shall be handled on a case-by-case basis. The contractor shall obtain at least three bids for the handling and disposal of any contaminated material. All manifest, bills of lading, etc. shall be the responsibility of the Contractor with copies provided to the Department. The Contractor is also responsible for hiring a Licensed Site Professional (LSP), as needed, for oversight and Bills of Lading, etc.

METHOD OF MEASUREMENT

Item 180.4 Monitoring/Handling and Stockpiling of Contaminated Soils will be measured by the volume, in cubic yards of contaminated material monitored, handled and/or stockpiled as described under Item 180.4.

BASIS OF PAYMENT

Item 180.4 Monitoring/Handling and Stockpiling of Contaminated Soils will be paid at the Contractor bid price, per cubic yard, which payment shall be considered compensation for all labor, tools, equipment and materials needed to do the work as described above.

ITEM 181.1 DISPOSAL OF CONTAMINATED SOILS TON

GENERAL

The contractor shall be responsible for the proper disposal or recycling of contaminated soils. The proper methods of disposal and recycling of contaminated soils shall comply with the methods described under Item 180.4 and in accordance with all Massachusetts Department of Environmental Protection and Environmental Protection Agency statutes, policies, and regulations. The following are disposal options for contaminated soils. MassDOT prefers methods involving recycling options.

DIRECTLY LANDFILLED HAZARDOUS WASTE

TREATED AND LANDFILLED HAZARDOUS WASTE

INCINERATED HAZARDOUS WASTE

DISPOSAL OF SPECIAL WASTE SOIL

PETROLEUM CONTAMINATED SOIL RECYCLED AT ASPHALT BATCH FACILITY

METHOD OF MEASUREMENT
Item 181, Disposal of Contaminated Soils will be measured by the weight, in tons, of contaminated material removed from the site and delivered to an approved landfill, disposal facility, or recycling facility, and includes any costs for approvals, permits, testing, transportation and disposal.

BASIS OF PAYMENT
Item 181, Disposal of Contaminated Soils will be paid at the contractor's unit bid price, per ton, which payment shall be considered full compensation for all labor, tools, equipment, permits, shipping papers and materials required to do the work as described above.

ITEM 184.1 DISPOSAL OF TREATED WOOD PRODUCTS TON

DESCRIPTION
Work under this item shall include the removal and disposal of all treated existing wood product as directed by the Engineer. The timber components of the existing structure are suspected to be treated with creosote, pentachlorophenol and/or CCA. This item shall include all costs for sampling, laboratory testing, loading, transportation and disposal of the treated wood. The Contractor is required to submit disposal manifests to the Engineer prior to the completion of the project. All aspects of this Item are to be completed in accordance with state and federal regulations.

COMPENSATION
Method Of Measurement
Measurement of Item 184.1 Disposal of Treated Wood Products shall be by the weight, in tons, of treated timber accepted at a licensed facility.

Basis Of Payment
Payment for this Item shall be at the unit price per ton, which price shall be the full compensation for all labor, tools, equipment, materials, testing, loading, transportation, approvals, and permits necessary for the completion of the work.

ITEM 201.5	**CATCH BASIN – MUNICIPAL STANDARD**	**EACH**
ITEM 201.52	**CATCH BASIN – MUNICIPAL STANDARD TYPE 2**	**EACH**
ITEM 201.53	**CATCH BASIN – MUNICIPAL STANDARD TYPE 3**	**EACH**
ITEM 201.54	**CATCH BASIN – MUNICIPAL STANDARD TYPE 4**	**EACH**

GENERAL
The work under these items shall conform to the relevant provisions of Section 200 of the Standard Specifications and the following:

Catch basins and manholes constructed under these items shall conform to the applicable construction details included on the plans.

METHOD OF MEASUREMENT
Items 201.5 – 201.54Catch Basins, will be measured for payment per each, complete and in place, including excavation and all appurtenances as shown on the details, except for the castings.

BASIS OF PAYMENT
Items 201.5 – 201.54, will be paid for at the respective Contract unit price per each, complete and in place, including excavation, bedding, backfill, trap, and all appurtenances as shown on the details, except for the castings. New castings will be paid under Item 222.2 Frame and Grade (or Cover) Municipal Standard and 224.12 12" Hood. Where required by the Engineer, the Contractor shall reuse existing castings obtained from structures removed or abandoned elsewhere on the project or from the Town yard at no additional compensation. Payment should be according to Standard Specifications Subsection 201.80 except that the standard depth for the structure will be 7' 6" except for Type 4 which will be 3' 8".

Catch Basin – Municipal Standard Type 2 requires a double frame and grate for each structure as shown on the plans. The double frame and grates will be measured as two units for each structure and will be paid for under Item 222.2, Frame and Grate (or Cover) Municipal Standard .

ITEM 220. DRAINAGE STRUCTURE ADJUSTED EACH

GENERAL
The work performed under these items shall conform to the relevant provisions of Section 220 of the Standard Specifications and the following:
The adjustment of the MWRA Water Manholes will also be adjusted under this item. It is anticipated that most of the drainage structures in the roadway will need to be adjusted three times, once to a level below the existing roadway surface just before the milling of the roadway, once immediately after the binder course is applied and once immediately before the surface course is applied. Only the final adjustment will require a concrete collar.

METHOD OF MEASUREMENT
Item 220. Drainage Structure Adjusted will be measured per unit each complete in place.

BASIS OF PAYMENT
Payment for Item 220. shall be at the respective Contract unit price. This unit price shall include all labor, materials, and equipment required to adjust the casting to the desired elevation.

ITEM 220.4 GALVANIZED CURB COVER EACH

GENERAL
The work performed under these items shall conform to the relevant provisions of Section 220 of the Standard Specifications and the following:
The Galvanizes Curb Cover shall conform to the detail and specifications included in the appendix of these Special Provisions.

METHOD OF MEASUREMENT
Item 220.4 Galvanized Curb Cover will be measured each complete in place.

BASIS OF PAYMENT
Payment for Item 220.4 shall be at the respective Contract unit price. This unit price shall include all labor, materials, equipment and transportation required to provide and install the galvanized curb cover in place.

ITEM 220.6	**SANITARY STRUCTURE REBUILT**	**FOOT**
ITEM 220.8	**SANITARY STRUCTURE REMODELED**	**EACH**

GENERAL
The work performed under these items shall conform to the relevant provisions of Section 220 of the Standard Specifications and the following:

When the line or grade or both line and grade of the sanitary structure changes more than 6 inches the structure shall be remodeled. The sloped masonry and the vertical masonry shall be removed to such depths as required by the Engineer and the new masonry shall conform to the proposed design and in conformity with requirements of the applicable parts of Section 201

When in the judgment of the Engineer the masonry shows deterioration, the structure shall be rebuilt. The casting and deteriorated masonry shall be removed in a neat manner until a clear sound base is obtained upon which concrete blocks and clay bricks may be set to rebuild the structure. Gravel borrow shall be furnished for backfill where required when excavated material is unsuitable. The casting shall be set to line and grade with a concrete collar and surfaced with a minimum of 3 inches of Hot Mix Asphalt top course as required. The new masonry construction, replacing of castings, highly early strength concrete collars, backfilling around structures and other incidental work shall be as specified in Section 201.

METHOD OF MEASUREMENT
Item 220.6, Sanitary Structure Rebuilt, will be measured per foot complete in place.
Item 220.8, Sanitary Structure Remodeled, will be measured per each complete in place.

BASIS OF PAYMENT
Payment for Items 220.6,-220.8 shall be at the respective Contract unit price. These unit prices shall include all labor, materials, equipment and transportation required to rebuild or remodel the sanitary structure in place.

ITEM 222.3	**FRAME AND GRATE (OR COVER) MUNICIPAL STANDARD**	**EACH**

GENERAL
The work to be done under this Item shall conform to the relevant provisions of Section 220 of the Standard Specifications, and the following:

The work to be done under this Item shall consist of the furnishing and installing of Frame and Grates (or Covers) Municipal Standards at the locations on the Plans, and as required by the Engineer.

METHOD OF MEASUREMENT
Item 222.3 Frame and Grate (or Cover) Municipal Standard will be measured per each in accordance with the provisions of Subsection 220.80 of the Standard Specifications.

BASIS OF PAYMENT
Item 222.3 Frame and Grate (or Cover) Municipal Standard will be paid at the contract unit price. per each complete in place and in accordance with the provisions of Subsection 220.81 of the Standard Specifications. This unit price shall include all labor materials, equipment and transportation required to be complete.

ITEM 223.1 FRAME AND GRATE (OR COVER) REMOVED AND STACKED EACH

GENERAL
Work to be done under this item shall conform to the relevant provisions of Section 220, and the following:

All frames and grates or covers designated to be stacked shall be carefully removed and stacked for pick up by the Belmont Public Works Department.

METHOD OF MEASUREMENT
Item 223.1, Frame and Grate cover Removed and Stacked, will be measured per each.

BASIS OF PAYMENT
Item 223.1, Frame and Grate Cover Removed and Stacked, will be paid at the Contract unit price per each. These unit prices shall include all labor, materials, equipment and stacking required to complete the work.

All costs in connection therewith shall be included in the price bid of Item 223.1.

ITEM 238.08 8 INCH DUCTILE IRON PIPE FOOT

GENERAL
The work to be done under these Items shall conform to the relevant provisions of Section 230, and the following:

The work under these Items shall consist of the furnishing and installing of 8-inch Ductile Iron Pipe

METHOD OF MEASUREMENT
Item 238.08 8 Inch Ductile Iron Pipe will be measured by the foot in accordance with the provisions of Subsection 230.80 of the Standard Specifications.

BASIS OF PAYMENT
Item 238.08 8 Inch Ductile Iron Pipe will be paid for at the contract unit price per foot complete in place and in accordance with the provisions of Subsection 230.81 of the Standard Specifications.

ITEM 241.21 21 INCH REINFORCED CONCRETE PIPE FOOT
ITEM 241.27 27 INCH REINFORCED CONCRETE PIPE FOOT

GENERAL
The work to be done under these Items shall conform to the relevant provisions of Section 230, and the following:

The work under these Items shall consist of the furnishing and installing of 21- and 27-inch Reinforced Concrete Pipe

METHOD OF MEASUREMENT
Item 241.21 21 Inch Reinforced Concrete Pipe and Item 241.27 27 Inch Reinforced Concrete Pipe will be measured by the foot in accordance with the provisions of Subsection 230.80 of the Standard Specifications.

BASIS OF PAYMENT
Item 241.21 21 Inch Reinforced Concrete Pipe and Item 241.27 27 Inch Reinforced Concrete Pipe will be paid for at the contract unit price per foot complete in place and in accordance with the provisions of Subsection 230.81 of the Standard Specifications.

ITEM 250.08 8 INCH POLYVINYL CHLORIDE SANITARY SEWER PIPE FOOT

GENERAL
Work under this item shall conform to the relevant provisions of Section 230 and the following:

Plastic storm drain pipe shall comply with ASTMD-D-1785(latest revision) for Polyvinyl chloride (PVC) pipe. All PVC pipes shall be Class 150, DR-18.

Joints for PVC pipe shall be 'ring-tite' joints, a flexible elastrometric ring in a groove, bell and spigot ends. The elastrometric ring shall meet the requirements of ASTM F-477 (latest revision).

METHOD OF MEASUREMENT
Item 250.08, 8 Inch Polyvinylchloride Sanitary Sewer Pipe will be measured per foot in accordance with the provisions of Subsection 230.80 of the Standard Specifications.

BASIS OF PAYMENT
Item 250.08, 8 Inch Polyvinyl Chloride Sanitary Sewer Pipe, will be paid for at the contract unit price per foot complete in place in accordance with the provisions of Subsection 230.81 of the Standard Specifications.

ITEM 369.06 6 X 6 INCH TAPPING SLEEVE, VALVE AND BOX EACH

GENERAL
The work to be done under this Item shall conform to the relevant provisions of Section 300 of the Standard Specifications, as shown on the Plans, as directed by the Engineer, and the following:

The work to be done under this Item shall consist of the furnishing and installing of 6 x 6 inch tapping sleeves. The tapping sleeves shall meet the requirements of the Town of Belmont.

METHOD OF MEASUREMENT
Item 369.0 6 x 6 Tapping Sleeves will be measured per each, in accordance with the provisions of Subsection 301.80 of the Standard Specifications

BASIS OF PAYMENT
Item 369.0 6 x 6 Tapping Sleeves will be paid for at the contract unit price per each complete in place, which price shall include all labor, materials, equipment and incidentals, all in accordance with the provisions of Subsection 301.81 of the Standard Specifications.

ITEM 376.5 HYDRANT ADJUSTED EACH

GENERAL
The work under this Item shall conform to relevant provisions of Section 300 of the Standard Specifications.

Existing hydrants designated to be adjusted shall be to the line or grade shown on the plans or as required by the Engineer.

METHOD OF MEASUREMENT
Item 376.5 Hydrants to be adjusted will be measured per each be in accordance with the provisions of Subsection 301.80 of the Standard Specifications.

BASIS OF PAYMENT
Item 376.5 Hydrants to be adjusted, will be paid for at the contract unit price per each complete in place and in accordance with the provisions of Subsection 301.81 of the Standard Specifications.

ITEM 384.2 CURB STOP ADJUSTED EACH

GENERAL
The work under this Item shall conform to relevant provisions of Section 300 of the Standard Specifications.

Existing gates and service boxes designated to be adjusted shall be to the line or grade shown on the plans or as required by the Engineer.

METHOD OF MEASUREMENT
Item 384.2 Curb Stop Adjusted will be measured per each be in accordance with the provisions of Subsection 301.80 of the Standard Specifications.

BASIS OF PAYMENT
Item 384.2, Curb Stop Adjusted, will be paid for at the contract unit price per each complete in place and in accordance with the provisions of Subsection 301.81 of the Standard Specifications.

ITEM 390. SPRINKLER HEAD REMOVED AND RESET EACH
ITEM 390.1 SPRINKLER SYSTEM PIPE REMOVED AND RESET FOOT

GENERAL
Work under this Item shall conform to the relevant provisions of Section 301 of the Standard Provisions and the following:

The work under these Items shall consist of removing existing sprinkler heads and piping and reinstalling or replacing them in a similar location as required by the Engineer. The work also includes removal, replacement and furnishing of new heads or pipe that is damaged due to the required work. The work shall also include all labor, materials, fittings, equipment, transportation and other incidental costs required to replace the existing system with a complete functioning system. Any new pipe or sprinkler heads shall match the existing pipe and heads in similar functionality, brand, diameter, material, pressure requirements or other manufacturer's requirements. All replacement parts will be approved by the Engineer.

A sketch/drawing shall be submitted to the Engineer for each system to be reset/replaced. The sketch/drawing shall include approximate locations of all necessary appurtenances for a complete system. The Contractor shall submit manufacturer's information about the sprinkler system to the Engineer for approval. The installation of the heads and pipe shall be in strict accordance with the recommendations and instructions of the manufacturer or as approved by the Engineer. Each system reset or replaced will be inspected and tested by the Engineer prior to acceptance.

METHOD OF MEASUREMENT
Item 390., Sprinkler Head Removed and Reset will be measured per each.
Item 390.1, Sprinkler System Pipe Removed and Reset, will be measured per foot, along the top of the pipe in place. No deduction shall be made for fittings or sprinkler heads.

BASIS OF PAYMENT
Payment shall be made at the contract unit price complete and in place. Payment shall include all labor, materials, equipment and transportation required to replace the existing sprinkler system with a complete functioning system.

ITEM 415. PAVEMENT MICROMILLING SQUARE YARD

Item 415 – Pavement Micromilling shall conform to the same requirements for Section 130 Pavement Milling within Section 450.

Description

415.20 General.

This work shall consist of micromilling and removal of existing Hot Mix Asphalt (HMA) pavement courses from the project by the Contractor. Micromilling shall be performed in conformity with the approved QC Plan. The Contractor shall present and discuss in sufficient detail the Quality Control information and activities related to milling at the Construction Quality Meeting required under Section 450. Unless otherwise specified, the milled material shall become the property of the Contractor.

Construction Procedures

415.60 General.

All construction procedures under Pavement Micromilling shall also conform to any of the following relevant provisions of Pavement Milling:

Milling Equipment Requirements.

The milling equipment shall be self-propelled with sufficient power, traction, and stability to remove the existing HMA pavement to the specified depth and cross-slope. The milling machine shall be capable of operating at a minimum speed of 10 feet (3 meters) per minute, designed so that the operator can at all times observe the milling operation without leaving the control area of the machine, and equipped with the following:

(a) A built in automatic grade control system that can control the longitudinal profile and the transverse cross-slope to produce the specified results.

(b) Longitudinal controls capable of operating from any longitudinal grade reference, including string line, 30 foot (10 meter) ski minimum, 30 foot (10 meter) mobile string line minimum, or a matching shoe.

(c) The transverse controls shall have an automatic system for controlling cross-slope at a given rate.

(d) Cutting heads able to provide a minimum 6 foot (2 meter) cutting width and a 0 to 4 inch (0 to 100 mm) deep cut in one pass. The teeth on the revolving cutting drum must be continually maintained and shall be replaced as warranted to provide a uniform pavement texture.

(e) An integral pickup and conveying device to immediately remove milled material from the roadway and discharge the millings into a truck, all in one operation.

(f) All necessary safety devices such as reflectors, headlights, taillights, flashing lights and back up signals so as to operate safely in both day and night.

(g) A means of effectively limiting the amount of dust escaping from the milling and removal operation in accordance with local, State, and Federal air pollution control laws and regulations.

When milling smaller areas or areas where it is impractical to use the above described equipment, the use of a smaller or lesser-equipped milling machine may be permitted when approved by the Engineer.

Sweeper Equipment Requirements.

The Contractor shall provide a sufficient number of mechanical sweepers to ensure that the milled surface is free of millings and debris at the end of each day's milling operations. Each sweeper shall be equipped with a water tank, spray assembly to control dust, a pick-up broom, a dual gutter broom, and a dirt hopper. The sweepers shall be capable of removing millings and loose debris from the textured pavement.

Milling Operations.

The milling operations shall be scheduled to minimize the duration and placement of traffic on the milled surface. The milling operations shall not proceed more than 3 miles ahead of the paving operations. Under no circumstances shall the milled surface be left exposed to traffic for a period exceeding seven days. The Engineer may allow the Contractor to adjust the above limitations on milling production when necessary.

The Contractor shall coordinate milling and paving operations to minimize the exposure of milled surfaces to traffic. The Contractor shall ensure that milled surfaces are overlaid in a timely manner to avoid damage to the pavement structure. Any damage to the pavement structure resulting from extended exposure of the milled surface to traffic shall be repaired as directed by the Engineer at the Contractor's expense.

The existing pavement shall be removed to the average depth shown on the plans, in a manner that will restore the pavement surface to a uniform cross-section and longitudinal profile. The longitudinal profile of the milled surface shall be established using a 30 foot (10 meter) mobile ski, mobile string line, or stationary string line. The cross-slope of the milled surface shall be established

by a second sensing device or by an automatic cross-slope control mechanism. The Contractor will be responsible for providing all grades necessary to remove the material to the proper line, grade, cross section, superelevation, and transitions shown on the plans or as directed by the Engineer. The requirement for automatic grade or slope controls may be waived by the Engineer in locations warranted by the situation, including intersections and closely confined areas.

The Engineer may adjust the average milling depth specified on the plans by ± 3/4" (± 20mm) during each milling pass at no additional payment to minimize delamination of the underlying pavement course or to otherwise provide a more stable surface. If delamination or exposure of concrete occurs when milling a HMA pavement course from an underlying Portland Cement Concrete (PCC) pavement, the Contractor shall cease milling operations and consult the Engineer to determine whether to reduce the milling depth or make other adjustments to the operation.

Protection of Inlets and Utilities.

Throughout the milling operation, protection shall be provided around existing catch basin inlets, manholes, utility valve boxes, and any similar structures. Any damage to such structures as a result of the milling operation is the Contractor's responsibility and shall be repaired at the Contractor's expense. To prevent the infiltration of milled material into the storm sewer system the Contractor shall take special care to prevent the milled material from falling into the inlet openings or inlet grates. Any milled material that falls into inlet openings or inlet grates shall be removed at the Contractor's expense.

Vertical Faces.

All permanent limits of the milled area shall be sawcut or otherwise neatly cut by mechanical means to provide a clean and sound vertical face. No vertical faces, transverse or longitudinal, shall be left exposed to traffic. If any vertical face is formed in an area exposed to traffic a temporary paved transition with a maximum 12:1 slope shall be established. If the milling machine is used to temporarily transition the milled pavement surface to the existing pavement surface, the temporary transition shall be constructed at a maximum 12:1 slope.

Opening to Traffic.

Prior to opening a milled area to traffic, the milled surface shall be thoroughly swept with a mechanical sweeper to remove all remaining millings and dust. This operation shall be conducted in a manner so as to minimize the potential for creation of a traffic hazard and to comply with local, State, and Federal air pollution control laws and regulations. Any damage to vehicular traffic as a result of milled material becoming airborne is the responsibility of the Contractor and shall be repaired at the Contractor's expense. Temporary pavement markings shall be placed in accordance with the provisions of Subsection 850.64.

Milled Surface Inspection.

The milled surface shall provide a satisfactory riding surface with a uniform textured appearance. The milled surface shall be free from gouges, excessive longitudinal grooves and ridges, oil film, and other imperfections that are a result of defective equipment, non-uniform milling teeth, improper use of equipment, or otherwise poor workmanship. Any unsatisfactory surfaces produced shall be corrected by remilling at the Contractor's expense and to the satisfaction of the Engineer.

The Contractor shall perform Quality Control inspection of all work items addressed as specified in the table below. Inspection activities during milling of HMA pavement may be performed by qualified Production personnel (e.g. Skilled Laborers, Foremen, Superintendents). However, the Contractor's QC personnel shall have overall responsibility for QC inspection. The Contractor shall not rely on the results of Department Acceptance inspection for Quality Control purposes. The Engineer shall be provided the opportunity to monitor and witness all QC inspection.

The milled surface of each travel lane shall be divided into longitudinal Sublots of 500 feet (150 meters). The Contractor shall perform a minimum of one random QC measurement within each Sublot with a 10 foot (3 meter) straightedge in the transverse direction across the milled surface. Additional selective QC measurements within each Sublot will be performed as deemed necessary by the QC personnel. All QC inspection results shall be recorded on NETTCP Inspection Report Forms. The Engineer will also randomly inspect a minimum of 25% of the Sublots. The Contractor shall perform surface texture measurements with a 10 foot (3 meter) straightedge in the transverse direction across the milled surface. The milled surface shall have a texture such that the variation from the edge of the straightedge to the top of ridges between any two ridge contact points shall not exceed 1/8 inch (3 mm). The difference in height from the top of any ridge to the bottom of the groove adjacent to that ridge shall not exceed 1/16" (1.6 mm). Any point in the surface not meeting these requirements shall be corrected as directed by the Engineer at the Contractor's expense.

In isolated areas where surface delamination between existing HMA layers or a surface delamination of HMA on Portland Cement Concrete causes a non-uniform texture to occur, the straightedge surface measurement requirements stated in the preceding paragraph may be waived, subject to the approval of the Engineer.

