
SPECIAL PROVISIONS

Proposed Roadway Reconstruction of Parker Street (Route 27)

Maynard, Massachusetts



Prepared for

Capital Group Properties

August 14, 2017

Prepared by



GREEN INTERNATIONAL AFFILIATES, INC.
Civil and Structural Engineers

Green No. 15104

SPECIAL PROVISIONS

GENERAL

These special provisions are hereby made part of the Contract Documents and shall apply to all parts of the Contract. The identification of the Contract Item Number corresponds to those listed in the 1988 edition of the Standard Specifications for the Highways and Bridges (Standard Specifications) of the Massachusetts Department of Public Works (Massachusetts Department of Transportation Highway Division) which includes the Supplemental Specifications dated July 1, 2015 and the Interim Supplemental Specifications dated September 9, 2016. References to Sections and Subsections, under each contract item refers to those contained in the Standard Specifications. The Contractor must have the 1988 Standard Specifications, all Supplemental Specifications, the Massachusetts Department of Transportation Construction Standard Details dated December 2016, the 2009 Manual on Uniform Traffic Control Devices for Streets and Highways with Massachusetts Amendments, the latest Standard Drawings for Signs and Supports and the latest Standard Drawings for Traffic Signals and Highway Lighting. All bid items not included in these special provisions are contained in the 1988 Standard Specifications and Supplemental Specifications.

TREE PROTECTION

The Contractor shall be responsible for protecting trees by preventing damage to branches, stems and root systems of trees to remain and to ensure their survival for the length of the Contract.

Fence material and temporary fence posts shall be subject to the approval of the Engineer. Fencing for tree protection shall be sufficiently sturdy to last the length of the contract, and shall be brightly colored and highly visible. Staking for individual tree protection fencing shall be steel posts or 2 inch by 4 inch stock as directed and approved by the Engineer.

Trunk protection shall be 2x4 inch cladding, at least 8 feet in length, clad together with wire. Trunk protection shall include burlap.

The Contractor shall provide water for maintaining plants in the construction area that will have exposed root systems for any period during construction.

To the extent possible, to avoid soil compaction within the root zone, construction activities including, but not limited to, vehicle movement, excavation, embankment, staging and storage of materials or equipment shall not occur underneath the canopy (drip line) of trees to remain.

After all other construction activities are complete, but prior to final seeding, temporary fencing, branch protection, and trunk protection materials shall be removed and disposed off site by the Contractor.

The Contractor shall be held responsible for the health and survival of the existing trees in the immediate vicinity of the construction area. Damage that, in the Engineer's opinion, can be remedied by corrective measures shall be repaired immediately. Broken limbs shall be pruned according to industry standards. Wounds shall not be painted. Trees or shrubs that are damaged irreparably shall, at the Engineer's discretion, be replaced with new plants of comparable size and type. Cost of replacement trees shall be borne by the Contractor.

SAW CUTTING

No separate compensation will be made for saw cutting. Saw cutting shall be required, as shown on the plans or as specified herein and shall be considered as included in the payment made for the various items of this contract, regardless of the depth of saw cutting required.

<u>ITEM 201.5</u>	<u>CATCH BASIN – MUNICIPAL STANDARD</u>	<u>EACH</u>
<u>ITEM 201.52</u>	<u>DOUBLE-GRATE CATCH BASIN –</u>	<u>EACH</u>
	<u>MUNICIPAL STANDARD</u>	
<u>ITEM 202.</u>	<u>MANHOLE</u>	<u>EACH</u>

The work under these Items shall conform to the relevant provisions of Section 201 of the Standard Specifications and the following:

All excavation for the structures shall be included in the cost of these items. Units shall be precast concrete.

All proposed catch basins shall be constructed with a 4-foot sump and constructed on a bedding of 12 inches of crushed stone.

The cone sections of catch basins and manholes shall be replaced with flat tops sections as needed at no additional cost.

All castings located within the pavement area shall not be set to finished grade until after the binder course has been placed and shall be set to finished grade no more than 7 calendar days prior to final paving. The cost of adjusting castings prior to setting to the final grade is included in the cost of this item.