Minimum QC Inspection of Milling Operations

Inspection Component	Items Inspected	Minimum Inspection Frequency	Point of Inspection	Inspection Method
Equipment	As specified in QC Plan	Per QC Plan	Per QC Plan	Per QC Plan
Environmental Conditions	Protection of Inlets & Utilities	Per QC Plan	Existing Surface	Visual Check
	Removal of Millings & Dust	Per QC Plan	Milled Surface	Visual Check
Workmanship	Milling Depth	Per QC Plan	Milled Surface	Check Measurement
	Cross-Slope & Profile	Per QC Plan	Milled Surface	Check Measurement
	Milled Surface Texture	Per QC Plan	Milled Surface	Visual Check
	Milled Surface Roughness	Once per 500 feet(150 meters) per milled lane	Milled Surface per Subsection 410.67	10 foot (3 meter) standard straightedge
	Sawcut Limit Vertical Face	Per QC Plan	Sawcut Limits	Visual Check

415.61 Micromilling Equipment Requirements.

The micromilling machine shall be equipped with a drum specifically designed to provide the surface specified below.

415.62 Control Strip.

The Contractor shall micromill a control strip. The control strip shall be 500 feet minimum in length with a uniformly textured surface and cross slope, as approved by the Engineer.

The micromilled surface of the control strip shall provide a satisfactory riding surface with a uniform textured appearance. The micromilled surface shall be free from gouges, excessive longitudinal grooves and ridges, oil film, and other imperfections that are a result of defective equipment, non-uniform milling teeth, improper use of equipment, or otherwise poor workmanship. Any unsatisfactory surfaces produced in the control strip shall be corrected by additional micromilling at the Contractor's expense and to the satisfaction of the Engineer.

The micromilled pavement surface shall have a transverse pattern of 0.2 – 0.3 inch center to center of each strike area. The Contractor shall perform surface texture measurements with a 10 foot (3 meter) straightedge in the transverse direction across the milled surface. The milled surface shall have a texture such that the variation from the edge of the straightedge to the top of ridges between any two ridge contact points shall not exceed 1/8 inch (3 mm). The difference in height from the top of any ridge to the bottom of the groove adjacent to that ridge shall not exceed 1/16" (1.6 mm). Any point in the surface not meeting these requirements shall be corrected as directed by the Engineer at the Contractor's expense.

415.67 Micromilled Surface Inspection.

The Contractor shall perform Quality Control inspection of all work items addressed under Section 415. The Contractor shall not rely on the results of Department Acceptance inspection for Quality Control purposes.

The micromilled surface shall meet the requirements of 415.62.

Compensation

415.80 Method of Measurement.

Micromilling - Micromilling will be measured for payment by the number of square yards (square meters) of area from which the milling of existing HMA pavement has been completed and the work accepted. No area deductions will be made for minor unmilled areas such as catch basin inlets, manholes, utility boxes and any similar utility structures.

415.81 Basis of Payment.

Micromilling - Micromilling, removal and disposal of existing HMA pavement will be paid for at the contract unit price per square yard (square meter). This price shall include all equipment, tools, labor, and materials incidental thereto. No additional payments will be made for multiple passes with the milling machine to remove the existing HMA surface to the grade specified.

No separate payments will be made for: performing handwork removal of existing pavement and providing protection around catch basin inlets, manholes, utility valve boxes and any similar structures; repairing surface defects as a result of the Contractor's negligence; providing protection

to underground utilities from the vibration of the milling operation; sawcutting micromilled limits; installing and removing any temporary transition; removing and disposing of millings; furnishing a sweeper and sweeping after milling. The costs for these items shall be included in the contract unit price for Pay Item 415., Pavement Micromilling.

SECTION 450
QUALITY ASSURANCE

Specifications To Be Inserted by MassDOT

SECTION 450.90	**CONTRACTOR QUALITY CONTROL**	**TON**
ITEM 451.	**HMA FOR PATCHING**	**TON**
ITEM 452.	**ASPHALT EMULSION FOR TACK COAT**	**GALLON**
ITEM 453.	**HMA JOINT SEALANT**	**FOOT**

SECTION 455
SUPERPAVE PAVEMENT COURSES

Specifications To Be Inserted by MassDOT

ITEM 455.23	**SUPERPAVE SURFACE COURSE – 12.5 (SSC - 12.5)**	**TON**
ITEM 455.31	**SUPERPAVE INTERMEDIATE COURSE – 12.5 (SIC - 12.5)**	**TON**
ITEM 455.42	**SUPERPAVE BASE COURSE – 37.5 (SBC – 37.5)**	**TON**
ITEM 455.52	**SUPERPAVE LEVELING COURSE – 9.5 (SLC – 9.5)**	**TON**

ITEM 454.5	**LATEX MODIFICATION OF HMA**	**TON**

The purpose of this Item is to latex-modify the Superpave Surface and Intermediate Courses specified under Item 455.23 and Item 455.31. Item 454.5 includes the cost of the latex, costs associated with injecting the latex into the HMA plant and incidentals. Costs for HMA production and placement is compensated under Section 450 and Section 455.

Mix Design

The latex polymer modifier type and amount shall be included as part of the job mix formula. The Superpave Surface Course 12.5 (SSC-12.5) and the Superpave Intermediate Course 12.5 (SIC-12.5) shall be produced with asphalt binder modification as follows:

Latex Polymer Modified Asphalt Binder

The polymer additive shall consist of unvulcanized Styrene Butadiene Rubber (SBR) in liquid latex form, with a minimum quantity of rubber solids of 3% by weight of the performance grade asphalt binder (PGAB) content of the mix. The PG 64-28 shall be modified to produce a PGAB grade of 70-28.

Quantity: 3% rubber solids by weight of the bitumen content of the mix. (Example: If the latex polymer is 70% solids, weight per gallon is 7.69 lbs = 5.38 lbs solids per gallon. If mix calls for 6% bitumen, 3% = 3.6 lbs of latex solids per ton mix or 0.70 gallons of latex per ton of mix.)

The latex polymer modified asphalt binder shall be injected into the mix at the time of manufacture. In a drum plant, the liquid latex polymer shall be pumped into the asphalt binder through a spud welded to the asphalt binder line just prior to where it enters the drum. The constant rate at which the latex polymer is pumped shall be determined by the mix speed of the drum. In a batch plant, the polymer is pumped directly into the mix five (5) seconds after the asphalt binder starts to dump into the pug mill. Mix time per batch after polymer is pumped in is 45 to 60 seconds.

The plant shall be equipped with an in-line blender and a sample cock for Quality Control and Acceptance purposes.

A metering system shall be attached to a printer which prints a time and date stamp, latex flow rate and cumulative polymer usage during the HMA production, allowing the Engineer to reference the injection rate and latex used against the plant's projection rate. The printout shall be set for a five minute interval. The latex polymer manufacturer will have a professional representative available at the HMA plant during the first day of mix production and placement, and as required thereafter by the Engineer.

The manufacturer of the SBR latex shall provide certified test results for Styrene Butadiene ratio, total rubber solids percentage by weight, pH, ash content, and viscosity to the Engineer prior to mix production.

Mix conforming to the requirements of these Special Provisions shall be placed when the ambient temperature is 50ºF and rising when measured in the shade away from artificial heat.

Mixing temperature shall be 290ºF to 325ºF unless otherwise specified by the Engineer. Mix shall be placed at between 275ºF and 310ºF.

Method of Measurement

Item 454.4 HMA Latex Modification of HMA shall be measured by the ton of hot mix asphalt modified with latex.

Basis of Payment

Payment under Item 454.5 includes the cost of the latex modifier and all equipment, labor, manufacturer's representative and incidental costs required to inject the latex into the HMA. Costs for HMA production and placement is compensated under Item 455.23 and Item 455.31.

ITEM 482.15 HOT APPLIED ASPHALTIC CRACK SEALER (POLYESTER FIBERS) GALLON

GENERAL

1. Scope of work

The work covered by this section of the specification consists of furnishing all plant, labor, equipment and materials necessary to perform all operation in connection with the cleaning and sealing of construction and random cracks in bituminous concrete pavements, and vegetation removal and

sterilization of cracks where necessary.

2. Material

Crack Sealer shall be an asphalt-fiber compound designed especially for improving strength and performance of the parent asphalt sealant.

(a) Asphalt Sealant shall be AC-10 or AC-20 with a penetration of 75-100.

(b) Fiber reinforcing materials shall be short-length Polyester fibers having the following properties.

Carbon Black Impregnated
Length.....0.2756 inch
Diameter.....0.0008 inch plus or minus 0.0001"
Specific Gravity.....1.32 to 1.40
Melt temperature.....480^{o} F. minimum
Ignition temperature…..1000^{o} F. minimum
Tensile strength.....75,000 PSI plus or minus 5,000 PSI
Break elongation.....33% plus or minus 9%-they are fully drawn

Asphalt-fiber compound shall be mixed at a rate of 7-9% fiber weight to weight of asphalt cement. This compound having the same chemical base provides compatibility and exhibits excellent bond strength. The fiber functions to redistribute high stress and strain concentrations that are imposed on the sealant by thermal sources, traffic loading, etc.

(c) Black Beauty Boiler Slag (type used for sandblasting) for cover.

Application shall be sufficient to prevent pickup of the completed application by traffic.

3. Equipment

Equipment used in the performance of the work required by this section of the specification shall be approved by the Engineer and maintained in a satisfactory working condition at all times.

(a) Air Compressor: Air Compressors shall be portable and capable of furnishing not less that 100 cubic feet of air per minute at not less than 90 lbs. per square inch pressure at the nozzle. The compressor shall be equipped with traps that will maintain the compressed air free of oil and water.

(b) Manually operated, gas powered air-broom or self- propelled sweeper designed especially for use in cleaning highway and airfield pavements shall be used to remove debris, dirt and dust from cracks.

(c) Hand tools shall consist of brooms, shovels, metal bars with chisel shaped ends, and any other tools which may be satisfactorily used to accomplish this work.

(d) Melting Kettle: The unit used to melt the joint sealing compound shall be double boiler, indirect fired type. The space between the inner and outer shells shall be filled with a suitable heat transfer oil or substitute having a flash point not less than 600 deg. F. The kettle shall be equipped with a satisfactory means of agitation the joint sealer at all times. This may be accomplished by continuous stirring with mechanically operated paddles and/or by a continuous circulating gear pump attached to the heating unit. The kettle must be equipped with thermostatic control calibrated between 200 deg. F. and 550 deg. F.

(e) An application shoe according to filler manufacturer's specifications.

4. Preparation

(a) Only cracks that are 1/4 in. or wider shall be filled.

(b) Debris removal. All old material and other debris removed from the cracks shall be removed from pavement surface immediately by means of power sweepers or hand brooms or air brooms.

(c) Vegetation. When cracks show evidence of vegetation, it shall be removed and sterilized by use of Propane Torch unit eliminating all vegetation, dirt, moisture and seeds.

(d) General. No crack sealing material shall be applied in wet cracks or where frost, snow or ice is present nor when ambient temperature is below 30^{o} F.

(e) All cracks shall be heated prior to the application of sealer with a propane torch unit, similar to a "Taffa" machine or equal.

5. Preparation of Sealer

Joint sealing material shall be heated and applied at temperatures specified by the manufacturer and approved by the Engineer. The minimum application temperature is 310-360^{o} F. According to the Resident Engineer.

6. Workmanship

All workmanship shall be of the highest quality, and excess or spilled sealer shall be removed from the pavement by approved methods and discarded. Any workmanship determined to be below the high standards of the particular craft involved will not be accepted, and will be corrected and/or replaced as required by the Engineer in charge.

It is the intent of the application of crack filler to fill the existing cracks and seal them against the weather. Any failure due to pickup by traffic within seven days shall be redone within the payment for the original work.

7. Performance

It is the intention of this Department not to award a contract for this work under this or any other proposal if the bidder cannot furnish satisfactory evidence that he has the ability and experience to perform this class of work and that he has sufficient capital and equipment to enable him to prosecute the work successfully and to complete it within the time named in the contract; and the Department reserves the right to reject this or any other proposal or to award the contract as is deemed to be in the best interest of said Department.

The Contractor must submit with his bid proposal a list of six (6) jobs which he has successfully completed, giving the name and the address of these projects so they can be investigated prior to the award of the contract.

8. Measurements and Payment

The procedure for ascertaining the correct volume used for each day's operations shall be as follows: (1) The Engineer or his inspector shall measure the volume of crack filler in the kettle before the start of the

day's work. This will be done by the use of a gauge and volume chart for the heating kettle to be furnished by the Contractor and acceptable to the Engineer. (2) Additional crack filler, in uniformly sized containers of standard measure, shall be added to the kettle only in the presence of the Engineer or his inspector. (3) At the end of the day's work the kettle shall again be gauged to ascertain the quantity remaining. The difference between the starting and finishing measurements plus the units added during the work and subsequently placed upon the roadway cracks shall be the quantity to be paid for that day. The Contractor's foreman shall countersign the Field Manifold Notebook page to indicate concurrence with the measure.

Payment for aggregate cover shall be included in the price per gallon of crack filler.

METHOD OF MEASUREMENT

Measurement for this bid unit shall be by the gallon and shall be the actual number of gallons of sealer applied to the pavement.

BASIS OF PAYMENT

Payment shall be at the unit price bid in the proposal and shall be complete payment for the entire item including furnishing, preparation and placing of materials, labor and equipment to be used on this project.

ITEM 482.3	**SAWING ASPHALT PAVEMENT**	**FOOT**
ITEM 482.4	**SAWING CEMENT CONCRETE**	**FOOT**

GENERAL

The work under these items shall conform to the relevant provision of Section 120 of the Standard Specifications and the following:

The work shall include the saw-cutting of existing pavements at limits of full-depth pavement and sidewalk construction, and as required by the Engineer. Saw-cut equipment shall be approved by the Engineer prior to commencing work.

All edges of excavations made for saw-cutting pavements shall be squared by saw-cutting with power-driven tools to provide a neat, clean edge for joining new pavement as shown on the Plans. Ragged, uneven edges shall not be accepted. Areas which have been broken or undermined shall be edged neatly with a minimum disturbance to remaining pavements.

Saw-cut surfaces shall be sprayed or painted with a uniform thin coat of RS-1 asphalt emulsion immediately before placement of bituminous concrete material against the surface.

Sawing Asphalt Pavement and Sawing Cement Concrete (including saw-cutting required for the installation of traffic signal conduits) includes all labor, tools, materials, equipment and incidental costs required to complete the work to the satisfaction of the Engineer.

METHOD OF MEASUREMENT

Item 482.3-482.4, Sawing Asphalt Pavement and Sawing Cement Concrete, will be measured for payment by the foot, complete in place. Sawing through rebar shall be considered incidental to the work.

BASIS OF PAYMENT

Item 482.3-482.4, Sawing Asphalt Pavement and Sawing Cement Concrete, will be paid for at the contract unit price per foot under Item 482.3, Sawing Asphalt Pavement, and 482.4, Sawing Cement Concrete respectively. Which price shall include all labor, tools, materials, equipment and incidental costs required to complete the work to the satisfaction of the Engineer.

ITEM 486.2 **COLORED SCORED CEMENT CONCRETE PAVEMENT** **CUBIC YARD**

GENERAL

The work under this item shall consist of constructing scored cement concrete pavement in accordance with these Special Provisions, the Construction Standard Details Drawing Number M/E 105.2.0 and in conformity with the lines and grades shown on the Plans and/or as required by the Engineer.

The scored cement concrete shall be 5,000 psi, 8inches, 26 p/ft^3 and shall conform to the requirements specified in Subsection M4.02.00 of the Standard Specifications.

The base below the concrete pavement shall be gravel the depth of which shall be such that the bottom line meets the bottom of the contiguous pavement and shall be compacted as specified in Section 401.

Forms shall be placed to the full depth of the concrete. They shall be of wood, not less than nominal 2 inch thickness and dressed on all sides. Forms shall be securely staked and braced and shall be constructed and set so as to resist the pressure of the concrete without springing out of alignment. The forms shall be oiled before use.

Colored concrete shall be brick red in color. The coloring shall be a mineral oxide based water reducing admixture; providing permanent fade resistant, uniform, streak free, integral color. It shall reduce color bleeding, laitance, and efflorescence.

Provide manufacturer's product data, and a 3' x 8' sample field panel for review and approval by the Designer.

Concrete shall be 5000 psi; ¾"; 705 lb/sy. Concrete shall be deposited with minimum re-handling in one layer. Hand spreading and spading shall be done adjacent to forms. The concrete shall be struck off and float finished. Protection and curing shall be as required in Section 901. The surface of the concrete pavement shall be scored and the contraction joints shall be sawed as shown in Drawing Number 105,2.0 of the Construction Standard Details.

METHOD OF MEASUREMENT

Item 486.2, Colored Scored Cement Concrete Pavement, will be measured per cubic yard complete in place and accepted.

BASIS OF PAYMENT

Item 486.2, Colored Scored Cement Concrete Pavement, will be paid for at the Contract unit price under Item 486.2, Colored Scored Cement Concrete pavement. The Contract unit price per cubic yard shall include full compensation for furnishing all labor, materials, tools, transportation, equipment, and incidentals required to complete the work to the satisfaction of the Engineer.

ITEM 487. **RESIN CROSSWALKS** **SQUARE YARD**

GENERAL
Work under this item shall conform to the relevant provisions of Section 701 of the Standard Specifications and the following:

The work under this item shall include preparation of the pavement surface in conjunction with the installation of Resin Crosswalks where shown on the plans or as required by the Engineer.

SUBMITTALS
Submit manufacturers product data describing the material and process to be used.

The application contractor shall be required to furnish written verification that they are an accredited, licensed installer of the approved material/process.

A mockup encompassing a minimum surface area of 3' x 8', consisting of the color(s) and pattern(s) selected for this project, shall be installed within a section of a planned crosswalk in the designated work area(s), at least five working (5) days prior to the initiation of any phase of construction of the crosswalks. The mockup site will be determined by the engineer. With approval of the completed sample section, work shall begin within twenty-four hours (24) hours of authorized notice to proceed. The cost of the mockup shall be included in the unit price for this item.

Contactor shall be required to furnish to the Engineer the locations of a minimum of five (5) similar crosswalk projects within the Commonwealth of Massachusetts, installed for a minimum period of five (5) years, as specified herein. The resin-based compound used on these projects must support a documented history of field performance and integrity of the work intended.

PREPARATION
This phase of the work consists of pre-cutting, removal and disposal of the pavement surface.

The section(s) of pavement to be replaced with the textured surface shall be precut in neat straight lines by saw cutting. The existing pavement surface shall be removed to an approximate uniform depth of between .50 and .75 inches. The area milled shall be protected throughout construction operations.

Residues resulting from this element of the work shall be immediately removed from the jobsites and disposed of in a legal manner.

All work sites must be properly prepared in accordance with the material manufacturer's requirements. Pavement sections where the surface has been removed must be left in a neat and clean condition, satisfactory to the Engineer.

INSTALLATION
Contractor shall be responsible for the preparation, placement and patterning of the resin according to the manufacturer' guidelines and subject to the approval of the Engineer. This synthetic paving material shall be composed of a hot-applied, resin-based compound formulated with a color stable pigment throughout, that shall be surface textured to simulate brick. The contractor shall be required to overlay in previously prepared recessed pavement surfaces as described in the preceding PREPARATION section and/or other areas, as required by the Engineer.

Using manufacturer prescribed methods and equipment the contractor shall adequately heat and uniformly mix the material(s) together with the desired colored pigment supplied by the

manufacturer. Maximum heating temperature of the completed formulation is 325 degrees F. The contractor shall then apply the properly prepared, homogeneous material to the surface of a hardened, structurally sound bituminous concrete or cement concrete pavement, as required. The material shall be spread to the desired build thickness (not to exceed .75 inches) using ironing tools, heated sufficiently to smooth the surface to a state of readiness for patterning. No material shall be applied when precipitation is present.

The color and surface pattern options shall be in accordance with the drawings and specifications. Final forming will begin immediately after leveling has occurred, while the material is still hot enough to allow the mold selected, to adequately penetrate the surface and create the desired pattern.

Once the finished surface has cooled sufficiently the application area may be opened to vehicular and/or pedestrian traffic. Any residue resulting from this work shall be removed and disposed of in a proper manner. The completed work area is to be left in a neat and clean condition, satisfactory to the engineer.

PROTECTION

The contractor shall take reasonable precautions and steps during crosswalk construction to prevent bodily harm or injury or damage to adjacent facilities such as new curb, sidewalks, drainage structures or water supply facilities. If during the execution of the work, the Contractors operations damage public or private property, the cost of repair or replacement shall be the responsibility of the contractor at no expense to the owner.

MATERIAL

The material(s) shall be a hot-applied resin based compound for use on bituminous concrete, with proven adhesion, flexibility and abrasion resistance characteristics, as well as color stability, chemical resistance and scrub ability.

The resin material shall be flexible with form stability consistent with the existing bituminous concrete and be formulated for use with appropriate traffic conditions in conformance to the following minimum physical properties:

TEST PROCEDURE	- GRADE 60 (heavy traffic)
Average Temp. Range	25 – 140 degrees F
Wheel Tracking @ 113	less than 1 mm/hr
Wheel Tracking @ 140 F	less than 5 mm/hr
Density	2.12
Indent @ 104 F	50 dmm maximum
Indent @ 122 F	5 dmm maximum
Ash Content	90% maximum
Skid Resistance Value	55 - 70

EQUIPMENT

Contractor must possess and be familiar with the specialized machinery required to perform the procedures as outlined and contained within these technical specifications, including, but not limited to, appropriate trucks, air compressors, miscellaneous asphalt equipment, dispensers, mixers, melters, applicators, heaters, cutters and/or specialized tools etc.

MOBILIZATION
Construction of the Resin Crosswalks shall commence within twenty-four (24) hours of written notification to proceed issued by the Engineer. Work shall commence within this timeframe without regard to the number of mobilizations that may be required by the Engineer to complete this work, with the exception of inclement weather.

Due to the logistical complications inherent to this type of specialized construction, given the general project size, scope, schedule and public safety concerns, the contractor may not assume that a single mobilization will be sufficient to complete this entire phase of the crosswalk work required in an orderly fashion. No separate payment shall be made for mobilization or demobilization.

METHOD OF MEASUREMENT
Item 487., Resin Crosswalks, will be measured for payment per square yard, complete in place.

BASIS OF PAYMENT
Item 487., Resin Crosswalks, will be measured for payment per square yard, complete in place will be paid at the respective Contract unit price bid per square yard, which price shall include all labor, material, equipment mobilization, mockup and incidental costs required to complete the work.

There shall be no additional compensation for the disposal of excavated materials or excess Resin materials.

No deductions shall be made for structures within the work area such as manholes, catch basins or water covers.

ITEM 509.2 GRANITE CURB FOR MBTA POLE – STRAIGHT EACH

GENERAL
Work under these items shall conform to relevant provisions of Section 500 and M9.04.5 of the Standard Specifications and the following:

The work shall consist of furnishing and installing granite curb sections conforming to lines, grades, dimensions and details shown on the Plans. Care must be taken when handling and placement of granite curb. Any damaged curb inlet shall be replaced by the Contractor at his/her own expense.

METHOD OF MEASUREMENT
Item 509.2, Granite Curb for MBTA Pole – Straight, will be measured per each complete in place.

BASIS OF PAYMENT
Item 509.2, Granite Curb for MBTA Pole – Straight will be paid for at the contract unit price each, which price shall include all labor, tools, equipment, materials, transportation, and incidental work required to install the curb inlet complete in place, to the satisfaction of the Engineer.

ITEM 514.2 GRANITE CURB INLET – STRAIGHT - MUNICIPAL STANDARD EACH

GENERAL
Work under these items shall conform to relevant provisions of Section 500 and M9.04.5 of the Standard Specifications and the following:

The work shall consist of furnishing and installing granite curb inlets (double) conforming to lines, grades, dimensions and details shown on the Plans. Care must be taken when handling and placement of curb. Any damaged curb inlet shall be replaced by the Contractor at his/her own expense.

METHOD OF MEASUREMENT
Item 514.2, Granite Curb Inlet – Straight- Municipal Standard, will be measured per each complete in place.