All frames shall be set in a concrete collar conforming to Construction Standard Details, Drawing No. E 202.9.0 prior to placement of the top course pavement. The cost of the concrete collar shall be included in the unit price bid for these items.

The Contractor shall furnish catch basin hoods on all catch basin outlets conforming to Construction Standard Details, Drawing No. E 201.12.0. The cost of the catch basin hoods shall be included in the unit price for these items.

Before ordering any precast structures, the Contractor shall provide shop drawings for each individual structure showing the depth, size and orientation of each pipe core location.

Measurement and Payment

Catch Basins - Municipal Standard, Double-Grate Catch Basins – Municipal Standard, and Manholes will be measured by the unit each, regardless of required depth. There shall be no additional compensation for the deep sump required for the catch basins.

Catch Basins - Municipal Standard, Double-Grate Catch Basins - Municipal Standard, and Manholes will be paid for at the Contract unit price per each, which shall be full compensation for all excavation, labor, materials, equipment and incidental costs necessary to complete the work.

Crushed stone for bedding shall be paid for under Item 156. Crushed Stone.

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

Work under this Item shall conform to the relevant provisions of Section 220 of the Standard Specifications and the following:

The word "DRAIN" shall be prominently cast in the top of all drain manhole covers.

Catch basins grates shall be grey iron and have square frames and grates as detailed on the plans. Each frame and grate and/or cover shall also be encased with a concrete collar as shown in the MassDOT Construction Standard Details, Plate No. E 202.9.0 which shall be included in the cost of the frame and cover.

Castings for double grate catch basin – municipal standard shall consist of a single rectangular frame and two individual Municipal Standard Type grates. All castings shall be designed for HS-25 loads.

Measurement and Payment

Frame and grate (or cover) municipal standard will be measured per each with one unit measured as the frame with grate or cover. The castings for the double grate catch basin – municipal standard will be measured as 2 units.

Frame and grate (or cover) municipal standard will be paid for at the Contract unit price per each, which price shall include all labor, materials, equipment and incidental costs required to complete the work.

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

The work under this Item shall conform to the relevant provisions of Sections 140 and 220 of the Standard Specifications and the following:

The existing frames and grates or covers from existing structures shown on the Plans to be removed, or changed in type, shall be removed and stacked unless, in the judgment of the Engineer, they are unsuitable for salvage. Unsuitable frames, grates and covers shall become the property of the Contractor and shall be legally disposed of off the site at no additional cost to the Owner.

Existing frames and grates or covers owned by the Town shall be removed, transported, unloaded, and stacked by the Contractor at the Town of Maynard Highway Department at the DPW Garage located at the end of Winter Street, Maynard, MA 01754, or as directed by the Engineer.

Measurement and Payment

Frame and Grate or Cover Removed and Stacked will be measured for payment per each, for each existing structure whose frame and grate or cover was actually removed and stacked (or discarded).

Payment for work to be done under this Item will be at the Contract unit price per each which price will be full compensation for removing, transporting, and stacking of the frames and grates or covers and for disposing of the frames, grates or covers that are deemed unsuitable.

Proposed Roadway Reconstruction of Parker Street (Route 27)
Maynard, MA

<u>ITEM 241.12</u>	<u>12 INCH REINFORCED CONCRETE PIPE</u>	<u>FOOT</u>
<u>ITEM 241.15</u>	<u>15 INCH REINFORCED CONCRETE PIPE</u>	<u>FOOT</u>
<u>ITEM 241.24</u>	<u>24 INCH REINFORCED CONCRETE PIPE</u>	<u>FOOT</u>
<u>ITEM 243.12</u>	<u>12 INCH REINFORCED CONCRETE PIPE CLASS IV</u>	<u>FOOT</u>
<u>ITEM 244.12</u>	<u>12 INCH REINFORCED CONCRETE PIPE CLASS V</u>	<u>FOOT</u>

The work under these Items shall conform to the relevant provisions of Section 230 of the Standard Specifications and the following:

No extra payment shall be made for trench excavations exceeding five (5) feet in depth or as described in Section 140.23 under Item 142. Class B Trench Excavation. The cost of all trench excavation, regardless of depth, shall be included in the cost of these Items.

The work shall include the removal of the abandoned 2” steel gas main when in conflict with the pipe and as required by the Engineer. No extra payment will be made for removing and legally disposing the gas main and the cost of this work shall be considered incidental to this item.

Measurement and Payment

These items will be measured per foot, complete in place.

These items will be paid for at the Contract unit price per foot, which price shall include all labor, materials, equipment and incidental costs required to complete the work.

ITEM 482.17 HOT APPLIED ASPHALTIC CRACK FILLER (CMCR)
GALLON

GENERAL

The work consists of furnishing all plant, labor, equipment and materials necessary to perform all operations in connection with cleaning and sealing of construction and random cracks in hot mix asphalt pavement, and vegetation cracks in hot mix asphalt pavement, and vegetation removal and sterilization of cracks where necessary. Quality Control procedures for Hot Applied Asphaltic Crack Filler shall be addressed and implemented in conformance with the QC Plan for “Pavement Preservation Treatments” described under Section 450.

MATERIAL

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

- (a) The asphalt binder shall consist of a blend of neat asphalt binder and chemically modified crumb rubber (CMCR) that meets the following specifications:
 - PG 64-34 or PG 70-34 after modification

- Viscosity of not more than 3PaS at 300°F
- Modification at a minimum shall consist of 5% CMCR and the maximum particle size for the CMCR shall be 80 mesh (#80 sieve)
- The performance grade of the neat asphalt binder shall not exceed a PG 58-XX
- The asphalt supplier shall provide testing for the neat asphalt binder and modified asphalt binder in accordance with AASHTO M320

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

- Length *25in.+0.02
- Elongation at break; ASTM D2256-90... 38%
- Melting point; ASTM D3418-82..... >475°F
- Crimps/Inc; ASTM D3937-90..... None
- Cross Section.....Round
- Denier; ASTM D1577.....4.5 Nominal dpf
- Tensile Strength; ASTM D2256-90.....>70,000 psi
- Diameter.....0.0085 in.**
- Specific Gravity; ASTM D792-91.....1.32 to 1.40

*At temperature ranging from ambient to maximum finished product mix temperature

**Subject to Normal Variations Modified asphalt fiber compound shall be mixed at a rate of 8% fiber weight of asphalt cement. This compound having the same chemical base provides compatibility and exhibits excellent bond strengths. The fiber function to redistribute high stress and strain concentrations that are imposed on the sealant thermal sources, Traffic loading, etc.

EQUIPMENT

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

- (a) Air compressor: Air compressors shall be portable and capable of furnishing not less than 100 cubic feet of air per minute at not less than 90 psi 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 pavement shall be used to remove debris, dirt and dust from the cracks.
- (c) Melter:

The unit used to melt or maintain crack sealant compound at the recommended application temperature shall be the indirect fired type. It shall be equipped with a remote heat exchanger and hot oil circulation pump capable of maintaining a consistent temperature of the heat transfer oil. The heat transfer oil shall be circulated to all sides and the bottom of the vat containing the crack sealant compound making a continuous loop back to the heat exchanger and having a flash point of not less than 600° F. The melter shall be equipped with a satisfactory means of agitating the crack sealant at all times. This may be accomplished by continuous stirring with mechanically operated paddles and/or by a circulating gear pump attached to the melter. The melter must be equipped with a thermostatic control calibrated between 200°F and 550°F and must be capable of pumping an 8% fiber content blend.

PREPARATION OF CRACKS

1. Debris and vegetation removal: All cracks shall be blown clean and sterilized by use of a propane air torch generating 2000°F. and 3000 foot/second velocity to eliminate all vegetation, dirt, moisture and seeds. All debris removed from the cracks shall be removed from the pavement surface immediately by means of a power sweeper, hand or air broom.
2. No crack sealant material shall be applied in wet cracks or where frost, snow or ice is present nor when ambient temperature is below 25°F.