BASIS OF PAYMENT
Item 514.2, Granite Curb Inlet – Straight- Municipal Standard will be paid for at the contract unit price each, which price shall include all labor, tools, equipment, materials, transportation, and incidental work required to install the curb inlet complete in place, to the satisfaction of the Engineer.

ITEM 531. TIMBER EDGING FOOT
ITEM 531.1 TIMBER EDGING – REMOVED AND RESET FOOT

GENERAL
The work under these Items shall conform to the relevant provisions of Section 501 of the Standard Specification and the following:

The work under these Items shall consist of the furnishing and installing of Timber Edging in the locations as shown on the plans and the removal and resetting of existing timber edging, in accordance with these specifications, and/or as required by the Engineer.

MATERIALS
Pressure treated timbers for use as Timber Edging shall conform to the relevant provisions of Section 955 Treated Timber. They shall match the size of the timbers they replace or abut. Landscape Timber screws shall be self taping heat treated steel screws with release coating. Anchor spikes shall be 24 inch #7 rebar.

CONSTRUCTION
Timber Edging shall extend to the depth of the adjacent concrete walk and shall meet the proposed and or existing elevation behind the walk, with an overall height from finish grade not to exceed 18 inches.

MEASUREMENT
Items 531. And 531.1 will be measured for payment per foot, complete in place.
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BASIS OF PAYMENT
Item 531. And 531.1 will be paid per foot, complete in place which shall include all labor, material, equipment, excavation and incidental costs required to complete the work.

ITEM 532. CEMENT CONCRETE QUARTER ROUND CURB FOOT

GENERAL
Work under these items shall conform to the relevant provisions of Section 501. and shall include fabricating and installing Cement Concrete Quarter Round Curb in the locations as shown on the plans, in accordance with these specifications, and/or as required by the Engineer.

SAMPLE
The contractor shall construct a 10 foot long sample section including at least one expansion joint to be approved by the Town prior to construction under these items. A second panel shall be provided if the first is not accepted by the Town and shall be constructed at the direction of the Engineer. Upon acceptance the sample section shall be included as part of the final curb.

MATERIALS
Cement Concrete Quarter Round Curb shall conform to the relevant provisions of Section M4 of the Standard Specifications and the following:
The concrete used for curb mix shall be a blend of approximately 65% concrete sand, 20% 3/8 stone, and 15% cement, with one (1) lb. of concrete reinforcing fiber per cubic yard or as required by manufacturer. Cement Concrete Quarter Round Curb shall be minimum 4,000 P.S.I after a curing period of 28 days and shall meet the requirements of ASTM C94
Two or more areas of laitance over 6" shall be reason for rejection and replacement at no additional cost to the Owner.

CONSTRUCTION
Cement Concrete Quarter Round Curb shall either be fabricated in the field by means of extrusion form or shall be precast. Cement Concrete Quarter Round Curb that is precast shall extend to the depth of the adjacent concrete walk. Extruded cement concrete curbs may be anchored to the surface of cement concrete walk by placing 6"x1/2" steel dowels at one foot on each side of every joint. The pavement shall be dry and cleansed of loose or deleterious Materials prior to curb placement.

Cement Concrete Quarter Round Curb shall be formed to match the shape of existing Cement Concrete Quarter Round Curb to which it replaces or abuts. Cement Concrete Quarter Round Curb shall be scored to correspond to the scoring of the adjacent sidewalk.

Where sections of existing and or proposed curb abut they shall receive an expansion joint and a 6"x1/2" steel dowel to control differential settlement.

METHOD OF MEASUREMENT
Item 532., Cement Concrete Quarter Round Curb, will be measured for payment per foot, complete in place.

BASIS OF PAYMENT
Item 532., Cement Concrete Quarter Round Curb, will be paid per foot, complete in place which shall include all labor, material, equipment, excavation and incidental costs required to complete the work.

ITEM 532.1 CEMENT CONCRETE QUARTER ROUND CURB REMOVED AND RESET FOOT

GENERAL
Work under these items shall conform to the relevant provisions of Section 500. and shall include removing, stockpiling, reinstalling, and where required replacing and or extending portions of Cement Concrete Quarter Round Curb in the locations as shown on the plans, in accordance with these specifications, and/or as required by the engineer.

Existing Cement Concrete Quarter Round Curb shall be photographed prior to removal and provided to the engineer for recording. Cement Concrete Quarter Round Curb shall be reset in its existing state and quantity as closely matching the original condition as is possible.

Cement Concrete Quarter Round Curb to be reset shall be removed and stored on the property from which it originated and protected from theft. It will be the Contractors responsibility to replace any that is stolen or damaged

If the Cement Concrete Quarter Round Curb is deemed to be in too poor a condition and or of inadequate quantity to complete the work, the contractor shall contact the engineer for a determination and shall provide additional Cement Concrete Quarter Round Curb conforming to the provisions of item 532 Cement Concrete Quarter Round Curb.

Sections of Cement Concrete Quarter Round Curb to be removed shall be removed in sections by saw cutting at the nearest control joint. Saw cutting shall conform to the provisions of item 482.4 Sawing Cement Concrete.

SUBMITTALS
Contractor shall submit existing condition photos including station and address to the resident engineer for use in recording and comparing the accuracy and quality of finished workmanship.

METHOD OF MEASUREMENT
Item 532.1 Cement Concrete Quarter Round Curb Removed & Reset will be measured for payment per foot, complete in place which shall include all labor, material, equipment, excavation and incidental costs required to complete the work.

Sections replaced or extended will be measured under item 532 Cement Concrete Quarter Round Curb.

BASIS OF PAYMENT
Item 532.1 Cement Concrete Quarter Round Curb Removed & Reset will be paid per foot, complete in place which shall include all labor, material, equipment, excavation and incidental costs required to complete the work.
Sections replaced or extended will be paid for under item 532 Cement Concrete Quarter Round Curb.

Cutting of Cement Concrete Quarter Round Curb will be paid for separately under item 482.4 Sawing Cement Concrete

The contractor shall not be paid for quantities of Cement Concrete Quarter Round Curb discarded due to its condition or for materials damaged due to the contractor's operations.

ITEM 533.1 PAVER EDGING REMOVED AND RESET FOOT

GENERAL
Work under these items shall conform to the relevant provisions of Section 700. and shall include removing, stockpiling, reinstalling, and where required replacing paver edging. Existing Paver Edging shall be photographed prior to removal and provided to the engineer for recording. Pavers shall be reset in their existing state and quantity as closely matching the original condition as is possible.

Pavers to be reset shall be removed and stored on the property from which they originated and be protected from theft. It will be the Contractor's responsibility to replace any that is stolen or damaged.

SUBMITTALS
Contractor shall submit existing condition photos including station and address to the Engineer for use in recording and comparing the accuracy and quality of finished workmanship.

METHOD OF MEASUREMENT
Item 533.1 Paver Edge Removed and Reset will be measured for payment per foot, complete in place which shall include all labor, material, equipment, excavation and incidental costs required to complete the work.

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BASIS OF PAYMENT
Item 533.1 Paver Edge Removed and Reset will be paid per foot, complete in place which shall include all labor, material, equipment, excavation and incidental costs required to complete the work.

The Contractor shall not be paid for quantities of pavers discarded due to their condition or materials damaged due to the contractor's operations.

ITEM 580.1	**CURB REMOVED, RELOCATED AND RESET**	**EACH**
ITEM 581.1	**CURB INLET REMOVED, RELOCATED AND RESET**	**EACH**
ITEM 582.2	**CURB CORNER REMOVED, RELOCATED AND RESET**	**EACH**

GENERAL
The work performed under these Items shall conform to the relevant provisions of Section 580 of the Standard Specifications and the following:

Work performed under these Items shall consist of the removing curbing, curb inlets, and curb corners from one location, transporting and stacking them at an off-site location, and, when required, relocating them to their new locations and setting them in their final locations in close conformity with the lines and grades shown on the Plans or established by the Engineer. The locations from which the units of curb are to be removed and relocated from are identified on the Construction Plans as "R, R &R". The locations to which the units of curb are to be transported and reset are shown on the Construction Plans as "PROP. GRAN. CURB (RELOCATED)". Granite curb removed and reset in place is shown on the Construction Plans as "GRAN. CURB FROM RESET" and is paid for under Item 580. Curb Removed and Reset.

METHOD OF MEASUREMENT
Item 580.1, 581.1, and 582.2, curbing, curb inlets, and curb corners will be measured per each complete in place.

BASIS OF PAYMENT
Item 580.1, 581.1, and 582.2, curbing, curb inlets, and curb corners will be paid for at the Contract unit price per each complete in place. This unit price shall include all labor, tools, materials, equipment and transportation required to complete the work to the satisfaction of the Engineer.

ITEM 590.	**CURB REMOVED AND STACKED**	**FOOT**
ITEM 593.	**EDGING REMOVED AND STACKED**	**FOOT**

GENERAL
Work performed under these items shall conform to the relevant provisions of Section 580 of the Standard Specifications, and the following:

The work shall consist of removing existing curb deemed satisfactory by the Engineer but not required for resetting on this Project, and carefully stacking temporarily in a stockpile on the site for removal by the Town. The Contractor's responsibility for the protection of the curbing shall cease upon final acceptance of the work or 60 days from the time a certified notice, with copy to the Engineer, is sent by Contractor to the Town. Any curbing damaged through lack of protection or carelessness on the part of the Contractor shall be replaced by the Contractor at his/her own expense.

METHOD OF MEASUREMENT
Items 590. Curb Removed and Stacked and 593. Edging Removed and Stacked will be measured per foot as specified in Subsection 580.80 of the Standard Specifications, which shall be the length of curb and edging actually removed and stacked.

BASIS OF PAYMENT
Items 590. Curb Removed and Stacked and 593. Edging Removed and Stacked will be paid for at the respective Contract unit price per foot. These unit prices shall include all labor, tools, materials, equipment and stacking required to complete the work to the satisfaction of the Engineer.

ITEM 645.142	**42 INCH CHAIN LINK FENCE (PTR) VINYL COATED (LINE POST OPTION)**	**FOOT**

GENERAL
The work to be done under this Item shall conform to the relevant provisions of Section 644 of the Standard Specifications and the following:

The work to be done under this Item shall consist of the furnishing and installing of vinyl coated chain link fence

MATERIALS

METHOD OF MEASUREMENT
Item 645.142 42-Inch Vinyl Coated Chain Link Fence will be measured, approximately parallel to the ground by the foot of completed fence, exclusive of openings from outside to outside of end posts.

BASIS OF PAYMENT
Item 645.142 42-Inch Vinyl Coated Chain Link Fence will be paid at the contract unit price per foot, complete in place, which price shall include full compensation for all labor, materials, equipment, and incidentals required to complete the installation.

ITEM 650.042	**42 INCH CHAIN LINK GATE WITH GATE POSTS**	**EACH**
ITEM 650.048	**48 INCH CHAIN LINK GATE WITH GATE POSTS**	**EACH**
ITEM 653.042	**42 INCH CORNER OR INTERMEDIATE BRACE POST**	**EACH**
ITEM 654.042	**42 INCH CHAIN LINK FENCE FABRIC**	**FOOT**
ITEM 654.048	**48 INCH CHAIN LINK FENCE FABRIC**	**FOOT**
ITEM 654.072	**72INCH CHAIN LINK FENCE FABRIC**	**FOOT**

GENERAL
This work under these Items shall consist of fabricating and installing Chain Link Fencing and Gates per the standards of Section 644. of the Standard Specifications, and the following:

For fence items requiring poured-in-place concrete footings, construct concrete footing in

accordance with requirements of Section 901 of the Standard Specifications.

METHOD OF MEASUREMENT
Items 650.042 42 Inch Chain Link Gate With Gate Post, 650.048 48 Inch Chain Link Gate With Gate Post, and 653.42 42 Inch Fence Corner or Intermediate Brace Post will be measured for payment per each, complete in place.

Items 654.042, 42 Inch Chain Link Fence Fabric, 654.048, 48 Inch Chain Link Fabric, and 654.072, 72 Inch Chain Link Fabric will be measured for payment per foot, complete in place.

BASIS OF PAYMENT
Items 650.042, 42 Inch Chain Link Gate With Gate Post, 650.048, 48 Inch Chain Link Gate With Gate Post, or Intermediate Brace Post and 653.42 42 Inch Fence Corner or Intermediate Brace Post will be paid for at the respective Contract unit price per each, which price shall include all labor, material, equipment and incidental costs required to complete the work.

Items 654.042, 42 Inch Chain Link Fence Fabric, 654.048, 48 Inch Chain Link Fabric, and 654.072, 72 Inch Chain Link Fabric will be paid for at the respective Contract unit price per foot, which price shall include all labor, material, equipment and incidental costs required to complete the work.

Concrete footings will be paid for separately under Item 901.3, 3000 psi, 1½ in., 470 Cement Concrete Masonry per Cubic Yard.

Rock excavation, where performed as required by the Engineer, will be paid for separately under Item 144. Class B Rock Excavation.

ITEM 670.1 METAL FENCE REMOVED AND RESET FOOT

GENERAL
This work shall consist removing, storing, and reinstalling Metal Fencing. The work shall be performed in accordance with the details shown on the plans, as specified in these technical provisions and as required by the Engineer.
Existing Metal Fence shall be photographed prior to removal. Metal Fence shall be reset in its existing state and quantity as closely matching the original condition as is possible.

STORAGE
Store units in covered, dry locations, protected from weather, stored off the ground, and secured. Avoid use of protective materials that trap heat and moisture.

Protect product’s finish from damage during handling and installation.

Secure all items from damage for any reason, including vandalism, and theft.

INSTALLATION
Install fence items in accordance with Standard Specifications.

For metal fencing items requiring poured-in-place concrete footings, construct concrete footing in accordance with requirements of Section 901 of the Standard Specifications.

For metal fencing items requiring installation into areas of unit pavement, core holes in pavers to required size and depth. Set steel sleeves prior to pouring of concrete plumb and flush with bottom of

paver setting bed. Install post at level height and shim as required.

All posts and all steel pickets shall be plumb. All steel channel rails shall parallel to the centerline grades.

Any surface damage during installation shall be repaired immediately to the Engineer's satisfaction.

METHOD OF MEASUREMENT

Item 670. Metal Fence Remove and Reset, will be measured for payment by the foot, complete in place.

BASIS OF PAYMENT
Item 670. Metal Fence Remove and Reset, will be paid for at the respective contract unit price per foot, which price shall include all labor, material, equipment and incidental costs required to complete the work.

Concrete footings will be paid for separately under Item 901.3, 3000 psi, 1½ in., 470 Cement Concrete Masonry per Cubic Yard.

Rock excavation, where performed as required by the Engineer, will be paid for separately under Class B rock Excavation.

ITEM 672.1 METAL GATE AND GATE POST REMOVED AND RESET EACH

GENERAL
This work shall consist removing, storing, and reinstalling Metal Gate and Gate Post. The work shall be performed in accordance with the Standard Specifications and as required by the Engineer.
Existing Metal Gate and Gate Post shall be photographed prior to removal. Metal Gate and Gate Post shall be reset in its existing state and quantity as closely matching the original condition as is possible.

STORAGE
Store units in covered, dry locations, protected from weather, stored off the ground, and secured. Avoid use of protective materials that trap heat and moisture.

Protect product's finish from damage during handling and installation.

Secure all items from damage for any reason, including vandalism, and theft.

INSTALLATION
Install completed Metal Gate and Gate Post items in accordance with Specifications and drawing requirements.

For Metal Gate and Gate Post items requiring poured-in-place concrete footings, construct concrete footing in accordance with requirements of Section 901 of the Standard Specifications. And at a minimum shall meet the standards detailed for proposed metal fence.

For Metal Gate and Gate Post items requiring installation into areas of unit pavement or other finish material, core holes in pavers to required size and depth. Set steel sleeves prior to pouring of concrete plumb and flush with bottom of paver setting bed. Install post at level height and shim as

required.

All posts and all steel pickets shall be plumb. All steel channel rails shall parallel to the centerline grades.

Any surface damage during installation shall be repaired immediately to the Engineer's satisfaction.

METHOD OF MEASUREMENT
Item 672.1, Metal Gate and Gate Post Remove and Reset, will be measured for payment per each, complete in place.

BASIS OF PAYMENT
Item 672.1, Metal Gate and Gate Post Remove and Reset, will be paid for at the respective Contract unit price per each, which price shall include all labor, material, equipment and incidental costs required to complete the work.

Concrete footings will be paid for separately under Item 901.3, 3000 psi, 1½ in., 470 Cement Concrete Masonry per Cubic Yard.

Rock excavation, where performed as required by the Engineer, will be paid for separately under Class B rock Excavation.

ITEM 685.3	**STONE MASONRY WALL IN CEMENT MORTAR (BALANCED)**	**CUBIC YARD**
ITEM 690.	**STONE MASONRY WALL REMOVED AND REBUILT IN CEMENT MORTAR**	**CUBIC YARD**

GENERAL
The work performed under this item shall conform to the relevant provisions of Sections 685 and 690 of the Standard Specification and the following.

Work performed under these items shall consist of the removing and rebuilding of existing stone walls in close conformity with the lines and grades shown on the Plans or as directed by the Engineer.

Stones used for construction of the retaining wall shall be the original stones in the present wall that must be rebuilt. Stones from the existing balanced wall along Mill Street may be used. Any new stones shall be of the kind, size, and color and shall match the original section of existing walls and thereby provide a uniform appearance along their entire length. Stones used for the balanced wall can be brought it but should match the existing walls in the size and shape of the stoned.

Mortar for the joints for the facial stones shall not be visible from the front of the wall, giving the wall an appearance of a dry construction. Cement mortar used in joints, should be darkened anywhere the joints are likely to visible on the outside of the wall, to match the color of the stones.

The contractor shall engage a mason with experience in reconstructing historic walls to perform work under this item.

METHOD OF MEASUREMENT
Measurement for these items shall be as specified in Subsection 690 of the Standard Specifications.

BASIS OF PAYMENT
Stone Masonry Wall in Cement Mortar shall be paid for at the contract unit price per cubic yard under Item 685.3 Stone Masonry Wall in Cement Mortar (Balanced). Stone Masonry Wall Removed and Rebuilt in Cement Mortar shall be paid for at the contract unit price per cubic meter under Item 690., Excavation for foundation will be paid for under Item 141, Class A Trench Excavation.

ITEM 697.1 SILT SACK EACH

DESCRIPTION
The work under this item includes the furnishing, construction, maintenance and removal of a fabric sack to be installed in drainage structures for the protection of wetlands and other resource areas.

Silt sacks shall be installed in catch basin within the project limits and as required by the Engineer.

The silt sacks shall be manufactured for a 2 foot x 2 foot opening under regular flow conditions or approved equal. The filter material shall be installed in accordance with the construction detail as shown on the plans.

Silt sacks shall be manufactured by:

- Atlantic Construction Fabrics, Inc. 1801-A Willis Road, Richmond, VA 23237
- ESS Brothers 23230 West Thomess Blvd., Loretto, MN 55357
- Bowhead Manufacturing Company PO Box 80327, Seattle, WA 98108
- or approved equivalent.

Silt sacks shall remain in place until the placement of the top course and the graded areas have become permanently stabilized by vegetative growth. All materials used for the filter fabric will become the property of the Contractor and shall be removed from the site.

The Contractor shall inspect the condition of silt sacks after each rainstorm and during major rain events. Silt sacks shall be cleaned weekly to remove accumulated debris, when it is approximately 50 percent full or as required. Sacks which become damaged during construction operations shall be repaired or replaced immediately at no additional cost to the Department.

COMPENSATION
Method Of Measurement
Silt sack shall be measured per each furnished and installed in the drainage structures.

Basis Of Payment
Payment for Item 697.1- Silt Sack shall be paid at the contract unit price per each complete in place, which price shall include all labor, material, equipment and incidental costs required to complete the work, including any installation, inspection, maintenance, removal of accumulated debris, and final removal from site.

ITEM 701.01	**SCORED CEMENT CONCRETE SIDEWALK**	**SQUARE YARD**
ITEM 701.02	**COLORED SCORED CEMENT CONCRETE SIDEWALK**	**SQUARE YARD**
ITEM 701.11	**SCORED CEMENT CONCRETE SIDEWALK AT DRIVEWAY**	**SQUARE YARD**
ITEM 701.2	**CEMENT CONCRETE WHEELCHAIR RAMP**	**SQUARE YARD**

GENERAL
Work under this item shall conform to the relevant provisions of Section 701 of the Standard Specifications and the following:

Scoring patterns for Scored Cement Concrete Sidewalk, Scored Cement Concrete Sidewalk at Driveway and Colored Scored Cement Concrete Sidewalk shall be as shown on the plans & details. Scoring shall not be saw cut, hand trowling is required.

Colored scored concrete sidewalk shall be brick red in color. It shall be a mineral oxide based water reducing admixture; providing permanent fade resistant, uniform, streak free, integral color. It shall reduce color bleeding, laitance, and efflorescence. Colored concrete banding shall be scored on a 12 inch grid as shown on plans and details.

All cement concrete pavement shall include expansion joints at a minimum of 20 feet on center. Expansion joint filler shall be preformed, non-bituminous type conforming to ASTM D1752, Type II.

All expansion joints shall be sealed with a flexible epoxy expansion joint sealant colored to match the corresponding pavement.

SAMPLES
The contractor shall construct an 8’ by 20’ long sample Scored Concrete Sidewalk section including at least one expansion joint and Colored Scored Concrete Sidewalk banding. Sample shall be approved by the Engineer prior to sidewalk construction under these items. A second panel shall be provided if the first is not accepted by the Engineer and shall be constructed at the direction of the Engineer. Upon acceptance the sample panel shall be included as part of the final concrete sidewalk.

SUBMITTALS
Detectable warning panels for wheelchair ramps shall be red pre-cast concrete paving units as supplied by one of the following or approved equal. Provide manufacturers product data.

Hanover
Detectable Warning Pavers
“Red15” Tech Tile

Tile Tech
Detectable Warning Pavers
“Red”

Pave stone
Detectable Warning Pavers
“Colonial Red”

Submit color sample for colored concrete along with manufacturer’s product data.

METHOD OF MEASUREMENT
Item 701.01 Scored Cement Concrete Sidewalk, item 701.02 Colored Scored Cement Concrete Sidewalk, item 701.11 Scored Cement Concrete Sidewalk at Driveway and item 701.2 Concrete Wheelchair Ramp will be measured for payment per square yard, complete in place.

BASIS OF PAYMENT
Item 701.01 Scored Cement Concrete Sidewalk, item 701.02 Colored Scored Cement Concrete Sidewalk, item 701.11 Scored Cement Concrete Sidewalk at Driveway and item 701.2 Concrete Wheelchair Ramp will be paid at the respective Contract unit price bid per square yard, which price shall include all labor, material, equipment and incidental costs required to complete the work.

ITEM 705.1	**FLAGSTONE WALK REMOVED AND RELAID**	**SQUARE YARD**
ITEM 706.1	**BRICK WALK REMOVED AND RELAID**	**SQUARE YARD**

GENERAL
The work shall consist of the removing and relaying of flagstone walks, brick walks, and granite steps, similar to the existing conditions and in close conformity with the lines and grades shown on the Plans or as required by the Engineer.

METHOD OF MEASUREMENT
Item 705.1 Flagstone Walk Removed and Relaid and Item 706.1 Brick Walk Removed and Relaid will be measured per square yard complete in place.

BASIS OF PAYMENT
Item 705.1, Flagstone Walk Removed and Reset and Item 706.1, Brick Walk Removed and Reset, will be paid for at the Contract unit price per square yard. This unit price shall include all labor, tools, materials, equipment and transportation required to complete the work to the satisfaction of the Engineer.