PREPARATION AND PLACEMENT OF SEALANT

- (a) The asphalt fiber compound shall be thoroughly mixed for a minimum of one hour before application can begin. Whenever material is added to the tank, sealing operations shall be suspended for 1 hour to allow for the minimum required mixing time. Minimum application temperature shall be 320o F.
- (b) Sealant shall be delivered to the pavement cracks through a high-pressure hose line and applicator shoe. Diameter of the applicator shoe is not to exceed 3.5 inches. When the pavement cracks are sealed the width of the sealant on the pavement (overbanding) shall be no greater than 3 inches. When traffic requires immediate use of the roadway, a boiler slag aggregate shall be broadcast over the cracks to prevent sealant from being picked up.

WORKMANSHIP

All workmanship shall be of the highest quality, and any excess of spilled sealant 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

MEASUREMENT AND PAYMENT

Payment shall be at the unit price bid per gallon in the proposal and shall be full compensation for furnishing, preparing, placing the material specified and furnishing of all labor, equipment and incidentals for the satisfactory completion of this item.

SPECIAL PROVISIONS: BID ITEMS AND SPECIFICATIONS

<u>ITEM 514.</u>	<u>GRANITE CURB INLET - STRAIGHT</u>	<u>EACH</u>
<u>ITEM 515.</u>	<u>GRANITE CURB INLET - CURVED</u>	<u>EACH</u>

The work to be done under these Items shall be in accordance with Section 501 of the Standard Specifications and the following:

Granite curb inlets for double grate catch basins shall be 8 feet in length, plus or minus ½ inch, from 17 to 19 inches in depth, 6 inches wide at the top and at least 6 inches wide at the bottom. A gutter mouth at least 3 inches in depth and 4 feet in length shall be cut in the front face of the stone.

Granite curb inlets for single grate catch basins shall be 6 feet in length, plus or minus ½ inch, from 17 to 19 inches in depth, 6 inches wide at the top and at least 6 inches wide at the bottom. A gutter mouth at least 3 inches in depth and 2 feet in length shall be cut in the front face of the stone.

Measurement and Payment

Each curb inlet set, complete in place, will be considered one unit.

Curb inlets will be paid for at the Contract Unit Price per each under the respective item for the particular type of inlet, straight or curved, complete in place.

<u>ITEM 620.12</u>	<u>STEEL W BEAM HIGHWAY GUARD (SINGLE FACED)</u>	<u>FOOT</u>
---------------------------	---	--------------------

The work under this Item shall conform to the relevant provisions of Section 620 of the Standard Specifications and the following:

Steel W Beam Highway Guard (Single Faced) shall be constructed per MassDOT Standard Details, except that the posts shall be 8-feet in length.

Measurement and Payment

Steel W Beam Highway Guard (Single Faced) will be measured for payment by the foot, complete and in place, along the face of the highway guard.

Steel W Beam Highway Guard (Single Faced) will be paid for at the Contract unit price per foot, which shall include all labor, materials, equipment, and incidentals costs required to complete the work.

ITEM 697.1

SILT SACK

FOOT

The work under this item shall conform to the relevant provisions of Section 670 of the Standard Specifications and the following:

The work under this item includes furnishing, installing, maintaining and removing a reusable fabric sack to be installed in drainage structures for the prevention of silt and sediment from the construction site entering the storm water collection system. Devices shall be ACF Environmental (800)448-3636; ESS Brothers (800)478-2027; Reed & Graham Inc. (800)644-9223; or approved equal.

Silt sacks shall be installed in retained existing and proposed catch basins within the project limits and as required by the Engineer.

The silt sack shall be as manufactured to fit the opening of the drainage structure under regular flow conditions, and shall be mounted under the grate. The insert shall be secured from the surface such that the grate can be removed without the insert discharging into the structure. The filter material shall be installed and maintained in accordance with the manufacturer's written literature and as directed by the Engineer.

Silt sacks shall remain in place until the placement of the pavement overlay or 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 periodically to remove and dispose of accumulated debris as required. Silt sacks, which become damaged during construction operations, shall be repaired or replaced immediately at no additional cost.