ITEM 707.1	**PARK BENCH**	**EACH**

GENERAL
This item of work shall conform to the relevant provisions of Section 700 and shall consist of supplying and installing materials for Park Benches. Park Bench locations shall be as shown on the plans, in accordance with these specifications, and/or as required by the Engineer. For each bench removed and stacked duplicate and replace memorial placards where applicable.

STANDARDS
Comply with applicable requirements of the following standards. Where these standards conflict with other specified requirements, the most restrictive requirements shall govern.

ASTM – American Society for Testing and Materials;
AWS – American Welding Society;
SSPC – Steel Structures Painting Council

SUBMITTALS
Contractor shall submit all shop drawings, manufacturers' product data, and samples in accordance with Division I. Shop drawings shall be returned to the Contractor for resubmission if required information is incomplete. Verify all dimensions in the field before shop drawings are submitted. The Contractor shall submit a sample of the product finish and color for approval by the Engineer.

Shop drawings shall include plans, sections and details as required to show all materials and reinforcing, layout, dimensions, jointing, method of connection and assembly, fabrication and tolerances for types of materials, types and details of connections and openings, cuts, holes, bolts, plates, concrete footings, reinforcing and finishing, anchors and fasteners, attachment details, and painting and finishing.

Certificate of Compliance: Submit manufacturer's certification that each unit piece of Site Furniture has been constructed/installed to conform to design, materials, and construction equivalent to requirements for labeled construction.

Refer to Section 901, CEMENT CONCRETE MASONRY for submittal requirements for all foundations, footings, and reinforced concrete structures.

Manufacturer's Literature: Submit product data including details of construction, materials, dimensions, analysis, hardware preparation, color charts and specific finishes, and label compliance.

Furnish to the Engineer notarized certificates of compliance with ASTM requirements specified in this Section for each item.
The Contractor shall provide shop drawings for each memorial plaques to be replaced. Shop drawing shall include photos of each existing memorial plaque with station location for reference.

QUALITY ASSURANCE AND WARRANTY
Cutting, painting (other than touch-up), and welding in the field will not be permitted.

Contractor shall provide to the Department the written maintenance and operational instructions, all warranties, and guarantees provided by the Manufacturers for the specific improvements and finishes, for a minimum of one year after Final Acceptance. If Manufacturer does not provide warrantee for materials installed, Contractor shall assume all cost for replacement of specified material, if product fails during warrantee period.

Contractor shall provide a guarantee of minimum of one year after acceptance of Workmanship and against defect as determined by the Department, and shall completely replace or repair site improvements at their own expense within two months after item is identified in the field.

DELIVERY, HANDLING AND STORAGE
Deliver units to the site in manufacturer's original, unopened containers and packaging. Upon delivery examine packages immediately to ensure all products are complete and undamaged. Remove and replace damaged items.

Store units in covered, dry locations, protected from weather, stored off the ground, and secured on-site.
Avoid use of protective materials that trap heat and moisture
Protect product's finish from damage during handling and installation.
Secure all items from damage for any reason, including vandalism, and theft.

PRODUCTS
Benches shall meet the visual illustration shown on the Drawings.

Plainwell bench 72", steel slats, - black
Landscape Forms Inc.
431 Lawndale Ave.
Kalamazoo, MI 49048
PH: (800-430-6209)

FM-324 Framers Modern bench, 6', steel slats -,black
Victor Stanley, Inc.
P.O. Drawer 330
Dunkirk, Maryland 20754 USA
PH: (800-368-2573)

Bench model 160-60, steel slats, black
Dumor Site Furnishings Inc.
M. E. O'Brien & Sons, Inc.
93 West Street P.O. Box 650
Medfield, MA 02052-0650
PH: (508-359-4200)

or approved equivalent.

MATERIALS
Bench shall be manufactured of milled steel bars, plates, and pipes to the dimensions and quantities shown on the Drawings. Side supports shall be of one-piece construction. Bars shall be 3/8 inch minimum thickness. Provide all materials from new stock, free from defects impairing strength, durability and appearance, and of best commercial quality for the purpose specified.

All hardware shall be fabricated from steel conforming to ASTM A36 and shall be galvanized by the hot-dip process in conformity with ASTM A153-73 for Zinc Coating (Hot-Dip) on Iron and Steel Hardware, unless otherwise specified as stainless steel conforming to ASTM Type 316 and 317 stainless steel bolts, anchors, clips, and fasteners shown on the Drawings and indicated herein.

All welds shall be continuous and ground smooth and watertight, without compromising the structural integrity of the weld.

Supply all equipment hardware and required accessories required for complete, operating and installed site improvement item specified herein. Provide all exposed fasteners of the same material, color and painted finish as the fastened material unless otherwise indicated in the Drawings and specified herein. Provide all exposed fasteners vandal-proof (spanner-head type), unless otherwise noted in the Drawings or specified herein. Provide fasteners and sleeves that allow for removal without damaging the fasteners or the item.

Anchoring for bench shall be as shown on the Drawings with stainless steel anchor bolts to dimensions and requirements of the manufacturer. Zinc plated bolts shall not be accepted.
All bolts shall receive an ornamental cover color to match bench to hide bolt form view.

Anchor bolts shall be vandal resistant requiring specialized tool for removal, provide two sets of tools to the Towns Department of Public Works.

FINISH
Unit shall be either electrostatically applied polyester powdercoat or coated or hot dip galvanized before painting with an epoxy prime coat with a minimum of three topcoats of black enamel paint. Thickness of finish shall be 8-10 mils. minimum.

Finish shall be semi-gloss.

Color shall be black.

CONSTRUCTION METHODS
Review layout of units for approval in the field with Engineer before footings and improvements are installed.

PARK BENCH INSTALLATION
Install Park Bench in accordance with manufacturer's instructions. Refer to the specific site elements and the Drawings for horizontal and vertical alignment. Anchor Park Bench securely and according to manufacturer's instructions and the Drawings, to concrete pads with stainless steel anchor bolts and fasteners with lock-tight washers.

Park Bench shall be securely installed to a 1/8 inch tolerance overall and shall be installed per manufacturer's directions, plumb and level, unless otherwise shown in the Drawings. Items that fall outside of this tolerance shall be required to be reset to meet tolerance, as a condition of acceptance. Bolts and fasteners shall be trimmed to safe length, as applicable and with review by the Engineer.

PROTECTION
Protect all stored and installed Park Benches from damage, use, theft or vandalism until acceptance. Contractor shall adjust, repair, or replace damaged, missing, or unacceptable items at their own expense. Site items shall be clean, and finishes as specified as condition of acceptance. Clean with non-abrasive means, careful not to damage finishes.

METHOD OF MEASUREMENT
Item 707.1 Park Bench will be measured for payment per each as called out on the plans or as required by the Engineer.

BASIS OF PAYMENT
Item 707.1 Park Bench will be paid for at the contract unit price per each, which price shall include all labor, material, equipment and incidental costs required to complete the work.

ITEM 707.12 REPLACEMENT BENCH PLAQUE EACH

GENERAL
This item of work shall conform to the relevant provisions of Section 700 and shall consist of supplying and installing replacement commemorative plaques on Park Benches. Where existing Park Benches to be Removed and Stacked include a plaque a duplicate plaque shall be provided for the replacement Park Bench.

SUBMITTALS
Contractor shall submit all shop drawings, manufacturers' product data, and samples in accordance with Division I. Shop drawings shall be returned to the Contractor for resubmission if required information is incomplete. Verify all dimensions in the field before shop drawings are submitted. The Contractor shall submit a sample of the product, finish, and color for approval by the Engineer.

Submit image of existing plaque and shop drawing and manufacturers product description of duplicate replacement plaque.

PRODUCTS

Plaque shall be provided by Manufacturer of Park Bench, Item 707.1 or approved equivalent.

MATERIALS

Material and finish to match existing unless otherwise approved.

INSTALLATION

Plaques shall be fabricated and installed by the Park Bench manufacturer unless otherwise approved. Fasteners shall be vandal resistant.

METHOD OF MEASUREMENT
Item 707.12 Replacement Bench Plaque will be measured for payment per each as called out on the plans or as required by the Engineer.

BASIS OF PAYMENT
Item 707.12 Replacement Bench Plaque will be paid for at the contract unit price per each, which price shall include all labor, material, equipment and incidental costs required to complete the work.

ITEM 707.11 PARK BENCH REMOVED AND STACKED EACH

GENERAL
This item of work shall conform to the relevant provisions of Section 700 and shall consist of detaching existing Park Bench from its foundation if any, packaging as required to prevent damage to finishes, and stacking it on site to be picked up by the Town of Belmont's Public Works Department. The contactor shall notify the Engineer and call The Town department at PH: (617) 489-7171 at least 1 week prior to the date it will be available to be picked up.

MEASUREMENT
Item 707.11 Park Bench Removed and Stacked will be measured for payment per each as called out on the plans or as required by the Engineer.

PAYMENT
Item 707.11 Park Bench Removed and Stacked will be paid for at the contract unit price Per each, which price shall include all labor, material, equipment and incidental costs required to complete the work.

ITEM 707.2 TRASH RECEPTACLE EACH

GENERAL
This item of work shall conform to the relevant provisions of Section 700 and shall consist of supplying and installing materials for trash receptacles. Trash receptacle locations shall be as shown on the plans, in accordance with these specifications, and/or as required by the Engineer.

STANDARDS
Comply with applicable requirements of the following standards. Where these standards conflict with other specified requirements, the most restrictive requirements shall govern.

ASTM – American Society for Testing and Materials;
AWS – American Welding Society;
SSPC – Steel Structures Painting Council

SUBMITTALS
Contractor shall submit all shop drawings, manufacturers' product data, and samples in accordance with

Division I. Shop drawings shall be returned to the Contractor for resubmission if required information is incomplete. Verify all dimensions in the field before shop drawings are submitted. The Contractor shall submit a sample of the product finish and color for approval by the Engineer.

Shop drawings shall include plans, sections and details as required to show all materials and reinforcing, layout, dimensions, jointing, method of connection and assembly, fabrication and tolerances for types of materials, types and details of connections and openings, cuts, holes, bolts, plates, concrete footings, reinforcing and finishing, anchors and fasteners, attachment details, and painting and finishing.

Certificate of Compliance: Submit manufacturer's certification that each unit piece of Site Furniture has been constructed/installed to conform to design, materials, and construction equivalent to requirements for labeled construction.

Refer to Section 901, CEMENT CONCRETE MASONRY for submittal requirements for all foundations, footings, and reinforced concrete structures.

Manufacturer's Literature: Submit product data including details of construction, materials, dimensions, analysis, hardware preparation, color charts and specific finishes, and label compliance.

Furnish to the Engineer notarized certificates of compliance with ASTM requirements specified in this Section for each item.

QUALITY ASSURANCE AND WARRANTY
Cutting, painting (other than touch-up), and welding in the field will not be permitted.

Contractor shall provide to the Department the written maintenance and operational instructions, all warranties, and guarantees provided by the Manufacturers for the specific improvements and finishes, for a minimum of one year after Final Acceptance. If Manufacturer does not provide warrantee for materials installed, Contractor shall assume all cost for replacement of specified material, if product fails during warrantee period.

Contractor shall provide a guarantee of minimum of one year after acceptance of Workmanship and against defect as determined by the Department, and shall completely replace or repair site improvements at their own expense within two months after item is identified in the field.

DELIVERY, HANDLING AND STORAGE
Deliver units to the site in manufacturer's original, unopened containers and packaging. Upon delivery examine packages immediately to ensure all products are complete and undamaged. Remove and replace damaged items.

Store units in covered, dry locations, protected from weather, stored off the ground, and secured on-site. Avoid use of protective materials that trap heat and moisture

Protect product's finish from damage during handling and installation.

Secure all items from damage for any reason, including vandalism, and theft.

PRODUCTS
Receptacles shall meet the visual illustration shown on the Drawings.

Receptacles shall be:

S-42 Iron Sites Series Litter Receptacle, black
Side opening
With steel closing dome top
Victor Stanley, Inc.
P.O. Drawer 330
Dunkirk, Maryland 20754 USA
PH: 800-368-2573

Receptacle 157-32, black
Side opening
With steel closing dome top PT.
Dumor Site Furnishings Inc.
M. E. O'Brien & Sons, Inc.
93 West Street P.O. Box 650
Medfield, MA 02052-0650
PH: 508-359-4200

MT3D-32 Mid Town Litter Receptacle with steel closing Dome top
Keystone Ridge Designs
670 Mercer Rd.
Buttler, PA 16001-1840
PH: 800 284 8208

Or approved equivalent.

MATERIALS
Provide all materials from new stock, free from defects impairing strength, durability and appearance, and of best commercial quality for the purpose specified.

Supply all equipment hardware and required accessories required for complete, operating and installed site improvement item specified herein.

All hardware shall be fabricated from steel conforming to ASTM A36 and shall be galvanized by the hot-dip process in conformity with ASTM A153-73 for Zinc Coating (Hot-Dip) on Iron and Steel Hardware, unless otherwise specified as stainless steel conforming to ASTM Type 316 and 317 stainless steel bolts, anchors, clips, and fasteners shown on the Drawings and indicated herein.

Provide all exposed fasteners of the same material, color and painted finish as the fastened material unless otherwise indicated in the Drawings and specified herein.

Provide all exposed fasteners vandal-proof (spanner-head type), unless otherwise noted in the Drawings or specified herein. Some items will require removal for regular maintenance or for other uses. Provide fasteners and sleeves that allow for removal without damaging the fasteners or the item.

Trash receptacle shall meet the visual illustration shown on the Drawings and shall be manufactured of solid milled steel bars, bands, plates, and pipes to the dimensions and quantities shown on the Drawings. All welds shall be continuous and ground smooth and watertight, without compromising the structural integrity of the weld.

Unit shall be coated with zinc rich epoxy primer before powder coating. Finish shall be an electrostatically applied powder coat. Color shall be black.

Anchoring for unit shall be floor mounted with stainless steel anchor bolts to dimensions and requirements of the manufacturer.

Receptacle shall have a high density plastic liner provided by the manufacturer minimum capacity of 32 gal.

Anchoring for unit shall be floor mounted with stainless steel anchor bolts to dimensions and requirements of the manufacturer. Anchor bolts shall be vandal resistant requiring specialized tool for removal, provide two sets of tools to the Towns Department of Public Works.

CONSTRUCTION METHODS
Review layout of units for approval in the field with Engineer before footings and improvements are installed.

UNIT INSTALLATION
Install Site Furniture in accordance with manufacturer's instructions. Refer to the specific site elements and the Drawings for horizontal and vertical alignment. Anchor site furnishings, securely and according to manufacturer's instructions and the Drawings, to concrete pads with stainless steel anchor bolts and fasteners with lock-tight washers.

Units shall be securely installed to a 1/8 inch tolerance overall and shall be installed per manufacturer's directions, plumb and level, unless otherwise shown in the Drawings. Items that fall outside of this tolerance shall be required to be reset to meet tolerance, as a condition of acceptance. Bolts and fasteners shall be trimmed to safe length, as applicable and with review by the Engineer.

PROTECTION
Protect all stored and installed units from damage, use, theft or vandalism until acceptance. Contractor shall adjust, repair, or replace damaged, missing, or unacceptable items at their own expense. Site items shall be clean, and finishes as specified as condition of acceptance. Clean with non-abrasive means, so as not to damage finishes.

METHOD OF MEASUREMENT
Item 707.2 Trash Receptacle will be measured for payment per each which price shall include all labor, material, equipment and incidental costs required to complete the work.

BASIS OF PAYMENT
Item 707.2 Trash Receptacle will be paid for at the contract unit price Per each, which price shall include all labor, material, equipment and incidental costs required to complete the work.

ITEM 707.21 TRASH RECEPTACLE REMOVED AND STACKED EACH

GENERAL
This item of work shall conform to the relevant provisions of Section 700 and shall consist of detaching existing Trash Receptacle from its foundation if any, packaging as required to prevent damage to finishes, and stacking them on site for pick up by the Town of Belmont's Public Works Department. The contactor shall notify the Engineer and call The Town department at PH: (617) 489-7171 at least 1 week prior to the

material being ready to be picked up.

METHOD OF MEASUREMENT
Item 707.21 Trash Receptacle Removed and Stacked will be measured for payment per each as called out on the plans or as required by the Engineer.

BASIS OF PAYMENT
Item 707.21 Park Trash Receptacle and Stacked will be paid for at the contract unit price Per each, which price shall include all labor, material, equipment and incidental costs required to complete the work.

ITEM 707.71	**3 INCH WAVERLEY TRAIL MEDALLION (INSTALLATION ONLY)**	**EACH**
ITEM 707.72	**12 INCH WAVERLEY TRAIL MEDALLION (INSTALLATION ONLY)**	**EACH**

GENERAL

Work done under this item shall conform to the relevant provisions of Section 701 of the Standard Specifications and the following:

The work shall consist of installing 3 inch and 12 inch trail medallions along the Waverley Trail as shown on the Plans. The medallions will be provided by others and installed in conformance with the manufacturer's recommendations and the details shown on the Plans. The medallions shall be placed in conjunction with the placement of the cement concrete sidewalks. The Contractor shall ensure that each medallion is flush with the sidewalk surface and does not cause a tripping hazard. The Contractor shall also ensure that the medallion shall be protected during the installation so that the image/text on the medallion is clean and free from concrete debris.

The Contractor shall provide the Engineer with a schedule for the placement of the concrete sidewalks along the path of the Waverley Trail, one month prior to the placement of the concrete sidewalks, to allow for delivery of the medallions to the Contractor. The Contractor, Engineer and a representative from the Town shall review the placement of the medallions prior to the placement of the concrete sidewalks.

METHOD OF MEASUREMENT
Items 707.71 and 707.72 will be measured for payment per each medallion installed.

METHOD OF PAYMENT
Items 707.71 and 707.72 will be paid for at the contract unit price per each, which shall include all labor, equipment and incidental costs required to complete the work.

ITEM 707.81	**WAVERLEY TRAIL SIGN REMOVED AND RESET**	**EACH**

GENERAL
This item of work shall conform to the relevant provisions of Section 700 and shall consist of Removing existing Waverley Trail Sign and its foundation, transporting it to the location indicated as shown on the plans, in accordance with these specifications, and/or as required by the Engineer and resetting it to meet its original conditions of installation.

CONSTRUCTION METHODS
The Contractor shall remove the Waverley Trail Sign and its foundation from its original location by first

cleanly cutting away surface pavement to prevent damage to the sign or its foundation during removal, excavating as required to remove the sign an its foundation and carefully removing any excess material required to cleanly reinstall the sign and its foundation in its new location.

MEASUREMENT
Item 707.81 Waverley Trail Sign Removed and Reset will be measured for payment per each as called out on the plans or as required by the Engineer.

PAYMENT
Item 707.81 Waverley Trail Sign Removed and Reset will be paid for at the contract unit price Per each, which price shall include all labor, material, equipment and incidental costs required to complete the work.

A new concrete footing, if required through no fault of the Contractor, will be paid for separately under Item 901.3, 3000 psi, 1½ in., 470 Cement Concrete Masonry per Cubic Yard.

Cutting of Cement Concrete Sidewalk will be paid for separately under Item 482.4 Sawing Cement Concrete.

Rock excavation, where performed as required by the Engineer, will be paid for separately under Class B Rock Excavation.

ITEM 707.82	**ELECTRIC BOLLARD SYSTEM LOCATON NO. 1**	**LUMP SUM**
ITEM 707.83	**ELECTRIC BOLLARD SYSTEM LOCATON NO. 2**	**LUMP SUM**

GENERAL
This item of work shall conform to the relevant provisions of Section 700 and shall consist of supplying and installing materials for Bollard. The bollard shall be provided with an optical assembly mounted inside the shaft providing an I.E.S. Type V distribution. The bollard shall be one-piece construction. The optical assembly shall be secured inside the shaft. The bollard top shall be removable for optical assembly access. The lighted bollards shall be furnished with an H.I.D. ballast and socket assembly. Sockets shall be glazed porcelain, medium base, with a copper alloy nickel plated screw shell and center contact. The ballast shall be a core and coil, high power factor, regulating type. Bollard locations shall be as shown on the plans, in accordance with these specifications, and/or as required by the Engineer.

STANDARDS
Comply with applicable requirements of the following standards. Where these standards conflict with other specified requirements, the most restrictive requirements shall govern.

ASTM – American Society for Testing and Materials;
AWS – American Welding Society;
SSPC – Steel Structures Painting Council

SUBMITTALS
Contractor shall submit all shop drawings, manufacturers' product data, and samples in accordance with Division I. Shop drawings shall be returned to the Contractor for resubmission if required information is incomplete. Verify all dimensions in the field before shop drawings are submitted. The Contractor shall submit a sample of the product finish and color for approval by the Engineer.

Shop drawings shall include plans, sections and details as required to show all materials and reinforcing,

layout, dimensions, jointing, method of connection and assembly, fabrication and tolerances for types of materials, types and details of connections and openings, cuts, holes, bolts, plates, concrete footings, reinforcing and finishing, anchors and fasteners, attachment details, and painting and finishing.

Certificate of Compliance: Submit manufacturer's certification that each unit piece of Site Furniture has been constructed/installed to conform to design, materials, and construction equivalent to requirements for labeled construction.

Refer to Section 901, CEMENT CONCRETE MASONRY for submittal requirements for all foundations, footings, and reinforced concrete structures.

Manufacturer's Literature: Submit product data including details of construction, materials, dimensions, analysis, hardware preparation, color charts and specific finishes, and label compliance.

Furnish to the Engineer notarized certificates of compliance with ASTM requirements specified in this Section for each item.

QUALITY ASSURANCE AND WARRANTY

Units shall be free of cracks, chips, scratches and any other defect at the time of delivery. All units shall be placed in a storage area, protected from damage prior to and during transit to the Owner's or Contractor's site.

Contractor shall provide to the Department the written maintenance and operational instructions, all warranties, and guarantees provided by the Manufacturers for the specific improvements and finishes, for a minimum of one year after Final Acceptance. If Manufacturer does not provide warrantee for materials installed, Contractor shall assume all cost for replacement of specified material, if product fails during warrantee period.

Contractor shall provide a guarantee of minimum of one year after acceptance of Workmanship and against defect as determined by the Department, and shall completely replace or repair site improvements at their own expense within two months after item is identified in the field.

DELIVERY, HANDLING AND STORAGE

Deliver units to the site in manufacturer's original, unopened containers and packaging. Upon delivery examine packages immediately to ensure all products are complete and undamaged. Remove and replace damaged items.

Store units in covered, dry locations, protected from weather, stored off the ground, and secured on-site. Avoid use of protective materials that trap heat and moisture

Protect product's finish from damage during handling and installation.

Secure all items from damage for any reason, including vandalism, and theft.

MATERIALS

Provide all materials from new stock, free from defects impairing strength, durability and appearance, and of best commercial quality for the purpose specified.

Supply all equipment hardware and required accessories required for complete, operating and installed site improvement item specified herein.

Provide all exposed fasteners of the same material, color and painted finish as the fastened material unless otherwise indicated in the Drawings and specified herein. Anchor bolts to be completely hot dip galvanized steel.

Provide all exposed fasteners vandal-proof (spanner-head type), unless otherwise noted in the Drawings or specified herein. Some items require removal for regular maintenance or for other uses. Provide fasteners and sleeves that allow for removal without damaging the fasteners or the item.

Bollard shall meet the visual illustration shown on the Drawings and shall be manufactured of steel or aluminum, to the dimensions and quantities shown on the Drawings.

Where specified in the drawing the Ornamental metal bollard shall include a recessed integral GFI receptacle. Wiring of receptacle shall be accomplished by a licensed electrician.

Anchoring for unit shall be floor mounted with stainless steel anchor bolts to dimensions and requirements of the manufacturer. Anchor bolts shall be vandal resistant requiring specialized tool for removal, provide two sets of tools to the Towns Department of Public Works.

FINISH
Unit shall be either an electrostatically applied polyester powder coat or hot dip galvanized before painting. If painted finish shall include an epoxy prime coat, with a minimum of three topcoats. Thickness of finish coat shall be 8-10 mils. Semi-gloss finish. Color shall be black.

CONSTRUCTION METHODS
Review layout of units for approval in the field with Engineer before footings and improvements are installed.

UNIT INSTALLATION
Install Bollard in accordance with manufacturer's instructions. Refer to the specific site elements and the Drawings for horizontal and vertical alignment. Anchor Bollard, securely according to manufacturer's instructions and the Drawings, to concrete pads with stainless steel anchor bolts and fasteners with lock-tight washers.

Bollard shall be securely installed to a 1/8 inch tolerance overall and shall be installed per manufacturer's directions, plumb and level, unless otherwise shown in the Drawings. Items that fall outside of this tolerance shall be required to be reset to meet tolerance, as a condition of acceptance. Bolts and fasteners shall be trimmed to safe length, as applicable and with review by the Engineer.

The contractor shall coordinate wiring connection, timer and power supply from the adjacent signal control cabinet.

PROTECTION
Protect all stored and installed units from damage, use, theft or vandalism until acceptance. Contractor shall adjust, repair, or replace damaged, missing, or unacceptable items at their own expense. Site items shall be clean, and finishes as specified as condition of acceptance. Clean with non-abrasive means, careful not to damage finishes.

METHOD OF MEASUREMENT
Items 707.82 and 707.83 Electrical Bollard System will be measured for payment per lump sum as called

out on the plans, complete in place.

BASIS OF PAYMENT
Item 707.82 and 707.83 Electrical Bollard System will be paid for at the contract unit price per lump sum, which price shall include the bollards and foundations, the wiring, the timer and all labor, material, equipment and incidental costs required to complete the work. The timer will be installed in the nearby traffic signal controller which will supply the power.

Conduit shall be paid for separately under item 804.2 2Iinch Electrical Conduit Type NM – Plastic (UL)

ITEM 707.9 BICYCLE RACK EACH

GENERAL
This item of work shall conform to the relevant provisions of Section 700 and shall consist of supplying and installing materials for bicycle racks. Bicycle rack locations shall be as shown on the drawings, in accordance with these specifications, and/or as required by the Engineer.
Retain below if alternates are specified in Division 1 Section for work in this Section.

STANDARDS
Comply with applicable requirements of the following standards. Where these standards conflict with other specified requirements, the most restrictive requirements shall govern.

ASTM – American Society for Testing and Materials;
AWS – American Welding Society;
SSPC – Steel Structures Painting Council

SUBMITTALS
Product Data: For each type of product indicated. Include construction details, material descriptions, dimensions of individual components and profiles, finishes, field-assembly requirements, and installation details.

Shop Drawings: Show fabrication and installation details, and attachments to other work.

DELIVERY, HANDLING AND STORAGE
Deliver units to the site in manufacturer's original, unopened containers and packaging. Upon delivery examine packages immediately to ensure all products are complete and undamaged. Remove and replace damaged items.

Store units in covered, dry locations, protected from weather, stored off the ground, and secured on-site. Avoid use of protective materials that trap heat and moisture

Protect product's finish from damage during handling and installation.

Secure all items from damage for any reason, including vandalism, and theft.

QUALITY ASSURANCE AND WARRANTY
Cutting, painting (other than touch-up), and welding in the field will not be permitted.

Contractor shall provide to the Department the written maintenance and operational instructions, all warranties, and guarantees provided by the Manufacturers for the specific improvements and finishes, for

a minimum of one year after Final Acceptance. If Manufacturer does not provide warrantee for materials installed, Contractor shall assume all cost for replacement of specified material, if product fails during warrantee period.

Contractor shall provide a guarantee of minimum of one year after acceptance of Workmanship and against defect as determined by the Department, and shall completely replace or repair site improvements at their own expense within two months after item is identified in the field.

PRODUCTS

Modle U2, black
Cycle-safe, Inc.
947 Forest Hills Avenue, Suite C
Grand Rapids, MI 49546
888-950-6531

Hoop Rack HD
Dero Bike Rack Co.
2657 32nd Ave S,
Minneapolis, MN 55406
PH: 800-891-9298

Bike Rack 83-00-S2, black
Dumor Site Furnishings Inc.
M. E. O'Brien & Sons, Inc.
93 West Street P.O. Box 650
Medfield, MA 02052-0650
PH: 508-359-4200

MATERIALS
Steel: Free from surface blemishes and complying with the following:
Plates, Shapes, and Bars: ASTM A 36/A 36M.
Steel Pipe: Standard-weight Schedule 40 steel pipe complying with ASTM A 53, or electric-resistance-welded pipe complying with ASTM A 135.

Metal Components shall be formed to required shapes and sizes with true, consistent curves, lines, and angles. Separate metals from dissimilar materials to prevent electrolytic action.

Welded Connections shall be continuous. Solid members shall be welded with full-length, full-penetration welds and hollow members with full-circumference welds. At exposed connections, finish surfaces smooth and blended so no roughness or unevenness shows after finishing and welded surface matches contours of adjoining surfaces.

Pipes and Tubes: Simple and compound curves shall be made by bending members in jigs to produce uniform curvature for each repetitive configuration required; maintain cylindrical cross section of member throughout entire bend without buckling, twisting, cracking, or otherwise deforming exposed surfaces of bike rack components.

Exposed Surfaces shall be polished, sanded, or otherwise finished; smooth all surfaces, free from burrs, barbs, splinters, and sharpness; all edges and ends rolled, rounded, or capped.

Assemble components in the factory to the greatest extent possible to minimize field assembly. Clearly mark units for assembly in the field.

Anchoring for unit shall be floor mounted with stainless steel anchor bolts to dimensions and requirements of the manufacturer. Anchor bolts shall be vandal resistant requiring specialized tool for removal, provide two sets of tools to the Towns Department of Public Works.

FINISHES
Finish shall be electrostatically applied polyester powder coat or approved equivalent.
Color shall be black.

INSTALLATION
Racks shall be surface mounted as indicated on drawings.

Comply with manufacturer's written installation instructions, unless more stringent requirements are indicated.

Maintain adequate setback position (minimum 2 feet from parallel walls; 2'-6" from perpendicular walls) of the rack with respect to adjacent building walls or other obstructions.

Provide minimum 4 feet at parking areas where vehicles overhang area between curbs or wheel stops and bike racks. Install bicycle racks level, plumb, true, and positioned at locations indicated on Drawings.

METHOD OF MEASUREMENT
Item 707.9 Bicycle Rack will be measured for payment per each as called out on the plans, or as required by the Engineer.

BASIS OF PAYMENT
Item 707.9 Bicycle Rack will be paid for at the contract unit price per each, which price shall include all labor, material, equipment and incidental costs required to complete the work.

ITEM 716 BARBER SHOP POST REMOVED & RESET EACH

GENERAL
This work shall consist removing and reinstalling a Barber Shop Post. The work shall be performed as required by the Engineer.

Existing Barber Shop Post shall be photographed prior to removal and submitted to the Engineer for record. Barber Shop Post shall be reset in its existing location, matching the original condition as closely as possible.

Contractor shall notify the owner of the Barber Shop at least 1 week in advance of relocation operations to either coordinate the selection of a temporary location during construction or to verify the proposed final location.

METHOD OF MEASUREMENT
Item 716. Barber Shop Post Removed & Reset will be measured for payment per each as called out on the plans.

BASIS OF PAYMENT
Item 716. Barber Shop Post Removed & Reset will be paid for at the contract unit price per each, which price shall include all labor, material, equipment and incidental costs required to complete the work.

ITEM 740. ENGINEERS FIELD OFFICE AND EQUIPMENT - TYPE A MONTH

To be inserted by MassDOT

ITEM 745.1 PEDESTRIAN BUS SHELTER –REMOVED AND RESET EACH
ITEM 745.3 PEDESTRIAN BUS SHELTER –INSTALLED EACH

GENERAL
The work under this Item shall conform to the relevant provisions of Section 700 of the Standard Specifications, and the following:

The work under this Item shall be coordinated with the MBTA Bus Division and shall be done in a manner that meets their satisfaction.

STANDARDS
American National Standards Institute (ANSI): ANSI A58.1. .Gravity and Lateral Loads Design.
Uniform Federal Accessibility Standards: FED-STD-795, 4/1/88. 4.13 Door Accessibility.
Public Law 101-336: Americans with Disabilities Act of 1990 (ADA).
Massachusetts State Building Code (MSBC), 8th edition

MATERIALS
The shelters included under Item 745.3 will be provided by the MBTA and stored by the Town of Belmont until ready to be installed.

CONSTRUCTION METHODS
The contractor shall submit a method of installation to the MBTA for review and approval. Anchors and flanges for mounting of Pedestrian Bus Shelter shall be specified and provided by the shelter manufacturer in accordance with stamped structural drawings provided for the shelter including all applicable wind loading calculations for the proposed location.

Shelter shall be anchored into a 6-inch thick welded wire reinforced concrete pad. The area of the pad shall extend 6-inches beyond the anchoring plates. Welded wire fabric shall be placed on chair rails or as required by the Engineer with a 3-inch depth of cover.

METHOD OF MEASUREMENT
Item 745.1 Pedestrian Bus Shelter – Removed and Reset will be measured per square yard in accordance with the provisions of Subsection701.80 of the Standard Specifications.

BASIS OF PAYMENT
Item 745.1 Pedestrian Bus Shelter – Removed and Reset, and 745.3 Pedestrian Bus Shelter Installed will be paid for at the contract unit price per each, complete in place which price shall include all labor, tools, materials, equipment, and incidentals to complete the work to the satisfaction of the Engineer,

ITEM 752.1 TREE PIT CUBIC YARD

GENERAL
Work under this item shall consist of installing concrete saddle and drainage mat at curb to the extents as shown on the Drawings and as required by the Engineer. The work shall include placement, re-handling and incidental work.

Excavation shall be conducted as per item 141 Class A trench excavation.

Where there is a Utility identified directly beneath a tree pit test pits shall be performed at 10 feet on center to determine the depth of the Utility. If the utility is determined to be less than 3 feet below finish grade stop work immediately and contact the Engineer for direction.

Where hand excavation is prescribed by the Engineer due to the proximity of utilities hand excavation shall be conducted as per item 102.4 Hand Excavation Root Zone.

MATERIALS
Loam
Loam shall meet the criteria of Item 751. Loam per the standard specifications.
as described herein.

Drainage mat shall be a 1" thick nylon core of fused entangled filaments with geotextile fabric bonded to both sides. It shall extend along the curb for the entire length of the tree pit and shall extend from the surface to the limit of loam borrow.

Concrete for curb saddle shall conform to the conditions of Item 903, 3000 psi, 1½ in., 470 Cement Concrete Masonry.

DELIVERY, STORAGE, AND HANDLING
Do not deliver or place materials in frozen or saturated condition.

UNDERGROUND UTILITIES AND SUBSURFACE CONDITIONS
Notify the Resident Engineer of any subsurface conditions, which will affect the Contractor's ability to complete the work.

Locate and confirm the location of all underground utilities prior to the start of any excavation.

Repair any underground utilities or foundations damaged by the Contractor during the progress of this work. The cost of all repairs shall be at the Contractor's expense.

SITE PREPARATION
Excavate to the proposed subgrade to the depths as shown on Plans.

Confirm that the subgrade is at the proper elevation and compacted as required. Subgrade elevations shall slope parallel to the finished grade and/or toward the subsurface drain lines as shown on the Plans.

Coordinate installation of tree pit with installation of adjacent curbs pavements and structures to prevent collapse, and avoid pedestrian and vehicular hazards.

Protect adjacent walls, walks, waterproofing, and utilities from damage. Use one-half (1/2) inch plywood and/or plastic sheeting as required, to cover existing masonry work during the installation of the loam.

Clean up any loam or dirt spilled on any paved surface at the end of each working day. Any damage to the paving or architectural work caused by installation shall be repaired by the General Contractor at the Installation Contractor's expense.

PLACEMENT OF LOAM FOR TREE PIT
After subgrade levels have been reached, and immediately prior to placing loam the entire subgrade area is to be thoroughly loosened to a minimum depth of two inches by deep raking.

Spread loam in 6 inch lifts and compact by watering or rolling with a minimum of two passes of a manual lawn roller.

Tree pit loam shall be installed to the depth and to the horizontal extents of the area(s) shown on plans.

CLEAN UP
Upon completion of the tree pit loam installation operations, clean areas within the contract limits. Remove all excess fills and loam, and legally dispose of all waste materials, trash, and debris. Remove all tools and equipment and provide a clean, clear site.

METHOD OF MEASUREMENT

Item 752.10 Tree Pit will be measured for payment per cubic yard as called out on the plans.

BASIS OF PAYMENT

Item 752.10 Tree Pit will be paid for at the contract unit price, which price shall include all labor, material, equipment, excavation and incidental costs required to complete the work.

Concrete saddle will be paid for separately under Item 903, 3000 psi, 1½ in., 470 Cement Concrete Masonry per Cubic Yard.

Loam borrow will be paid for separately under Item 751 Loam Borrow.

Hand Excavation, if requested by the engineer, will be paid for separately under Item 102.4 Hand Excavation Root Zone

ITEM 752.3 ROOT PATH FOOT

GENERAL
This item of work shall consist of excavating trenches, backfilling with loam, covering with nonwoven geotextile, and biaxial soil reinforcing grid and adding plastic root barrier. Loam for backfilling shall conform to the relevant provisions of Section 751. Root path locations shall be as shown on the drawings, in accordance with these specifications, and/or as required by the Engineer.

Where there is a Utility identified directly beneath a Root Path test pits shall be performed at 10 feet on center to determine the depth of the Utility. If the utility is determined to be less than 3 feet below finish grade stop work immediately and contact the Engineer for direction.

SUBMITTALS
Product Data: For plastic soil reinforcing grid. Include construction details, material descriptions, and dimensions.

DELIVERY, STORAGE, AND HANDLING
Store materials to comply with manufacturer's directions to prevent deterioration from moisture, heat, cold, direct sunlight, or other causes.

PRODUCTS
Geotextile migration barrier shall be a nonwoven synthetic geotextile fabric.

Biaxial Plastic Reinforcing Grid shall be as specified under item 752.31 Biaxial Plastic Reinforcing Grid
Root barrier shall be a either a rigid interlocking plastic barrier, or a min. 60 mil. HDPE flexible root barrier intended for use in deflecting tree roots. It shall be one of the following products or approve equivalent.

LB 12-2 Linear Guide
Deep Roots Partners, L.P.
530 Washington St.
San Francisco, CA 94111

Root Barrier
Americover Inc.
2067 Wineridge Place Suite. F
Escondido, CA 92029

Root Guide RS – 12
Root Solutions San Rafael, Ca 94901

INSTALLATION
Excavate trench to depths as shown on plans. The subgrade shall be loosened to a depth of at least 3in to permit bonding of the loam to the subsoil. Remove all stones greater than 1in in diameter and all debris or rubbish. Such material shall be removed from the site, at no additional cost to MassDOT.

fill trenches with loam to a depth sufficiently greater than base depth so that after settlement by two passes with a 390lb seed roller , the completed work shall conform to the lines, grades, and elevations indicated. Cover filled trenches with geotextile migration barrier prior to placement of Biaxial Soil Reinforcing Grid.

Unroll Biaxial Soil Reinforcing Grid over root paths and sub grade and apply tension by hand to eliminate wrinkles. 1 foot overlap is required at seams. Adjacent Biaxial Soil Reinforcing Grid rolls should be overlapped in the direction of anticipated fill spreading.

METHOD OF MEASUREMENT

Item 752.3 Root Path will be measured for payment Per Foot as called out on the plans, or as required by the Engineer.

BASIS OF PAYMENT

Item 752.3 Root Path will be paid for at the contract unit price Per Foot, which price shall include all labor, material, excavation, equipment and incidental costs required to complete the work.

ITEM 752.31 BIAXIAL SOIL REINFORCING GRID FOOT

GENERAL
This item of work shall consist of installing Biaxial Soil Reinforcing Grid as shown on the drawings, in accordance with these specifications, and/or as required by the Engineer.

SUBMITTALS
Product Data: For Biaxial Soil Reinforcing Grid include material descriptions, and dimensions.

DELIVERY, STORAGE, AND HANDLING
Store materials to comply with manufacturer's directions to prevent deterioration from moisture, heat, cold, direct sunlight, or other causes.

PRODUCTS

Biaxial Soil Reinforcing Grid shall be one of the following products or approve equivalent.

Base Grid22,
US Fabrics, Inc.
3904 Virginia Avenue
Cincinnati, OH 45227

BX1100 Geogrid,
Tensar International Corporation
5883 Glenridge Drive
Suite 200
Atlanta, GA

SYNTEENSF11,
GSI Geo-Synthetics, Inc.
W239 N428 Pewaukee Rd.
Waukesha, WI 53188
Toll Free: 1-800-444-5523

INSTALLATION
All areas of "Root Path" shall be covered by Biaxial Soil Reinforcing Grid prior to the installation of corresponding pavement in accordance with the manufacturers specifications.

Unroll geogrid over root paths and sub grade and apply tension by hand to eliminate wrinkles. 1 foot overlap is required at seams. Adjacent geogrid rolls should be overlapped in the direction of anticipated fill spreading.

METHOD OF MEASUREMENT

Item 752.31 Soil Grid Biaxial Soil Reinforcing Grid will be measured for payment Per Foot as called out on the plans, or as required by the Engineer.

BASIS OF PAYMENT

Item 752.31 Biaxial Soil Reinforcing Grid will be paid for at the contract unit price Per Foot, which price

shall include all labor, material, excavation, equipment and incidental costs required to complete the work.

ITEM 752.4 **BIO-SWALE SOIL** **CUBIC YARD**

GENERAL

The purpose of this item is to install planting medium for Infiltration Swale, as shown on the drawings and as required by the Engineer.

The work includes, but is not limited to, the following items: preparation, obtaining, stockpiling, re-handling placement, and compacting of planting medium on prepared subgrade and incidental work.

Where there is a Utility identified directly beneath an Infiltration Swale test pits shall be performed at 10 feet on center to determine the depth of the Utility. If the utility is determined to be less than 3 feet below finish grade stop work immediately and contact the Engineer for direction.

STANDARDS
The following standards form a part of these Specifications:

ASTM D1556. Test for Density of Soil in Place by tile Sand-Cone Method.

ASTM D1557. Moisture-Density Relations of Soils and Soil-Aggregate Mixtures
Using 10-lb. (4.5kg) Rammer and 18-in. (457mm) Drop.

AASHTO T-59. The Moisture-Density Relations of Soils Using a 5.5-lb. (2.5kg)
Rammer and a 12-in. (305mm) Drop.

SUBMITTALS
Submit manufacturers product data for Bio-swale Soil including organic amendment (compost), sand sieve analysis, and loam soil test for USDA classification and macro nutrients. Include manufacturers contact information, material content, and source.

PRODUCTS

Shall be:
Bio Infultration Soil as manufactured by
DH Loam Co.
2352 Main Street Concord, MA 01742
(Phone: 978-897-4901)

Bio-Retention Soil as manufactured by
New England Specialty Soils Lancaster, MA
(Phone: 978-230-2300)

Bioretention Soil as manufactured by
Read Custom Soils
125 Turnpike Street, Canton, MA 02021
(Phone: 888-475-5526)

MATERIALS
Planting medium shall be a uniformly graded mix of sand, compost and loam.

Mix design shall be by volume as follows and shall be adjusted as required. It shall be uniformly blended. soil mixture shall be 50% sand; 40% leaf compost, manure or other approved organic amendment (non-sludge) and 10% loam. The soil shall be a uniform mix free of stones, stumps, roots or other similar objects larger than two inches.

Fertilizer shall not be added to planting medium.

DELIVERY, STORAGE, AND HANDLING
Do not deliver or place materials in frozen or saturated condition.

Deliver material at or near optimum compaction moisture content as determined by AASHTO T 99 D 698. Do not deliver or place materials in an excessively moist condition (beyond two (2) percent above optimum moisture content as determined by AASHTO T 99 D 698).

Do not store unprotected from large rainfall events. Do not allow excess water to enter the site prior to compaction (washing of tools, trucks, etc.) If water is introduced into the material after grading, allow material to drain to near optimum compaction moisture content.

SITE PREPARATION
Excavate to the proposed subgrade to the depths as shown on Plans.

Confirm that the subgrade is at the proper elevation and compacted as required. Subgrade elevations shall slope parallel to the finished grade and/or toward the subsurface drain lines as shown on the Plans.

Coordinate the installation of the planting medium with installation of adjacent pavement, curbs, structures and utility work.

Protect adjacent walls, walks, waterproofing, and utilities from damage or staining by the soil. Use one-half (1/2) inch plywood and/or plastic sheeting as required, to cover existing masonry work and other times during the installation of the structural soil material. Clean up any soil or dirt spilled on any paved surface at the end of each working day. Any damage to the paving or architectural work caused by the Soils Installation Contractor shall be repaired by the General Contractor at the Soils Installation Contractor’s expense.

PLACEMENT OF PLANTING MEDIUM
After subgrade levels have been reached, and immediately prior to placing planting medium, the entire subgrade area to be thoroughly compacted, then loosened to a minimum depth of two inches utilizing the teeth on the bucket of a backhoe or by deep raking.

Spread planting medium in the lifts not greater than 6 inches and compacted by two passes with a 390lb seed roller.
planting medium shall be installed to a depth of 2 feet below finish grade and to the horizontal extents of the area(s) shown on plans.

The Resident Engineer should check the relative compactness of the materials on site.

Infiltration swale shall receive Lawn Sodding immediately upon completion of Bioswale Soil Placement.

CLEAN UP
Upon completion of the planting medium material installation operations, clean areas within the contract limits.

Remove all excess fills soils and mix stockpiles, and legally dispose of all waste materials, trash, and debris. Remove all tools and equipment and provide a clean, clear site.

Sweep, do not wash, all paving and other exposed surfaces of dirt and mud until the paving has been installed over the mix. Avoid washing the area until all paving has been completed.

METHOD OF MEASUREMENT
Item 752.4 Bioswale Soil will be measured for payment per cubic yard as called out on the plans, complete in place.

BASIS OF PAYMENT
Item 752.4 Bioswale Soil will be paid for at the Contract unit price per cubic yard, which price shall include all labor, material, equipment and incidental costs required to complete the work.

Concrete saddle will be paid for separately under Item 903, 3000 psi, 1½ in., 470 Cement Concrete Masonry per Cubic Yard.

Excavation will be paid for under Item 141 class A trench excavation and/or Item 102.4 Hand Excavation Root Zone.

Lawn Sodding will be paid for separately under Item 770.

ITEM 752.5 STRUCTURAL SOIL CUBIC YARD

GENERAL
Work under this item to consist of providing Structural Soil for plantings as shown on the Drawings and as required by the Engineer.

The work shall include obtaining, mixing, stockpiling, re-handling and incidental work. The work includes, but is not limited to, the following items: preparation, placement, and compacting of structural soil medium on prepared subgrade, for the purposes of supporting isolated tree plantings located within the sidewalks.

Structural soil shall be a uniformly graded mix of sand, compost and loam.

Mix design shall be by volume as follows and shall be adjusted as required it shall be uniformly blended and compacted to 90 percent proctor. It shall have a minimum saturated hydraulic conductivity of six inches per hour at that density.

Mixing ratio shall be 4 parts coarse sand, 1 part loam and 1 part compost.

Mixing procedure shall be as follows:

Structural soil should be premixed to a uniform consistency by a qualified soil manufacturer.