When emptying the silt sack, the contractor shall take all due care to prevent sediment from entering the structure. Any silt or other debris found in the drainage system at the end of construction shall be removed by the Contractor. The silt and sediment from the silt sack shall be legally disposed of off site. Under no condition shall silt and sediment from the insert be deposited on site and used in construction.

All curb openings shall be blocked to prevent stormwater from bypassing the device.

All debris accumulated in silt sacks shall be handled and disposed of as described in Section 227.

Silt sacks will be measured for payment per each, complete in place.

Silt sacks will be paid for at the Contract unit price per each, which price shall include all labor, materials, equipment and incidental costs required to complete the work. No separate payment will be made for removal and disposal of the sediment from the insert, but all costs in connection therewith shall be included in the Contract unit price bid.

ITEM 756. NPDES STORM WATER POLLUTION PREVENTION PLAN LUMP SUM

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 (CGP) issued by the U.S. Environmental Protection Agency (EPA).

Pursuant to the Federal Clean Water Act, construction activities which disturb one acre or more are required to apply to the EPA for coverage under the NPDES General Permit for Storm Water Discharges from Construction Activities. On February 16, 2017, EPA issued the final NPDES Construction General Permit (CGP) for construction activity. The Contractor shall be fully responsible for compliance with the CGP. Should a fine or penalty be assessed against it, or MassDOT, as a result of a local, state, or federal enforcement action due to non-compliance with the CGP, the Contractor shall take full responsibility.

The NPDES CGP requires the submission of a Notice of Intent (NOI) to the EPA prior to the start of construction (defined as any activity which disturbs land, including clearing and grubbing). There is a fourteen (14) 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 (SWPPP) 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 will 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 to DEP and, if required, the SWPPP filing to DEP shall be paid by the Contractor.

The CGP also requires the preparation and implementation of a SWPPP in accordance with the afore-mentioned statutes and regulations. The Plan will include the CGP 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 (4) weeks prior to any site activities. It is the responsibility of the Contractor to comply with the CGP 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 the project and to include in the SWPPP the methods and means necessary to comply with applicable conditions of said permits (reference to Part 9.1.1 of the 2012 CGP).

SPECIAL PROVISIONS: BID ITEMS AND SPECIFICATIONS

It is the responsibility of the Contractor to complete the SWPPP in accordance with the EPA CGP, provide all information required, and obtain any and all certifications as required by the CGP. 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 CGP 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 0.25 inches in twenty-four hours. For multi-day storms, EPA requires that an inspection must be performed during or after the first day of the event and after the end of the event. The CGP requires that inspections be performed by a qualified individual. MassDOT requires proof of completion of a 4 hour minimum sedimentation and erosion control training class current to the latest CGP. This individual can be, but not limited to, someone that is either a certified inspector, certified professional, or certified storm water inspector. The documentation shall be included as an appendix in the SWPPP. The Engineer must approve the contractor's inspector. This individual shall be on-site during construction to perform these inspections. 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 necessary to comply with the provisions of the CGP. 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. All Control measures must be properly selected, installed, and maintained in accordance with manufacturer specifications and good engineering practices. If periodic inspections or other information indicates a control has been used inappropriately or is no longer adequate, it is the responsibility of the Contractor to replace or modify the control for site conditions at no additional cost to the Department. Contractor must maintain all control measures and other protective measures in effective operating condition and shall consider replacement of erosion controls for each construction season.

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.

SPECIAL PROVISIONS: BID ITEMS AND SPECIFICATIONS

The Contractor is advised The CGP provides specific requirements for temporary and final stabilization. This shall be incorporated into the project schedule. The permit defines specific deadline requirements for Initial Stabilization (“immediately”, i.e., no later than the end of the next work day following the day when earth-disturbing activities have temporarily or permanently ceased) and for Complete Stabilization Activities (no later than 14 calendar days after the initiation of stabilization). Stabilization criteria for vegetative and non-vegetative measures are provided in the CGP.