Where there is a Utility identified directly beneath Structural Soil test pits shall be performed at 10 feet on center to determine the depth of the Utility. If the utility is determined to be less than 3 feet below finish grade stop work immediately and contact the Engineer for direction.

STANDARDS
The following standards form a part of these Specifications:

1. ASTM D1556. Test for Density of Soil in Place by tile Sand-Cone Method.

2. ASTM D1557. Moisture-Density Relations of Soils and Soil-Aggregate Mixtures Using 10-lb. (4.5kg) Rammer and 18-in. (457mm) Drop.

3. AASHTO T-59. The Moisture-Density Relations of Soils Using a 5.5-lb. (2.5kg) Rammer and a 12-in. (305mm) Drop.

SUBMITTALS
Submit manufacturers product data for Sand Based Structural Soil including organic amendment (compost), sand sieve analysis, and loam soiltest for USDA classification and macro nutrients. Include manufacturers contact information, material content, and source.

Submit manufacturers product data for Geotextile.

Submit manufacturers product data for Root Barrier.

PRODUCTS

Shall be:
Sand Based Structural Soil as manufactured by
DH Loam Co.
2352 Main Street Concord, MA 01742
(Phone: 978-897-4901)

Sand Based Structural Soil as manufactured by
New England Specialty Soils
Lancaster, MA
(Phone: 978-230-2300)

Sand Based Structural Soil as manufactured by
Read Custom Soils
125 Turnpike Street, Canton, MA 02021
(Phone: 888-475-5526)

Perforated plastic pipe shall be corrugated HDPE plastic pipe with filter fabric wrapping.

Pipe riser shall be Schedule 40 PVC pipe, with matching cap and fittings (Color Black).

Geotextile migration barrier shall be a nonwoven synthetic geotextile fabric.

Root barrier shall be consistent with barrier provided under Item 752.3.

DELIVERY, STORAGE, AND HANDLING
Do not deliver or place materials in frozen condition.

Do not store unprotected from large rainfall events. Do not allow excess water to enter the site prior to compaction (washing of tools, trucks, etc.) If water is introduced into the material after grading, allow material to drain to near optimum compaction moisture content.

SITE PREPARATION
Excavate to the proposed subgrade to the depths as shown on Plans.

Confirm that the subgrade is at the proper elevation and compacted as required. Subgrade elevations shall slope parallel to the finished grade and/or toward the subsurface drain lines as shown on the Plans.

Coordinate installation of the structural soil material with that of walls, curb footings, and utility work in the area. Structural & paving elements that are dependent on the structural soil material for support may be postponed until the immediately after the installation of the mix.

Protect adjacent walls, walks, waterproofing, and utilities from damage or staining by the soil. Use one-half (1/2) inch plywood and/or plastic sheeting as required, to cover existing masonry work and other times during the installation of the structural soil material. Clean up any soil or dirt spilled on any paved surface at the end of each working day. Any damage to the paving or architectural work caused by the Soils Installation Contractor shall be repaired by the General Contractor at the Soils Installation Contractor's expense.

PLACEMENT OF STRUCTURAL SOIL PLANTING MEDIUM
After subgrade levels have been reached, and immediately prior to placing Structural Soil Planting Medium the entire subgrade area to be thoroughly compacted, then loosened to a minimum depth of two inches by deep raking.

Spread Structural Soil the lifts not greater than six inches and compacted with a minimum of two passes of vibratory compaction equipment.

Structural soil shall be installed to a depth and to the horizontal extents of the area(s) shown on plans.

The Resident Engineer should check the relative compactness of the materials on site.

CLEAN UP
Upon completion of the structural soil material installation operations, clean areas within the contract limits.

Remove all excess fills soils and mix stockpiles, and legally dispose of all waste materials, trash, and debris. Remove all tools and equipment and provide a clean, clear site.

METHOD OF MEASUREMENT
Item 752.50 Structural Soil will be measured for payment per cubic yard as called out on the plans.

BASIS OF PAYMENT
Item 752.50 Structural Soil will be paid for at the Contract unit price per cubic yard, which price shall include all labor, material, equipment, excavation, and incidental costs required to complete the work.

ITEM 756. NPDES STORM WATER POLLUTION PREVENTION PLAN LUMP SUM

GENERAL

This Item addresses the preparation and implementation of a Storm Water Pollution Prevention Plan required by the National Pollutant Discharge Elimination System (NPDES) and applicable Construction General Permit.

Pursuant to the Federal Clean Water Act, effective March 10, 2003, construction activities which disturb one acre or more are required to apply to the U.S. Environmental Protection Agency (EPA) for coverage under the NPDES General Permit for Storm Water Discharges From Construction Activities. On July 1, 2003 (68 FR 39087), EPA published the final NPDES construction general permit for construction activity. On August 4, 2003 (68 FR 45817), EPA reissued the General Permit for the Commonwealth of Massachusetts and included state specific requirements.

The NPDES General Permit requires the submission of a Notice of Intent (NOI) to the U.S. EPA prior to the start of construction (defined as any activity which disturbs land, including clearing and grubbing). There is a seven (7) day review period commencing from the date on which EPA enters the Notice into their database. The Contractor is advised that, based on the review of the NOI, EPA may require additional information, including but not limited to, the submission of the Storm Water Pollution Prevention Plan for review. Work may not commence on the project until final authorization has been granted by EPA. Any additional time required by EPA for review of submittals shall not constitute a basis for claim of delay.

In addition, if the project discharges to an Outstanding Resource Water, vernal pool, or is within a coastal ACEC as identified by the Massachusetts Department of Environmental Protection (DEP), a separate notification to DEP is required. DEP may also require submission of the Storm Water Pollution Prevention Plan for review and approval. Filing fees associated with the notification and, if required, the SWPPP filing to DEP will be paid by the Contractor.

The owner, MassDOT, and the operator, the Contractor, must submit separate NOIs. In cases where the municipality or other party has control over the plans and specifications or day-to-day site operations, said party must also submit a NOI. The Contractor is responsible to ensure that all required parties have submitted an NOI and shall provide proof of same to the Engineer.

The General Permit also requires the preparation and implementation of a Storm Water Pollution Prevention Plan (SWPPP) in accordance with the afore-mentioned statutes and regulations. The Plan shall include the General Permit conditions and detailed descriptions of controls of erosion and sedimentation 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 CGP. The Contractor shall submit the Plan to the Engineer for approval at least four weeks prior to any site activities. It is the responsibility of the Contractor to be familiar with the General Permit conditions and the conditions of any state Wetlands Protection Act Order, Water Quality Certification, Corps of Engineers Section 404 Permit and other environmental permits applicable to this project and to include in the Stormwater Pollution Prevention Plan the methods and means required to comply with applicable conditions of said permits.

It is the responsibility of the Contractor to complete the SWPPP in accordance with the EPA Construction General Permit, provide all information required, and obtain any and all certifications as required by the Construction General Permit. Any amendments to the SWPPP required by site conditions, schedule changes, revised work, construction methodologies, and the like are the responsibility of the Contractor.

Amendments will require the approval of the Engineer prior to implementation.

Included in the General Permit conditions is the requirement for inspection of all erosion controls and site conditions on a weekly basis as well as after each incidence of rainfall exceeding 0.5 inches in twenty-four hours. The Contractor shall choose a qualified individual who will be on-site during construction to perform these inspections. The Engineer must approve the contractor's inspector. In addition, if the Engineer determines at any time that the inspector's performance is inadequate, the Contractor shall provide an alternate inspector. Written weekly inspection forms, storm event inspection forms, and Monthly Summary Reports must be completed and provided to the Engineer. 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.

The Contractor is responsible for preparation of the Plan, all SWPPP certifications, inspections, reports and any and all corrective actions required to comply with the provisions of the General Permit. Work associated with performance of inspections is not included under this Item. The Standard Specifications require adequate erosion control for the duration of the Contract. Inspection of these controls is considered incidental to the applicable items. This Item addresses acceptable completion of the SWPPP, any revisions/amendments required during construction, and preparation of monthly reports. In addition, any erosion controls beyond those specified in bid items elsewhere in this contract which are selected by the Contractor to facilitate and/or address the Contractor's schedule, methods and prosecution of the work shall be considered incidental to this item.

The CGP requires the submission of a Notice of Termination (NOT) from all operators when final stabilization has been achieved. Approval of final stabilization by the Engineer and confirmation of submission of the NOT shall be required prior to submission of the Resident Engineer's Final Estimate.

BASIS OF PAYMENT

Item 756., NPDES Storm Water Pollution Prevention Plan, payment for all work detailed above, including Plan preparation, required revisions, revisions/addenda during construction, monthly reports and filing fees are included in the Lump Sum for this Item. Upon final acceptance of the SWPPP by the Department, a payment equal to 50% of the Contract Lump Sum price will be paid. The remaining 50% of the Lump Sum will be paid in 10% increments distributed equally throughout the remaining period of the Contract.

ITEM 773.001	**EVERGREENT TREE 5-6 FOOT HEIGHT**	**EACH**
ITEM 773.002	**EVERGREEN TREE 8-10 FOOT HEIGHT**	**EACH**
ITEM 775.000	**TREE 2-2.5 INCH CALIPER**	**EACH**
ITEM 775.001	**TREE 1-1.5 INCH CALIPER**	**EACH**
ITEM 778.000	**SHRUB 18-24 INCH HEIGHT**	**EACH**
ITEM 779.001	**EVERGREEN SHRUB 2-3 FEET HEIGHT**	**EACH**
ITEM 779.002	**EVERGREEN SHRUB 2.5-3 FEET HEIGHT**	**EACH**
ITEM 779.003	**EVERGREEN SHRUB 18-24 INCH HEIGHT**	**EACH**
ITEM 779.004	**EVERGREEN SHRUB 15-18 INCH HEIGHT**	**EACH**
ITEM 796.000	**SHRUB – 2 GALLON**	**EACH**
ITEM 796.001	**GRASS – 1 GALLON**	**EACH**

DESCRIPTION

The work under this item shall conform to the applicable requirements of Section 771, PLANTING TREES,

SHRUBS AND GROUNDCOVER, of the Standard Specifications, except as amended and supplemented as indicated on the drawings and as specified below.

For the above items the Contractor shall provide and install plant material of genus, species, variety, size and quantities in locations as required by the Engineer. The work of this section includes, but is not limited to, the following:

Samples and Submittals

Submittals for the following soil amendments shall be provided per the requirements of section 771.41 and the following.

Soil wetting agent: Submit supplier specifications and certification.
Fungal mychorrhizae: Submit supplier specifications and certification.
Fertilizer: Submit supplier specifications and certification.
Biostimulant: Submit supplier specifications and certification.
Organic Matter: Submit manufacturer source, specifications, and certification. (Peatmoss is not acceptable.) Compost shall be free of noxious weed seeds.
Fertilizer: Submit supplier specifications and certification.
Lime: Submit supplier specifications and certification.

MATERIALS

Soil Wetting Agent
Soil Wetting Agent shall be a synthetic, non-toxic acrylic polyacrylamide or natural soluble plant extract. Application rates shall be per manufacturer's recommendations.

Fungal Mycorrhizae
Each plant shall be planted with fungal mycorrhizae. Mycorrhizae shall include at least three species of vesicular arbuscular (endomycchorizal) fungi as well as ectomycorrhizal fungi. Mycorrhizae shall be shipped in individual dosage packets.

Biostimulant
Biostimulant shall be a dry, water soluable product that contains nitrogen fixing, phosphorous solubilizing, and growth promoting bacteria. In addition, humic acid, cold processed kelp, B-Complex and K vitamins, amino acids and natural sugars shall be incorporated.

Fertilizer
Fertilizer shall be an organic pelletized product and/ or stabilized nitrogen UMAXX or UFLEXX type. With available nutrients in the percentages and applied at a rate as designated by the landscape architect based on the findings of the soil test report.

Lime
Limes shall be pelletized dolomitic limestone and applied at a rate as designated by the landscape architect based on the findings of the soil test report.

COMPENSATION
Method of Measurement
Items 773.001 through 796.001 will be measured for payment per each as called out on the plans, complete in place. The quantity of plants to be paid for will be the number of living trees, shrubs, vines and ground cover

plants of specified kinds and sizes furnished, planted and accepted in accordance with these specifications.

Mulch for planting beds and tree pits shall be incidental to the cost of the plants. Mulch used on areas other than over tree pits or planting beds will be measured by area and at the specified depth. The mulch taken from this measured volume and used for mulching trees and shrubs will be deducted on the basis of the volume of mulch placed over the rated size of each planting pit at a depth of 3 inches.

Basis of Payment
Items 773.001 through 796.001 will be paid for at the respective Contract unit price per each, which price shall include all labor, excavation, material, equipment and incidental costs required to complete the work.
The quantity of trees, shrubs, vines and ground cover plants measured as provided above will be paid for at the contract unit prices per each for planting of the types, species and sizes called for in the bid schedule. The unit price per planting item shall include furnishing and delivering all plants, furnishing and delivering prepared backfill soil, mulch, fertilizer, excavation for plant pits, planting, pruning, guying and staking, mulching, weeding, watering, cleanup, plant establishment work and care including replacements, and for all labor, equipment, tools and incidentals necessary to complete the work prescribed in this section, except that mulch for vines and ground cover plants will be paid for under the contract unit price for the mulch specified. Mulch for areas other than specified for trees and shrubs will be paid for at the contract unit price per cubic yard in place, under the item for Aged Pine Bark Mulch.

No payment will be made for mulching specified as required and included in payment for other contract items.

No separate payment will be made for plant pit excavation, soil preparation, soil amendments, planting mix preparation, loam for planting mix, soil amendments, plant protection, bark mulch (including placement), watering, tree watering bags, drainage mat, geogrids, root barriers, geofoam, maintenance, disposal of unsuitable soils, and all other incidentals required for furnishing and installing the plantings, but all costs in connection therewith shall be included in the Contract unit price bid.

ITEM 804.3	**3 INCH ELECTRICAL CONDUIT TYPE NM - PLASTIC (UL)**	**FOOT**
ITEM 804.32	**3 INCH ELECTRICAL CONDUIT TYPE NM (DOUBLE)- PLASTIC (UL)**	**FOOT**
ITEM 804.33	**3 INCH ELECTRICAL CONDUIT TYPE NM (TRIPLE)- PLASTIC (UL)**	**FOOT**

DESCRIPTION
The work under this item shall consist of the furnishing and the installation of 3” electrical conduits for a traffic signal system as shown on the plans or as directed, complete in place.

The work to be performed under these items shall conform to the relevant portions of Section 801.

METHOD OF MEASUREMENT
Measurement of the above listed items shall be in accordance with provisions of Subsection 801.80 of the Standard Specifications.

BASIS OF PAYMENT
Payment will be made at the unit price per foot for Item 804.3, 3 Inch Electrical Conduit Type NM-Plastic – (UL), Item 804.32, 3 Inch Electrical Conduit Type NM (Double) – Plastic (UL) and Item 804.33, 3 Inch Electrical Conduit Type NM (Triple) – Plastic (UL) as installed, complete in place, which price shall constitute full compensation for all labor, tools, and equipment, for furnishing and installing conduit, fittings, bends, clamps, couplings, all trench excavation (except rock), saw cutting for the

temporary and permanent patches, backfilling, joint encasement, de-watering, pull ropes, and all work necessary for the proper completion of the work specified herewith, as shown on the plans, or as directed by the Engineer. Temporary patching of the roadway pavement shall be paid for under Item 472. Hot Mix Asphalt for Miscellaneous Work, Permanent patching of the roadway will be paid for under Item 451. HMA for Patching, and controlled density fill for the trenches in the roadway will be paid for under Item 153.

ITEM 811.32 PULL BOX 12 X 24 INCHES EACH

DESCRIPTION
The work under these items shall conform to relevant provisions of Section 801 of the Standard Specifications and the following

The work under this Item shall consist of furnishing and the installation of the 12 X 24 Inches pull boxes and frames and covers as shown on the plans or as directed complete in place. A detail of what is to be provided is included in the ppendix of these Special Provisions.

METHOD OF MEASUREMENT
Measurement of the above listed items shall be in accordance with provisions of Subsection 801.80 of the Standard Specifications.

BASIS OF PAYMENT
Payment for Item 811.32, Pull Box 12 X 24 Inches shall be at the contract unit price per each in accordance with Subsection 801.81 of the Standard Specifications. The unit price per each shall include the furnishing of materials and fittings, excavation and backfilling, all equipment and related work required to install the above item, complete in place, to the satisfaction of the Engineer.

ITEM 813.79 INTERCONNECT CABLE SYSTEM LUMP SUM

GENERAL
Work under this Item consists of furnishing and installing all materials, equipment, appurtenances, and making electrical connections for interconnecting traffic signal controllers in accordance with the applicable provisions of Section 800.

The work shall involve interconnecting traffic signals at the following locations as shown on the plans:

Location No. 1: Trapelo Road at Mill Street
Location No. 2: Trapelo Road at pedestrian signal east of Agassiz Street
Location No. 3: Trapelo Road at Pleasant Street
Location No. 4: Trapelo Road at Lexington Road/ Shaw's Drive/ Moraine Street
Location No. 5: Lexington Street at Thayer Street/Church Street

The proposed interconnect cable as shown on the plans shall be a continuous run through all pull boxes. Each conductor shall be terminated on properly labeled terminals. .

CONDUCTOR	FUNCTION
1	Cycle 1 & 2
2	Cycle 3 & 4

3	Split 1 & 2
4	Split 3 & 4
5	Offset 1
6	Offset 2
7	Offset 3
8	Free Operator
9	Flashing Operator
10	Common
11	Spare
12	Spare

The interconnect cable shall run between the traffic controller cabinets as shown on the plans. The cable shall conform to the requirements of I.M.S.A. Specifications and shall be 12 pair, #19 AWG stranded.

The Contractor shall install the proposed interconnect cable through the conduits and pull boxes as shown on the Plans. He shall make all required electrical connections to the proposed controllers as shown on the Plans.

A section of the interconnect conduit system, as shown on the plans, includes use of spare ducts within existing Belmont Municipal Light Department electrical conduits between locations Nos. 4 and 6 to cross the railroad bridge

After completion of this item, when the master controller generates information, the interconnect system shall transmit such information functionally to all interconnected local controllers.

Splices shall not be permitted. Cables must be terminated in a control box with R66 terminal blocks, split type, six clip wide, isolated between two slot clips. Bridge clips shall be furnished and installed to connect the three sets of slips for all terminals including spares. Cables shall be attached to the R66 blocks so that removal of bridge clips will isolate cables from each other. Installation of the cable shall be such that straight through pulls in hand holes and pull boxes shall not be permitted. At least five feet of cable shall be coiled in each pull box or hand hole to facilitate future maintenance. All interconnect cable shall be appropriately terminated in each control cabinet including lightning and overvoltage protection for each used conductor in each cabinet.

BASIS OF PAYMENT

Item 813.79 will be paid for at the Contract unit price, which price shall include all labor, excavation, material, equipment and incidental costs required to complete the work. Traffic signal conduit shall be paid for under Item 804.3 and pull boxes under Item 811.31.

ITEM 815.3	**TRAFFIC CONTROL SIGNAL LOCATION NO 3**	**LUMP SUM**
ITEM 816.01	**TRAFFIC SIGNAL RECONSTRUCTION LOCATION NO 1**	**LUMP SUM**
ITEM 816.02	**TRAFFIC SIGNAL RECONSTRUCTION LOCATION NO 2**	**LUMP SUM**
ITEM 816.04	**TRAFFIC SIGNAL RECONSTRUCTION LOCATION NO 4**	**LUMP SUM**
ITEM 816.05	**TRAFFIC SIGNAL RECONSTRUCTION LOCATION NO 5**	**LUMP SUM**
ITEM 816.06	**TRAFFIC SIGNAL RECONSTRUCTION LOCATION NO 6**	**LUMP SUM**
ITEM 816.07	**TRAFFIC SIGNAL RECONSTRUCTION LOCATION NO 7**	**LUMP SUM**

ITEM 816.08	**TRAFFIC SIGNAL RECONSTRUCTION LOCATION NO 8**	**LUMP SUM**
ITEM 816.09	**TRAFFIC SIGNAL RECONSTRUCTION LOCATION NO 9**	**LUMP SUM**
ITEM 816.10	**TRAFFIC SIGNAL RECONSTRUCTION LOCATION NO 10**	**LUMP SUM**
ITEM 816.11	**TRAFFIC SIGNAL RECONSTRUCTION LOCATION NO 11**	**LUMP SUM**
ITEM 816.12	**TRAFFIC SIGNAL RECONSTRUCTION LOCATION NO 12**	**LUMP SUM**
ITEM 816.13	**TRAFFIC SIGNAL RECONSTRUCTION LOCATION NO 13**	**LUMP SUM**

Work under the above Items shall be performed according to the provisions of Section 800 of the Standard Specifications, supplemented by the following:

The work includes furnishing and installing of traffic signal control equipment, signal housings, signal modules, signal posts and bases, mast arms, service connections and providing all incidental materials necessary for operating and controlling the traffic control signals, as shown on the plans and sketches. Only signal equipment listed on MassDOT's latest approved equipment list shall be used on this project.

The existing signal installation to be reconstructed under this shall be maintained in operation throughout the construction period and until the reconstructed/new traffic signal equipment is ready for operation.

Any temporary installations shall be in conformance with the current edition of the MUTCD at all times. If an existing signal is to be turned off temporarily to allow controller switchovers or rewiring, police details shall be used to control traffic at the intersection.

A list of major items required for each of the intersections is included on the Traffic Signal Plan. The lump sum prices bid for Traffic Control Signals shall be full compensation for all labor, materials, and equipment necessary or incidental to the installation of a traffic control system.

Cement concrete for foundation shall be 4,000 psi, 3/4-inch 610 Lbs. Cement Concrete Masonry conforming to the relevant provisions of Section M4 of the Standard Specifications. Reinforcing steel shall be an ASTM A-615, Grade 60.

No work shall be commenced by the Contractor until approval of the shop drawings and manufacturer's data has been received in writing from the Engineer. Approval of these drawings will be general in character and shall not relieve the Contractor from the responsibility of, or the necessity of, furnishing materials and workmanship conforming to the plans and specifications.

The Contractor shall deliver to the Engineer a certificate of compliance by the manufacturer for all materials purchased from the manufacturer.

Flashing Operation

Changes from automatic flashing to stop-and-go operation and from stop-and-go to automatic flashing operation shall occur as set forth in Section 4D.28 to Section 4D.31 of the MUTCD.

Controllers

Each traffic signal controller cabinet assembly shall comply with NEMA TS2-2003 specifications in its totality except the following options. The applicable NEMA section is referenced in parenthesis:

- Size 6 Cabinet (7.8.3.2)
- Sheet Aluminum (7.2.2.1)
- Painted (7.7.2) with Exterior & Interior: Primed Aluminum

- Pre-wired with Type 1, Config.#3 Assembly (5.3.1)
- Detector Rack Config.#2 (5.3.4)
- Type 1 Actuated/NTCIP Controller (3.2 and 3.3)
- Detector input test buttons in cabinet door:
  - 4 Pre-empt
  - 8 Pedestrian Phase
  - 16 Vehicle Channel

- Surge Protection with pre-approved independent lab test verification for each device
  - AC Service (5.4.2.4) except surge capacity shall be 80 kA
  - The following lines shall have surge suppression installed according to the respective voltage:
    - 8 Pedestrian detector lines
  - Surge suppressors (except those for AC Service) shall meet the following specifications:
    - Circuit Type: 3 stage
    - Surge Capacity: 10 kA 8 x 20 µs impulse per line
    - Resettable Fuse: Positive Temperature Coefficient (PTC)
    - Testing Param: ANSI/IEE C62.45
    - Warranty: 10 years (in writing included with above lab report)
- Document Tray
  - One (1) slide-out document tray shall be mounted below the bottom shelf.
    - Sufficient size to contain cabinet wiring diagrams and two manuals
    - Slides out on nylon rollers or ball bearings
    - Hinged cover to protect documents
    - The closed cover shall be able to support a laptop computer.
  - All cables shall be tied away to allow the tray to be opened and closed smoothly without any obstructions
- Meter Socket
  - Standard residential meter socket with no knock-out on top
  - Rated for 125 Amps, 100 Amps continuous, 600 VAC, CU/AL rated
  - Attached and electrically grounded to the cabinet
  - Three power service unfused terminal connections (AC-,AC+ and ground) having the ability to connect No. 6 AWG conductor
  - Bypass switch to remove meter without disrupting service

The front portion of the detector rack shall be provided with a marker strip to allow identification of detector phase assignments. In addition to the required marker strip, the Contractor shall supply and install on the upper left hand corner of the back of the cabinet door a laminated, pictorial diagram depicting the traffic detector amplifier channel assignments. The assignment information contained shall include approach name, phase, detector number and terminal numbers.