The CGP requires the submission of a Notice of Termination (NOT) from all operators when final stabilization has been achieved, as well as removal and proper disposal of all construction materials, waste and waste handling devices, removal of all equipment and construction vehicles, removal of all temporary stormwater controls, etc. . Approval of final stabilization by the Engineer and confirmation of submission of the NOT will be required prior to submission of the Resident Engineer’s Final Estimate. The permittee is required to use EPA’s electronic NOI system or “eNOI system” to prepare and submit NOT. The electronic NOT form can be found at <https://www.epa.gov/npdes/stormwater-discharges-construction-activities#ereporting> . If you are given approval by the EPA Regional Office to use a paper NOT, you must complete the form in Appendix K of the 2012 CGP.

Compensation

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

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

ITEM 767.12

COMPOST FILTER TUBES

FOOT

The purpose of this item is to provide a linear, compost-filled tube for filtering suspended sediments from storm water flow. This item shall conform to the requirements of Sections 751 and 767 of the Standard Specifications and the following:

Material for the filter tubes shall be compost meeting M1.06.0, except that no manure or bio-solids shall be used. In addition, no kiln-dried wood or construction debris shall be allowed. Particle size analysis: 98% shall pass through a 3 inch sieve; 30-50% shall pass 3/8 inches sieve.

Tubes for compost filters shall be a minimum of 12” and a maximum of 18” in diameter. Tube material shall be a knitted mesh with 1/8” - 3/8” openings, and made of biodegradable (cotton or jute) materials. Photodegradable (HDPE or polypropylene) fabric may be used; however, photodegradable fabric must be removed and disposed of by the contractor, at his expense, at the end of the contract. Additional tubes shall be used at the direction of the Engineer.

Stakes for anchors, if required, shall be nominal 2” x 2” stakes.

SPECIAL PROVISIONS: BID ITEMS AND SPECIFICATIONS

Tubes of compost may be filled on site or shipped. Tubes shall be placed, filled and staked in place as required to ensure stability against water flows. All tubes shall be tamped to ensure good contact with soil. Compost Tubes shall be placed as shown on the plans and as directed by the Engineer.

The Contractor shall ensure that the filter tubes function as intended at all times. Tubes shall be inspected after each rainfall and at least daily during prolonged rainfall. The Contractor shall immediately correct all deficiencies, including, but not limited, to washout, overtopping, clogging due to sediment, and erosion. The Contractor shall review location of tubes in areas where construction activity causes drainage runoff to ensure that the tubes are properly located for effectiveness. Where deficiencies exist, such as overtopping or wash-out, additional staking or compost material shall be installed as directed by the Engineer. Contractor shall remove sediment deposits as necessary and as directed by the Engineer to maintain the filters in working condition.

Filter tubes shall be removed by the Contractor when site conditions are sufficiently stable to prevent surface erosion, and after receiving permission to do so from the Engineer. All tube fabric shall be cut and removed and disposed of off-site by the Contractor. At the direction of the Engineer, the Contractor may rake out and seed mulch material so that it is no greater than 2 inches in depth on soil substrate.

Compost filter tubes will be measured for payment per foot, complete in place.

Compost filter tubes shall be paid for at the Contract unit price per foot, complete in place, which price shall include all labor, materials, equipment and incidental costs required to complete the work, including but not limited to stakes and tube fabric, removal and proper disposal of sediment deposits, removal and disposal of fabric and stakes, raking and seeding of compost.

ITEM 815.

TRAFFIC CONTROL SIGNAL

LUMP SUM

Work under this Item shall consist of the installation of a traffic control system complete and ready for operation at the following location:

Parker Street at 129 Parker Street Primary Driveway

Work shall include furnishing and installing a new controller and cabinet on a new foundation, pedestal posts and foundations, signal heads, wire and cable, emergency vehicle pre-emption system, video detection system including cameras and video detection processor, and providing a service connection.

The work shall include all incidental materials and labor necessary for operating and controlling the traffic control signals at this location, as shown on the plans and as specified herein, all in accordance with the applicable provisions of the MassDOT Standard Specification for Traffic Control Devices (Section 800), NEMA Standards Publication No. TS-2, Type 1 Chassis Configuration, the Manual on Uniform Traffic Control Devices (2009 Edition) and the following:

The Contractor shall be responsible for the electrical utility costs to run the traffic control signal system during the construction process until such time that the traffic signal control system is accepted by the Town of Maynard.