All programmable data contained within the controller, malfunction management unit, amplifiers, and other devices shall be printed out, documented, and kept within the cabinet.

All detectors shall be clearly labeled with approach, phase, detector number (if applicable) and cabinet lead-in termination point. The tag shall be made of plastic or plastic laminate and shall be labeled with permanent ink.

There shall be two switches for the police door: 1) Main power switch and 2) A switch for switching the controller from automatic to flashing operation and vice versa, with the controller power :off" in flashing operation.

The cabinet shall be wired with a normally closed switch connected to a user defined input to the controller for later remote monitoring of the control cabinet's door open status.

A 1/2- inch bead of silicone sealant is required to form a waterproof seal between the controller cabinet and the top of the concrete foundation.

The controller cabinet will be mounted 18" above the foundation and the foundation will extend one inch above the surrounding surface. An 18" non-corrosive spacer will be installed between the foundation and the cabinet and the spacer will match the controller cabinet in color and materials. The spacer will be

All equipment supplied within the control cabinet shall be on the MassDOT's Traffic Signal Approved Equipment List, latest revision.

Master Controller

The master controller shall be compatible with the proposed NEMA TS2-Type 1 local controllers. General requirements are as follows:

Construction

The unit shall consist of a mainframe suitable for shelf mounting, with appropriate interface harnesses.

Operator programmable data entry shall be accomplished through a menu driven keyboard and a display located on the front panel.

Connectors shall be provided for interconnecting all inputs and outputs with their external control circuits.

Timing shall be accomplished by digital methods and with power applied shall use the power line frequency as the time base.

All components shall be operated in accordance with good commercial practice to optimize life and performance.

The design goal shall be such that, under 24 hour a day operating conditions in their circuit applications, all components shall have a life of not less than 5 years.

The circuit reference designation for each component on the printed circuit board shall be clearly marked immediately adjacent to the component.

Electrical

The master controller shall be designed for use of nominal 120 volt, 60 Hz single phase alternating current. It shall operate correctly in the voltage range of 95 to 135 volts AC.

All DC inputs and outputs shall conform to NEMA TS2 - Type 1 standards for transition zone, response time, current capability, surge and noise immunity, as well as all other applicable electrical specifications.

Environmental

The master controller shall maintain all its programmed functions from -30 degrees F to +165 degrees F.

The unit shall perform to this specification when operated in relative humidity from 5% to 95%.

The unit shall conform to all applicable portions of the Environmental and Operating Standards as described in the NEMA Standards TS2-1992.

Functional

All master control equipment shall be placed in the cabinet at the Trapelo Road and Lexington Street (Location 4) intersection. The master control equipment shall be capable of maintaining coordination between all interconnected locations. All controllers shall have internal coordination operation.

The master control equipment shall also be capable of providing a yearly time program for selecting four cycle lengths, three splits, and three offsets plus flashing operation for control of local controllers. The schedule shall be as included and/or as shown on the plans.

The master controller shall be fully compatible with all existing and proposed local controllers and capable of communicating with a computer at a remote location - via a telephone linkage (dial up modem) to the nearest telephone pole or manhole. The modem shall have a data rate of 1,200 baud minimum and use a 10- or 11-bit asynchronous protocol. The power on which the modem runs shall be 12 VDC. The interface shall be through an RS232 port. The modem shall have a 5-year warranty. The modem shall meet the environmental aspects of the NEMA specifications for controllers and corollary equipment.

The Contractor shall provide graphics required for intersection and system monitoring. These graphics shall be customized to reflect the exact geometry, detection, and signalization of the intersections included in the subsystem listed herein. All street names shall be labeled.

The Contractor shall program each programmable local hardware component according to the "time of Day Schedule" as follows:

TIME OF DAY SCHEDULE (BACK UP)

	6 AM-9 AM	**9 AM-11 AM**	**11 AM-2 PM**	**2 PM-4 PM**	**4 PM-7 PM**	**7 PM-6AM**
Mon - Fri	1-1-1	Free	Free	Free	2-2-2	Free
Sat	Free	Free	Free	Free	Free	Free

Sun/Hol	Free	Free	Free	Free	Free	Free

NOTE: CYCLE-SPLIT-OFFSET

NOTE: Patterns shown on the plans are as follows:

AM	1-1-1
PM	2-2-2

Note: Following implementation of the system, thresholds shall be revised as fine tuning occurs.

Video Detection system

The Video Detection System (VDS) shall monitor and detect vehicles on a roadway using video images which can be processed to provide detector outputs to a traffic signal controller. Components of the system shall be included in the MassDOT approved equipment list.

The VDS shall consist of one or more video cameras, a video detection processor (VDP) which mounts in a standard detector rack; a detector rack mounted extension module, field video monitor and pointing device, software and all associated equipment required to set up and operate the system in the field. The equipment shall included camera mountings, extensions, connectors and standard detector rack with power supply.

The system software shall be capable of detecting vehicles and bicycles in multiple lanes using only the video image. Detection zones shall be defined using only onboard video menu and a pointing device to place the zones on a video image. Up to 24 detection zones per camera shall be available. A separate computer shall not be required to program the detection zones.

Vehicle Detection

The VDS shall provide real time vehicle detection comparable to properly operating inductive loops.

Detection shall be a least 98% accurate in good weather conditions and at least 96% accurate in adverse weather conditions (rain, snow, fog). Detection accuracy is dependent upon site geometry; camera placement, camera quality and detection zone location, and these accuracy levels do not include allowances for occlusion or poor video due to camera location or quality.

A minimum of 24 detection zones shall be supported and each detection zone shall be user definable in size and shape to suit the site and the desired vehicle detection region.

Placement of detection zones shall be done by using only a pointing device, and a graphical interface built into the VDP and displayed on a video monitor, to draw the detection zones on the video image from the video camera. No separate computer shall be required to program the detection zones.
Detection zones shall have the capability of implementing logical functions (including AND and OR), counting, delay and extension timing. A single detection zone shall be able to replace multiple inductive loops and the detection zones shall be OR'ed as the default or may be AND'ed together to indicate vehicle presence on a single phase of traffic movement.

A minimum of 3 detection zone patterns shall be saved within the VDP memory. The VDP's memory shall be non-volatile to prevent data loss during power outages. The VDP shall continue to operate (e.g. detect vehicles) using the existing zone configurations even when the operator is defining/modifying a zone pattern. The new zone configuration shall not go into effect until the configuration is saved by the operator.

The selection of the detection zone pattern for current use shall be done through a menu or remote computer via RS-232 port. It shall be possible to activate a detection zone pattern for a camera from VDP memory and have that detection zone pattern displayed within 1 second of activation.

It shall be possible to save detector configurations on disk, to download configurations to the VDP or to retrieve the configuration that is currently running.

When a vehicle occupies a detection zone, the corners of the detection zone will flash on the video overlay display screen to confirm the detection of the vehicle.

Detector placement shall not be more distant from the camera than a distance of ten times the mounting height of the camera.

The VDP unit shall compensate for minor camera movement (up to 2 percent of the field view at 400 ft.) without falsely detecting vehicles. The camera movement shall be measured on the unprocessed video input to the processor units.

The VDP shall provide up to 24 channels of vehicle presence detection per camera through a standard detector rack edge connector and one or more extension modules.

The VDP shall provide dynamic zone reconfiguration (DZR) to enable normal detector operation of existing channels except the one where a zone is being added or modified during the setup process. The VDP shall output a constant call on any detection channel corresponding to a zone being modified.

Detection zone setup shall not require site specific information such as latitude, longitude, date and time to be entered into the system.

The VDP shall output a constant call for each enabled detector output channel if a loss of video signal occurs. The VDP shall output a constant call during the background learning period.

Detection zone outputs shall be configurable to allow the selection of presence, pulse, extend, and delay outputs. Timing parameters of pulse, extend, and delay outputs shall be user definable between 0.1 to 25.0 seconds.

Up to six detection zones shall be capable to count the number of vehicles detected. The count value shall be internally stored for later retrieval through the RS-232 port. The data collection interval shall be user definable in periods of 5, 15, 30 or 60 minutes.

Video Detection Camera

The video cameras used for traffic detection shall be furnished by the VDP supplier and shall be qualified by the supplier to ensure proper system operation.

The camera shall produce a useable video image of the bodies of vehicles under all roadway lighting conditions, regardless of time of day. The minimum range of scene luminance over which the camera shall produce a useable video image shall be the minimum range from nighttime to daytime, but not less than the range 0.1 lux to 10,000 lux.

The camera shall use a CCD sensing element and shall output monochrome video with resolution of not less than 380 lines vertical and 380 lines horizontal.

The camera shall include an electronic shutter control based upon average scene luminance and shall be equipped with a factory adjusted manual iris. Auto-iris lenses are not allowed.

The camera shall include a variable focal length lens with variable focus that can be adjusted, without opening up the camera housing, to suit the site geometry by means of a portable interface device designed for that purpose and manufactured by the detection system supplier. The horizontal field of view shall be adjustable from 8.1 to 45.9 degrees. A single camera configuration shall be used for all approaches in order to minimize the setup time and spares required by the user.

The camera electronics shall include AGC (antiglare coating) to produce a satisfactory image at night.

The camera shall be housed in a weather-tight sealed enclosure. The housing shall be field rotatable to allow proper alignment between the camera and the traveled road surface.

The camera enclosure shall be equipped with a sunshield. The sunshield shall include a provision for water diversion to prevent water from flowing in the camera's field of view. The camera enclosure with sunshield shall be less than 6" diameter, less than 15" long, and shall weigh less than 6 pounds when the camera and lens are mounted inside the enclosure.

The camera enclosure shall include a thermostatically controlled heater to assure proper operation of the lens shutter at low temperatures and prevent moisture condensation on the optical faceplate of the enclosure.

When mounted outdoors in the enclosure, the camera shall operate satisfactorily in a temperature range from -30 °F to +140 °F and a humidity range from 0% RH to 100% RH.

The camera shall be powered by 120-240 VAC 50/60 Hz. Power consumption shall be 15 watts or less under all conditions.

Recommended camera placement height shall be 33 feet (or 10 meters) above the roadway, and over the traveled way on which vehicles are to be detected. For optimum detection the camera should be centered above the traveled roadway. The camera shall view approaching vehicles at a distance not to exceed 350 feet for reliable detection (height to distance ratio of 10:100). Camera placement and field of view (FOV) shall be unobstructed and as noted in the installation documentation provided by the supplier. The final camera placement shall be dictated by the specific intersection geometry for accurate detection of vehicles in the detection zones.

The camera enclosure shall be equipped with separate, weather-tight connections for power and setup video cables at the rear of the enclosure. These connections may also allow diagnostic testing and viewing of video at the camera while the camera is installed on a mast arm or pole using a lens adjustment module (LAM) supplied by the VDP supplier. Video and power shall not be connected within the same connector.

The video signal output by the camera shall be black and white in RS170 or CCIR format. The video signal shall be fully isolated from the camera enclosure and power cabling.

The coaxial cable to be used between the camera and the VDP in the traffic cabinet shall be 75 ohm, precision video cable with 20 gauge solid bare copper conductor (9.9 ohms/M), solid polyethylene insulating dielectric, 98% (min) tinned copper double-braided shield and black polyethylene outer covering. The signal attenuation shall not exceed 0.78 dB per 100 feet at 10 MHz. Nominal outside diameter is 0.304 inches. The coax cable shall be a continuous unbroken run from the camera to the VDP. This cable shall be suitable for installation in conduit or overhead with appropriate span wire. 75-ohm BNC plug connectors should be used at both the camera and cabinet ends. The coaxial cable, BNC connector, and crimping tool shall be approved by the supplier of the video detection system, and the manufacturer's instructions must be followed to ensure proper connection.

POWER CABLING

The power cabling shall be 16 AWG three-conductor cable. The cabling shall comply with the National Electric Code, as well as local electrical codes. Cameras may acquire power from the luminaire if necessary.

Mast Arm Structures

All signal heads and signs on the mast arms shall be fixed mounted. Shoe type bases shall be used. A minimum vertical clearance of 17.5 feet shall be maintained by the 35-foot mast arms.

Mast Arm Foundations

Borings were obtained at each mast arm foundation location and boring logs included. The Contractor shall be responsible for constructing the foundations in accordance with the recommendations noted on the plans, the Standard Specifications, and details based on these boring logs.

The foundation design shall be in conformance with the Standard Specifications and Standard Details. All shop drawings and calculations shall be stamped by a Professional Engineer registered in Massachusetts and provided to the engineer.

For all mast arm pole foundations, the standard mast arm pole foundation shall be modified to a concrete cored foundation as shown on the Standard Drawings for Type 2 Mast Arm Cored Pier Foundations included in the plans. For Type B mast arms use the foundation for required for a 45’ mast arm.

The Contractor is wholly responsible for the design of all foundations regardless of soil conditions and/or ledge found at the proposed foundation locations. Soil boring logs with soil type recommendations are furnished in these specifications.

In the event that soil conditions or ledge prevent the use of the MassDOT standard foundation type, the Contractor is responsible to select and design alternative foundation types. Alternative foundation types could include spread footings, coring and socketing into rock or other foundations previously used to support similar loads, within reason.

Foundations shall not obstruct a sidewalk or crosswalk so that passage by disabled persons is not impaired.

Mast Arms

All mast arms shall be monolever Type II galvanized Steel, and shall be designed in accordance with the AASHTO "Standard Specifications for Structural Supports for Highway Signs, Luminaries and Traffic Signals," 4th Editions (2001) with 2003 Interims. The following shall be the design parameters:
Life: 25 years
Wind Velocity: 130 MPH
Fatigue Category: Category 2 with natural wind gust loading (no truck induced loading, no galloping loading, no vortex shedding)

Type B mast arms shall be designed to allow no more than 12 inches of dynamic sway range for 130 mile per hour wind and ice.

All shop drawings and calculations shall be stamped by a Professional Engineer registered in Massachusetts and provided to the engineer. Acceptance of Type II mast arm poles will be contingent upon review and approval of shop drawings for all mast arms. Shop drawings shall include paint chip and paint application methods/materials.

Mast Arm Sign Hanger Brackets

Sign hanger brackets for mast arms shall be used in all locations where a sign is to be mounted to the mast arm. Mast arm sign hanger brackets shall consist of a mast arm clamp assembly cast from 356-T6 aluminum alloy or equivalent, vertical support tube extruded from 6063 aluminum or equivalent, stainless steel bands, clamp screw, hardware and all miscellaneous materials necessary to fix mount the sign to the mast arm.

The sign hanger bracket shall be universally adjustable capable of making horizontal, vertical and 360-degree rotational adjustments so that any sign mounted on a mast arm can be adjusted to provide proper alignment and sight perpendicular to the flow of traffic.

Vertical support tubes shall be of sufficient length to allow mounting of the sign to within 3 In. of the top and bottom of the sign.

Backplates

Backplates shall be constructed of anodized half hard aluminum with a louvered profile. Backplates shall provide a minimum of 5-inch border around the signal assembly and shall be of dull flat black color. Corners of the backplates shall be rounded with a 2½-inch radius.
Backplates shall be installed with all vehicle signal heads.

Labels

All time settings, switches, harnesses, relays, terminals and fuses shall be clearly and permanently labeled.

Posts and Bases

All 8-feet and 10-feet traffic signal posts shall be aluminum. The pole shall be made of 6063-T6 aluminum alloy and shall be a continuously tapered, seamless tube. Bases shall be pedestal type cast aluminum. Pole and base shall be a single unit.

Vehicle Signal Heads

All vehicle signal heads shall be aluminum.

When in the judgment of the Engineer the visibility of proposed signal faces will be obstructed by trees and other vegetation, the Contractor shall clear the obstructions for proper sight distance. Any clearing necessary shall be done within the State Highway layout, as directed by the Engineer.

Led Signal Module

All signal and pedestrian displays shall be equipped with LED signal modules. All red, amber, green, and pedestrian signal housings with the exception of optically programmed housings shall conform to the following where applicable:

- ITE's Vehicle Traffic Control Signal Heads – Light Emitting Diode (LED) Arrow Traffic Signal Supplement, Dated April 3, 2006.
- ITE's Vehicle Traffic Control Signal Heads- Light Emitting Diode (LED) Circular Signal Supplement, Dated June 27, 2005.
- ITE's Pedestrian Traffic Control Signal Indications Part 2: Light Emitting Diode (LED) Pedestrial Traffic Signal Modules, Adopted March 19, 2004.
- Energy Star/ EPACT Program Requirements for Traffic Signals
- On the MassDOT's Traffic Signal Approved Equipment List

An independent lab shall certify that the LED signal module complies with the applicable ITE specification. The independent report should be submitted to MassDOT for review unless the module is already on the approved list. See "Traffic Signal Controls" under "Qualified Construction Materials" on the Department website.

To prevent the LED module warranty from being voided, the connecting leads on the module shall not be cut. The original LED module leads shall be connected to the signal head terminal block as continuous wire without splices.

The LED signal module will be replaced by the manufacturer if it exhibits one of the following:

- A failure due to workmanship or material defects within the first 60 months of field operation
- A greater than 40 percent light output degradation or a fall below minimum intensity levels (as defined by the latest ITE performance specifications) within the first 36 months of field operation

Spare Equipment

The Contractor shall provide in the traffic signal controller cabinet the following spare signal equipment listed below:

- A full complement of load switches to accommodate each available position of the break panel.
- A full complement of flash transfer relays to accommodate each available position of the back panel.
- Two (2) Bus Interface Units
- A 25 foot RS-232 cable for communication function with a laptop computer.

OPTICAL EMERGENCY PREEMPTION SYSTEM

The work consists of furnishing and installing optical traffic signal preemption systems ready for operation, as described herein and shown on the plans. Included in the work is the furnishing and installing of traffic signal preemption unit and related equipment, optical detection equipment and all necessary connections to the traffic signal controller. The fire preemption system shall be approved by MassDOT and installed in the same cabinet as the controller.

The fire preemption system shall consist of a data-encoded phase selector to be installed within the existing control cabinet. This unit will serve to validate, identify, classify, and record the signal from the optical detectors located on support structures at the intersection. Upon receiving a valid signal from the detector, the phase selector shall generate a preempt call to the controller initiating a preemption operation as shown on the plans.

The phase selector shall be a rack-mounted plug-in four-channel, dual priority device. Programming the phase selector shall be via a PC-based computer utilizing unit specific software. One copy of software on a disk shall be supplied and licensed to the Town as part of this contract. A hard copy of final programming data shall be left in the control cabinet. The Contractor shall supply a complete set of interface cables for phase selector to laptop connection.

Emergency vehicles equipped with optical energy emitters transmit optical energy impulses to optical detectors mounted at the intersection. When optical energy impulses are received at the intersection, control of the signals shall transfer from the local controller to show a selected display shown on the plans to assist the vehicle through the intersection without conflict. After the vehicle has passed through the intersection, control of the signals shall then return to the local controller which shall restore the appropriate timings that were in effect prior to preemption.

Preemption Confirmation Light

A preemption confirmation light shall be provided and mounted as shown on the plans. It shall be located in a position where it may be visible from all preemption approaches to each intersection. The light shall be weather tight and consist of a double flash clear (white) strobe which shall be illuminated whenever the controller is in the emergency preemption phase. The indicator light shall meet ITE, NEMA, IMSA and MassDOT standards. The light shall have a minimum diameter of 140mm and height of 170mm. It shall be capable of flashing at a rate of 60 to 75 flashes per minute. Candela intensity shall be a minimum of 1,000 for clear lenses.

The Contractor shall be responsible for the proper programming of the phase selector, orientation of the optical receivers in the field, and all other work necessary to provide a complete and operating emergency preemption system.

Accessible Pedestrian Signal

Accessible pedestrian signal units shall be furnished and installed at all locations as shown on the plans. The accessible pedestrian signal /pedestrian push button shall be in accordance Section 4E.09 to 4E.12 of the 2009 MUTCD. It shall have a locator tone to allow visually impaired pedestrians to find the push button to activate the walk signal, as well as a tactile arrow indicating the direction of travel on the crosswalk. Once the push button call has been placed, the signal will provide both an audible and a tactile response during the WALK phase of the cycle. The Audible WALK indicator shall be a rapid tick tone,

repeating at 8 to 10 ticks per second. Output levels shall be 90 db @ 3 feet and be self-switching to one of two output levels depending on ambient noise conditions.

The accessible pedestrian pushbutton shall be mounted at a maximum height of 42 inches above the finished sidewalk grade. The push buttons shall be oriented to be parallel to the crosswalk signal to be actuated. Traffic signal sign (R3-10e) shall be installed with each push button assembly and the cost shall be incidental to the push button assembly

COUNTDOWN PEDESTRIAN SIGNAL

Construction

The LED countdown pedestrian module shall be a single, self-contained device, not requiring on-site assembly.

The assembly of the LED countdown pedestrian module shall be designed to assure all internal components are adequately supported to withstand mechanical shock and vibration from high winds and other sources.

All LED indications on the pedestrian signal shall have an automatic dimming circuit for night illumination, and also to match threshold ambient light conditions.

The countdown signal shall use a standard 3-wire configuration for Walk, Don't Walk and Neutral.

The LED countdown pedestrian module shall be made of UL94VO flame retardant material or similar. The lens of the module is excluded from this requirement.

Combination hand/person pedestrian signal modules shall incorporate separate power supplies for the hand and the person icons.

Countdown Functionality

The countdown module shall be compatible with all types of controllers, and especially with the type of traffic signal controller that will be installed as part of this project.

The countdown timer shall continuously monitor the traffic controller for any changes in the pedestrian phase time and reprogram itself automatically, if needed. The countdown module shall be automatically set by the traffic controller based upon the pedestrian change interval only

Per MUTCD, countdown displays shall not be used during the Walk interval or during the yellow change interval of a concurrent vehicular phase.

A steady upraised hand shall be displayed during the yellow change interval and the red clearance interval.

The countdown module shall begin at the start of the flashing DON'T WALK (pedestrian change interval) and shall display the number of seconds remaining until the termination of the DON'T WALK interval, and blank out or remain dark during the steady DON'T WALK interval.

The countdown timer display shall remain synchronized with the signal indications and shall always reach zero at the same time as the flashing hand.

Chromaticity

The standard colors for the LED countdown pedestrian module shall be white for the Walking Person and Portland orange for the Upraised Hand Icon. The countdown numbers shall be Portland orange.

The colors for these Icons shall conform to the current version of the MUTCD Section 4E.04

The chromaticity measurements shall remain unchanged over the input line voltage range of 80VAC to 135VAC.