Timing, sequence, and operation shall be as shown on the Sequence and Timing chart included in the Contract Drawings.

A list of the major traffic signal items required is included on the Sequence and Timing Plans.

Only traffic control equipment listed on MassDOT's Qualified Construction Materials List shall be furnished for this project. Equipment not on the list will be rejected.

Within 30 days following execution of the Contract, the Contractor shall submit shop drawings for signal supports, a list of equipment, and manufacturer's equipment specifications to the Engineer in accordance with the relevant provisions of Section 815.20.

The Contractor shall not commence any work until approval of the shop drawings and the manufacturer's data has been received in writing from the Engineer. Approval of these drawings shall 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 with the manufacturer for all materials purchased from the manufacturer.

Any Electrical Contractor performing work on roadways or signals under the jurisdiction of the Town shall have International Municipal Signal Association (IMSA) Certification as a Traffic Signal Electrician Level II.

In general, work under this Item shall include but not be limited to the following:

Proposed Roadway Reconstruction of Parker Street (Route 27)
Maynard, MA

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.29 of the MUTCD.

Controller and Cabinet

The work shall include furnishing and installing a new TS 2, Type 1 controller, a new cabinet on a new cabinet foundation, and a concrete pad located as shown on the plans.

The controller, malfunction management unit, bus interface unit and all other ancillary traffic signal control components included in the traffic control cabinet shall comply with the National Electrical Manufacturers Association (NEMA) Standard No. TS 2, Traffic Controller Assemblies. The controller and cabinet assemblies shall be supplied in an 8 phase TS 2 Type 1 configuration as required in the list of major traffic signal items included on the plans for this location. The controller shall have two (2) SDLC ports; ENET 1:100 Base-T Ethernet switch, one (1) uplink and three (3) additional ports; ENET 2:100 Base-T Ethernet port dedicated for local communications; and four (4) USB ports for data retrieval and input.

The cabinet shall be made of aluminum, shall be painted black, and mounted to the foundation.

TS 2 Type 1 Controllers and Cabinet Assemblies: Controller shall conform to Section 3, Controller Units of NEMA No. TS 2, Traffic Controller Assemblies.

The TS 2 Type 1 cabinet shall meet the requirements of configuration 3 as defined in Table 5-2, "Type 1 Configurations" of the NEMA TS 2 Standard.

The cabinet shall be wired with a normally closed switch connected to a user defined input to the controller for remote monitoring of the control cabinets' door open status. The controller cabinet shall also be supplied with a Manual Police Button to manually control the operations of the traffic signal via the Police Door Access Panel.

Controller cabinet foundations shall not obstruct a sidewalk or crosswalk so that passage by physically challenged persons is impaired.

The following requirements are applicable to the signalized location and are designed for effective use of a laptop computer in conjunction with traffic signal controllers. These requirements are also designed to permit all engineers, electricians and technicians (including those who are disabled but ambulatory) to work in the cabinet in a safe, effective and comfortable manner. To this extent, the following meets applicable ADA requirements.

1. Adjust the control cabinet height by use of a cabinet extender, adjust the placement of cabinet shelves, adjust the height of the cabinet foundation or provide any combination of these three items so that the top of the LCD or other visual display window of the controller is no more than 48" above finished grade in front of the cabinet. The top of the cabinet door opening shall be at least 68" above finished grade. Any technical provision, plan detail, standard specification or

SPECIAL PROVISIONS: BID ITEMS AND SPECIFICATIONS

standard drawing to the contrary shall not apply to the extent that it may conflict with this viewing height requirement.