Display

The LED countdown pedestrian signal shall consist of a single module 16” wide with the Upraised Hand and the Walking Person graphics overlaid upon each other and two seven-segment digits for the countdown display.

The operation, shape and size of the graphic symbols shall meet the current version of the MUTCD, Section 4E.04 and Section 4E.07.

The graphic symbols shall follow PTSCI Part 2 Section 4 for luminance, uniformity, and distribution.

The countdown numbers shall be at least 7 inches in height. The graphic symbols and the countdown numbers shall be located on a black opaque background.

The Portland orange LED shall be of the latest ALLnGa P technology and the white LED shall be of the latest GaN technology.

The individual LED light source shall be interconnected so that a catastrophic failure of a single LED will result in a total loss of not more than 5% of the signal light output.

Warranty

The LED module will be replaced or repaired by the manufacturer if it exhibits a failure due to workmanship or material defects within the first 60 months of field operation.

The LED module will be replaced or repaired by the manufacturer if it falls below the minimum intensity levels as established by ITE within the first 60 months of field operation.

Wiring and Service Connections

Traffic signal cable shall be of Type 2, 12 gauge, 10 conductor. All systems shall have a minimum of one (1) ten (10) conductor cable for each vehicle phase, overlap phase and pedestrian phase for controller outputs to field wiring required by the timing and sequence plan. A minimum of five (5) spare conductors shall be provided in the base of each signal post, mast arm pole and strain pole. Openings, where cables enter the base of a cabinet, shall be sealed with an approved elastic sealing compound. The open ends of conduits entering or leaving mast arms, posts and pull boxes shall also be sealed with the approved elastic sealing compound.

The work for service connections shall consist of furnishing and installing all materials and equipment to deliver power to traffic signals and related electrical systems.

The work for service connections shall consist of furnishing and installing all materials and equipment to deliver power to traffic signals and related electrical systems.

Equipment Color and Finish

Signal Housings	green number 24062 Federal Color Standard 5954
Front of Signal Housings	flat black
Signal Visors and Backplates	flat black
Posts and Bases	green number 24062 Federal Color Standard 5954
Controllers Cabinets	green number 24062 Federal Color Standard 5954
Meter Socket	green number 24062 Federal Color Standard 5954
Mast Arm, Posts and Bases	green number 24062 Federal Color Standard 5954
Hangers, Clamps & Brackets	green number 24062 Federal Color Standard 5954

The final painting shall have a semi-gloss finish in appearance. The contractor shall submit to the Engineer and the Town of Belmont for approval, paint chips of the prescribed color prior to any work being done under this heading

As-built Traffic Layout Plans

It will be the responsibility of the Contractor to provide the Design Engineer with as-built traffic signal layout plans indicating all changes made during the construction. The plans shall indicate the location of all traffic signal equipment installed including detectors, signal posts, mast arms, strain poles, pedestrian and vehicular signal heads, controller cabinets, conduit, pull boxes, service connections and pre-emption equipment. The plans shall also indicate the final as-built timing and sequence, major item list, power-pole number and meter number.

Upon receipt of the above as-built information from the Contractor, the Design Engineer will field verify the as-built information and plans. Following field verification, the Design Engineer will prepare the as-built Traffic Signal Layouts and/or Permits for submission to the MassDOT District 5 and the Town of Belmont Department of Public Works prior to the final acceptance of the project.

Miscellaneous Requirements

The actuated controllers shall have capability to preempt to a preselected phase by external command.

The Contractor's attention is drawn to the requirements of Section 813.60C Splicing, relative to four optional methods of splicing in signal bases, Section 813.40C Ground Electrodes relative to requirement 1 - connection to a water piping system and Section 813.61 Equipment Grounding.

All anchor bolts and bolts for holding hand hole and access covers shall be greased at the time of installation.

The Contractor shall make all necessary arrangements with the electric company for the service connections or for any main power cut off when necessary, and bear all charges incurred thereby.

COMPENSATION
The work under Items 815.3 Traffic Control Signal Location 3, and 816.01 to 816.13 Traffic Signal Reconstruction, Location Nos. 1 & 2, 4 to 13 will be paid for at the Contract Lump Sum prices, which prices shall include all labor, materials, equipment and incidental costs to complete the work. The Lump Sum price bid for this Item shall include the installing and maintaining of an operable traffic signal system, and the removal and stacking of the existing traffic signal equipment at the project site for collection by the Town. Signal equipment not required by the Town shall be removed and discarded by the Contractor away from the site at no additional cost.

Conduit will be paid for separately under Item 804.3, 3 Inch Electrical Conduit, Type NM Plastic (UL).

Pull boxes will be paid for separately under Item 811.31, Pull Box 12 x 12 Inches - SD2.031, and Item 811.32 Pull Box 12x24 Inches.

ITEM 823.75 MBTA CATENARY POLE – REMOVED AND STACKED EACH

GENERAL
Work under this item shall conform to Section 820 of the Standard Specifications, and the following:
Existing catenary lines shall be relocated to proposed MBTA Catenary Pole by MBTA prior to removal of existing MBTA Catenary Pole. Existing pole shall be cut off at grade, removed and delivered to one of the MBTA facilities, in the City of Boston, either at 500 Arborway in Jamaica Plain or Alford Street in Charlestown. The contractor shall notify the MBTA representative at least one week prior to scheduled delivery.

METHOD OF MEASUREMENT
Item 823.76, MBTA Catenary Pole Removed and Stacked will be measured for payment per each as called out on the plans.

BASIS OF PAYMENT
Item 823.76, MBTA Catenary Pole Removed and Stacked will be paid for at the contract unit price per each, which price shall include all labor, material, equipment and incidental costs required to complete the work. Removal of the foundation will be paid for under Item 823.77 MBTA Foundation Abandoned.

ITEM 823.76 MBTA CATENARY POLE EACH

GENERAL
Work under this item shall conform to Section 820 of the Standard Specifications, and the following:
Obtaining and installing MBTA Catenary Pole as described in the MBTA P22-H-Tubular Steel Poles specification included in the appendix.

Where applicable, reattachment of catenary lines, and power lines shall be performed by the MBTA.

Where applicable, reattachment of lights and banners shall be performed by Belmont Light and Power.

Contractor shall notify the MBTA and Belmont Light and Power at least 1 week in advance of construction operations to coordinate the reattachment of supported features described herein and any other peripheral equipment required to complete the work.

Catenary Poles shall not be relocated without the written consent of a qualified MBTA representative.

Where applicable coordinate with Belmont Light and Power for reconnection of electrical equipment upon installation of conduit and riser.

FINISH
In addition to the primer finish described in the MBTA specification, the Poles supplied shall receive a minimum of three topcoats of black enamel paint. Thickness of finish coat shall be 8-10 mils. Minimum.

Finish shall be semi-gloss.

Color shall be black.

SUBMITTALS
Submit Manufacturer's Literature: Submit product data including details of construction, materials, dimensions, analysis, hardware preparation, color charts and specific finishes, and label compliance.

METHOD OF MEASUREMENT
Item 823.76- MBTA Catenary Pole will be measured for payment per each as called out on the plans.

BASIS OF PAYMENT
Item 823.76- MBTA Catenary Pole will be paid for at the contract unit price per each, which price shall include all labor, material, equipment and incidental costs required to complete the work.

Item 826.70 Electric Service Riser Relocation, will be paid for separately.

ITEM 823.77 MBTA FOUNDATION ABANDONED EACH

GENERAL
Work under this item shall conform to Section 145 of the Standard Specifications, and the following: Where shown on the plans or directed by the Engineer the foundation of a recently or previously removed MBTA catenary pole shall be removed to a depth of 18" below the finished grade. The work will include cutting and removal of the remaining portion of the previously cut and removed steel catenary pole and any reinforcing. The remaining hole will be backfilled with suitable material as directed by the engineer and compacted as indicated in Section 150. The work shall also include the attaching of a reflective strip of tape onto the catenary pole facing the direction of travel to warn drivers of the fact that the pole is closer to the curb than is standard.

METHOD OF MEASUREMENT
Item 823.77 MBTA Foundation Abandoned will be measured for payment per each as called out on the plans.

BASIS OF PAYMENT
Item 823.77 MBTA Foundation Abandoned will be paid for at the contract unit price per each, which price shall include all labor, material, equipment, reflective tape, and incidental costs required to complete the work.

ITEM 823.78 MBTA POLE PROTECTION EACH

GENERAL
The purpose of this item is to prevent damage to pole, riser, and foundation of existing MBTA Poles to

remain, to ensure public safety and to prevent disruption to MBTA systems. Provisions under this item include steps to minimize disturbance and to construct protection measures for poles within construction areas.

It shall be the responsibility of the Contractor to ensure adequate protection of all MBTA Poles within the work site through the full duration of the construction period. Maintenance and protection responsibilities shall include all portions of the Pole above and below the ground.

The work under this item shall conform to the relevant provisions of the Standard Specifications and the following:

Examination of Conditions

The Contractor shall be solely responsible for judging the full extent of the work requirements, including, but not necessarily limited to any equipment and materials required for providing MBTA Pole protection.

Pole Armoring

All existing mbta poles within the limits of the work, which are marked on the Plans to be protected, shall be protected by wood slats strapped to pole/ riser as shown on the details or other acceptable device in order to avoid damage. The Pole protection barrier utilized by the Contractor shall be subject to the approval of the Engineer. The minimum height of the protective barrier for Poles with riser shall be 3 inches above the height of riser or a maximum of 4 feet, additionally. All Poles or Risers that sustain damage caused by the Contractor's work force during the course of the work shall be repaired immediately as directed by the Engineer.

Where damage deemed by the Engineer to impair the structural stability of MBTA Pole Riser or Foundation occur, The MBTA representative shall be notified in writing as to the condition and repair or replacement shall be executed immediately and at no additional cost to the owner or municipality as directed by the owners representative.

Protection from Excavation

The Contractor shall take due care to protect All portions of the Pole Riser and Foundation from damage while performing work within its vicinity. All over hanging wires shall be identified and protected from equipment damage and disturbance. Alternative operations shall be utilized where required.

During Examination the engineer shall determine the best method for excavation around existing poles.

Necessary excavation that could pose risk of topple or other structural failure of the pole shall be brought to the attention of the engineer and where deemed necessary temporary bracing or other stabilization measures shall be put in place. Any significant excavation directly adjacent to Poles where improvements cannot be completed immediately shall be braced or temporarily filled.

The removal of existing sidewalk shall be conducted carefully. The existing subgrade material under the sidewalk shall be reused, if it is deemed appropriate by the Engineer, in order to avoid excavation.

Where required to repair damage to MBTA Poles by the contractors work, such care shall include but shall not necessarily be limited to cleaning, priming, painting, and patching of concrete.

METHOD OF MEASUREMENT

Item 823.78 MBTA Pole Protection will be measured for payment per each as called out on the plans, complete in place.

BASIS OF PAYMENT
Item 823.78 MBTA Pole Protection will be paid for at the contract unit price per each, which price shall include all labor, material, equipment and incidental costs required to complete the work. Excavation will be paid for separately under Item 120 General Earth Excavation.

ITEM 823.79 MBTA FOUNDATION REMOVED EACH

GENERAL
Work under this item shall conform to Section 146 of the Standard Specifications, and the following: Where directed by the Engineer the foundation of a previously removed MBTA catenary pole shall be removed and disposed of in its entirety. The remaining hole will be backfilled with suitable material as directed by the engineer and compacted as indicated in Section 150.

METHOD OF MEASUREMENT
Item 823.79 MBTA Foundation Removed will be measured for payment per each as called out on the plans.

BASIS OF PAYMENT
Item 823.79 MBTA Foundation Removed will be paid for at the contract unit price per each, which price shall include all labor, material, equipment and incidental costs required to complete the work.

ITEM 826.70 ELECTRIC SERVICE RISER RELOCATION EACH

DESCRIPTION
The work shall conform to the relevant provisions of Section 800 and the following:

The work under this item shall consist of the removal and relocation of electric service risers attached to utility poles supplying secondary electrical service through underground conduit.

The existing underground conduit shall be excavated and exposed for a necessary distance to allow for the re-alignment of the conduit to the relocated pole. The existing galvanized riser and sweep at the base of riser shall be removed and reset on the new pole, reconnecting the existing conduit with a split coupling. The existing wires shall be retained in the conduit during the relocation. If additional lengths of conduit are necessary for the reconnection of the riser to the new pole, split conduit shall be used. New galvanized steel straps shall be used to attach the riser pipe to the utility pole, spaced per utility company recommendations. A ground clamp at the top of riser pipe and weather and wire seals will be installed per Utility Company recommendations.

The work shall include all excavation and backfill, compaction, and materials or any other requirements in accordance with the latest edition of the National Electrical Code, the respective utility company, local codes and guidelines. The work associated with disconnecting power and reconnecting power to the utilities secondary power lines should be performed at a time convenient to the property owners or tenants occupying the building. The actual time of day or evening for the disconnecting and reconnecting will be agreed upon between the Engineer, Power Company and the property owner/tenant during construction. No additional compensation shall be given for this work outside of normal work hours if necessary.

COMPENSATION
Payment for service connections shall be at the contract unit price per EACH. This shall be full compensation for the furnishing of all labor, materials, tools and equipment associated with the work complete in place. The work associated with the relocation of the utility poles and the transfer of the

Utilities overhead primary and secondary wiring shall be the responsibility of the respective utility companies and shall not be paid for under this item.

ITEM 826.70 ELECTRIC SPLICE BOX REPLACEMENT EACH

DESCRIPTION
The work shall conform to the relevant provisions of Section 800 and the following:

The work under this item shall consist of the removal and replacement of an electric splice box that is attached to an existing Belmont Municipal Light Department (BMLD) transformer and a Belmont Housing Authority (BHA) terminal box supplying secondary electrical service through underground conduit.

A new splice box meeting all the needs of the existing splice box and meeting all current code requirements shall be provided and installed at the location shown on the plans and as directed by the Engineer. It shall be mounted on a new 6" concrete base. New conduit and wiring shall be provided and installed matching the existing conduit and cable in materials, size and quantity excepting that if must meet all existing electrical codes. The existing underground conduit to remain shall be excavated and exposed for a necessary distance to allow for the re-alignment of the conduit to meet the new conduit. The work shall be done in such a manner as to keep the loss of power to the BHA complex to no more than one hour. All work shall be coordinated with the BHA and BMLD.

The work shall include all required materials, excavation and backfill, foundation, compaction, and materials or any other requirements in accordance with the latest edition of the National Electrical Code, the respective utility company, local codes and guidelines. The work associated with disconnecting power and reconnecting power to the utilities secondary power lines should be performed at a time convenient to the property owners or tenants occupying the building. The actual time of day or evening for the disconnecting and reconnecting will be agreed upon between the Engineer, Power Company and the property owner/tenant during construction. No additional compensation shall be given for this work outside of normal work hours if necessary.

COMPENSATION
Payment for service connections shall be at the contract unit price per EACH. This shall be full compensation for the furnishing of all labor, materials, tools and equipment associated with the work complete in place. The work associated with the transfer of the Utilities underground primary and secondary wiring shall be the responsibility of the respective utility companies and shall not be paid for under this item.

ITEM 850.41 ROADWAY FLAGGER HOUR

GENERAL
The Contractor shall provide the number of flaggers required in either the appropriate Traffic Control Plan (TCP) template (see MassDOT's website at http://www.mhd.state.ma.us/) or that the Engineer requires for the direction and control of traffic within the site. A flagger shall be used as required by the Engineer in accordance with 701 CMR 7.00, this section, and the TCP. Any flagger determined by the Engineer to be ineffective in controlling traffic may be removed at the discretion of the Engineer. If a flagger is required to be removed, the Contractor shall immediately comply with the directive from the Engineer and shall immediately comply with the directive from the Engineer and shall suspend operations as required until a qualified replacement can be provided. Such a suspension of operations shall not be considered as a basis for a claim or an extension of time.

QUALIFICATIONS
Flaggers used during the performance of the Work shall be at least eighteen (18) years of age.

Flaggers used during the performance of the Work shall possess a current certificate of satisfactory completion from a Department-approved flagger training program within the previous two (2) years. Prior to the start of work, the Contractor shall provide to the Engineer a written list of certified flaggers to be used, including the most recent date of certification or re-certification for each person listed. All flaggers shall carry their approved flagging training program certification card with them while performing flagging duties. Flagger certifications shall remain valid for the duration of the project or the flagger shall be removed from the project.

Flaggers used during the performance of the Work shall have completed a First Aid training course according to the standards and guidelines of the American Heart Association or the American Red Cross. Flaggers shall carry their First Aid certification cards with them while performing flagging duties. First Aid certifications need not be renewed once the initial certification has expired.

MATERIALS
Each flagger shall be equipped with the following high visibility clothing, signaling, and safety devices:

1. A white protective hard hat with a minimum level of reflectivity per the requirements of ANSI, Type I, Class E & G;
2. A clean, unfaded, untorn lime/yellow reflective safety vest and safety pants meeting the requirements of ANSI 107 Class 3 with the words "Traffic Control" on the front and rear panels in minimum two (2) inch (50 millimeter) high letters;
3. A twenty-four (24) inch "STOP/SLOW" traffic paddle conforming to the requirements of Part 6E.03 of the Manual on Uniform Traffic Control Devices (MUTCD), a weighted, reflectorized red flag, flagger station advance warning signage, and two-way radios capable of providing clear communication within the work zone between flaggers, the Contractor, and the Engineer. The traffic paddle should be mounted on a pole of sufficient length to be seven (7) feet above the ground as measured from the bottom of the paddle;
4. A working flashlight with a minimum of 15,000 candlepower and a six (6) inch red attachable wand, a whistle with an attached lanyard, and a First Aid kit that complies with the requirements of ANSI Z308.1;
5. An industrial/safety type portable air horn that complies with the requirements of the U.S. Coast Guard.

COMPENSATION
Compensation for flaggers will be paid on an hourly basis for only the actual time spent flagging and payment shall be made under Item 850.41, Roadway Flagger. No allowance or additional payment shall be made for required training, equipment, travel time, transportation, or any administrative charges associated with the costs of flaggers.

ITEM 874. STREET NAME SIGN EACH

GENERAL
Work under this item shall conform to the applicable provisions of Section 828 of the Standard Specifications, supplemented and amended as follows: legends, sheeting, color and type shall be as shown on the Plans or as required by the Engineer.

METHOD OF MEASUREMENT
Item 874. Street Name Sign, will be measured for payment per each as called out on the plans.

BASIS OF PAYMENT
Item 874 Street Name Sign will be paid at the Contract unit price per each which price shall include all labor, equipment, materials and incidentals required to complete the work.

ITEM 874.2 TRAFFIC SIGN REMOVED AND RESET EACH

GENERAL
The work under this Item shall conform to the relevant provisions of Section 828 of the Standard Specifications and the following.

The Contractor shall carefully remove all existing signs, attachment hardware, and sign support posts to be reset as shown on the Drawings and as required by the Engineer.

Signs, attachment hardware and sign support posts shall be satisfactorily stored and protected until reset in the proposed work.

Signs, attachment hardware and sign support posts lost, damaged or otherwise made unsuitable for reuse while being removed, transported, stored or reset shall be replaced with new material at no additional cost. New attachment hardware shall be furnished and installed as required to replace any missing or unusable existing hardware.

Each sign with post shall be completely removed and reset in the proposed work complete with required attachment hardware.

METHOD OF MEASUREMENT
Items 874.2 will be measured for payment per each as called out on the plans.

BASIS OF PAYMENT
Items 874.2 will be paid at the Contract unit price per each which price shall include all labor, equipment, materials and incidentals required to complete the work.

Included for payment under this Item are warning, regulatory, route marker signs, parking signs and miscellaneous directional signs. Excluded under this item are guide signs, which are covered under other items as applicable.

ITEM 874.4 TRAFFIC SIGN REMOVED AND STACKED EACH

GENERAL
Work under this Section shall conform to the applicable provisions of Section 850 of the Standard Specifications and the following:

The work shall consist of removing and stacking existing regulatory, warning and directional signs and supports. Signs and attached hardware shall be carefully removed from their supports. The supports and existing foundations shall be removed to a depth of at least 6 inches below the existing ground and the holes backfilled with gravel. The surface shall be patched with a material to match the existing ground or as required by the Engineer.

The signs and supports shall be removed and temporarily stacked in a stockpile on the site for removal by the Town/Owner. The Contractor shall be responsible for the signs, and shall replace or repair any damage due to his operations with no additional compensation. Signs not required by the Town shall be removed and discarded by the Contractor away from the site.

If signs are attached to existing light poles, utility poles or traffic poles, only the sign and attached hardware shall be removed and stacked.

METHOD OF MEASUREMENT
Item 847.4 Traffic Sign Removed and Stacked, for this item will be measured on a per each basis.

BASIS OF PAYMENT
Item 847.4 Traffic Sign Removed and Stacked, will be paid for at the Contract unit price, which price shall be full compensation for dismantling, loading, transporting and stacking of the signs and supports as designated above, the excavating and disposal of the existing foundation, and the supplying and placing of compacted gravel backfill where foundations and posts are removed, and the patching of the existing surface, including all labor, material and incidentals to complete the work as shown on the Plans and as required by the Engineer.

ITEM 874.7. MISCELLANEOUS SIGNS REMOVED AND STACKED EACH

GENERAL
Work under this Section shall conform to the applicable provisions of Section 850 of the Standard Specifications and the following:

The work shall consist of removing and stacking existing regulatory, warning and directional signs and supports. Signs and attached hardware shall be carefully removed from their supports. The supports and existing foundations shall be removed to a depth of at least 6 inches below the existing ground and the holes backfilled with gravel. The surface shall be patched with a material to match the existing ground or as required by the Engineer.

The signs and supports shall be removed and temporarily stacked in a stockpile on the site for removal by the Town/Owner. The Contractor shall be responsible for the signs, and shall replace or repair any damage due to his operations with no additional compensation. Signs not required by the Town shall be removed and discarded by the Contractor away from the site.

If signs are attached to existing light poles, utility poles or traffic poles, only the sign and attached hardware shall be removed and stacked.

METHOD OF MEASUREMENT
Item 874.4 Miscellaneous Signs Removed and Stacked, for this item will be measured on a per each basis.

BASIS OF PAYMENT
Item 874.4 Miscellaneous Signs Removed and Stacked, will be paid for at the Contract unit price, which price shall be full compensation for dismantling, loading, transporting and stacking of the signs and supports as designated above, the excavating and disposal of the existing foundation, and the supplying and placing of compacted gravel backfill where foundations and posts are removed, and the patching of the existing surface, including all labor, material and incidentals to complete the work as shown on the

Plans and as required by the Engineer.

ITEM 874.8 MISCELLANEOUS SIGNS REMOVED AND RESET EACH

GENERAL
The work under this Item shall conform to the relevant provisions of Section 828 of the Standard Specifications and the following.

The Contractor shall carefully remove all existing signs, attachment hardware, and sign support posts to be reset as shown on the Drawings and as required by the Engineer.

Signs, attachment hardware and sign support posts shall be satisfactorily stored and protected until reset in the proposed work.

Signs, attachment hardware and sign support posts lost, damaged or otherwise made unsuitable for reuse while being removed, transported, stored or reset shall be replaced with new material at no additional cost. New attachment hardware shall be furnished and installed as required to replace any missing or unusable existing hardware.

Each sign with post shall be completely removed and reset in the proposed work complete with required attachment hardware.

METHOD OF MEASUREMENT
Items 874.8, Miscellaneous Signs – Removed and Reset will be measured for payment per each as called out on the plans.

BASIS OF PAYMENT
Items 874.8, Miscellaneous Signs – Removed and Reset will be paid at the Contract unit price per each which price shall include all labor, equipment, materials and incidentals required to complete the work.

Included for payment under this Item are guide signs.

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