2. Furnish and install one slide-out/slide-in shelf or swing-out/swing-in shelf appropriate for the size and load of a laptop computer. This moveable shelf shall support the bottom of the laptop computer at a height between 40" and 44" above finished grade in front of the cabinet.
3. Furnish and install a paved pad in front of the control cabinet. This pad shall be cement concrete, built in accordance with standard sidewalk specifications, approximately level, approximately 1" above the surrounding unpaved surface, or at even grade with the adjacent surface if paved. This pad shall abut the front of the cabinet, project at least 1" to each side of the cabinet and at least 36" in front. No pad is required if the front of the cabinet immediately abuts an existing or proposed paved sidewalk or other paved surface.
4. Both the firmware and software version for each timer unit supplied shall be the same throughout the project, and shall be the latest version available for that product. In addition, the contractor shall promptly furnish and install for the owner the latest versions of both firmware and software through the last day of the inspection period, guarantee period or warranty period, whichever date is later.
5. The contractor shall furnish one cable with each new timer unit to connect a controller to a laptop computer. This cable shall have a termination at one end to match the controller. It shall have a termination on the other end to match the type of serial port found on laptop computers, usually DB9. This cable shall be wired to provide serial RS232C communication between the controller and the computer.
6. Payment for the work described above shall be deemed to be incidental to and included in the prices bid for various items of traffic signal work, and no additional payment shall be made for the work described above.

Bus Interface Units

The Bus Interface Unit (BIU) shall comply with Section 8 of the NEMA TS 2 Standard. The BIU shall be fully interchangeable with any other manufacturer's unit and interchangeable in a NEMA TS 2 Type 1 cabinet assembly.

TS 2 Cabinet Power Supply

As a minimum, the cabinet power supply shall meet all requirements of Section 5.3.5 of the NEMA TS 2 Standard. A test point terminal shall also be located on the unit's front panel for + 24 VDC and logic ground testing.

Malfunction Management Unit

The malfunction management unit (MMU) shall comply with Section 4 of the NEMA TS 2 standard. The MMU's supplied shall be configured to operate as Type 16 units.

The MMU shall be connected directly to the controller unit to support enhanced MMU monitoring of controller operations.

Video Detection System

General

This specification sets forth the minimum requirements for a system that detects vehicles on a roadway using only video images of vehicle traffic.

The system shall be installed by technicians that have been trained and certified by the manufacturer.

System Hardware

The Contractor shall provide and install a Single-Point Video Detection System (SPVDS) as shown on the plans and these special provisions. The SPVDS shall consist of these components: Camera assembly, machine vision processor (MVP), detection algorithms, application software, and all associated equipment required to setup and operate in a field environment including a field setup computer, (if required), connectors and camera mounting hardware.

One pointing device and one hand held color monitor within the controller cabinet for future viewing of the detection camera images shall be supplied by the Contractor. The Contractor shall also supply any necessary cables, interface devices and software for monitoring video detection via laptop computers.

SPVDS System

1. The SPVDS shall use camera assembly(ies) to collect video image data for the MVP for purposes of detecting vehicle presence and generating traffic data.
2. The SPVDS shall provide near-real-time vehicle detection.
3. The SPVDS shall be able to detect either approaching or departing vehicles in multiple traffic lanes, and multiple intersection approaches simultaneously.
4. The SPVDS shall provide flexible detection placement anywhere within the field of view of the camera assembly(ies). A single SPVDS detection camera shall be able to replace multiple in-ground or aboveground detectors.
5. The SPVDS shall provide complete video surveillance of all intersection approaches simultaneously, including the center of the intersection, for situational awareness and incident monitoring while fully actuated detection is active.
6. The SPVDS shall incorporate the use of three-dimensional vehicle modeling for purposes of improving system performance across various image perspectives.

SPECIAL PROVISIONS: BID ITEMS AND SPECIFICATIONS

7. The SPVDS shall operate at a level of presence detection accuracy at or above 97%, excluding issues of occlusion due to limitations imposed by camera placement.
8. The SPVDS shall feature fail-safe operation, triggering a state of "all call" to the controller in the event of an equipment failure or system malfunction.
9. The SPVDS provides the user-selected option of operating in either presence detection mode or SCATS-compatible pulse mode.

Camera Assembly

1. Power: 48 VDC, single burial grade CAT 5e cable (or better).
2. Operating Temp: -35C to +60C.
3. Humidity: Up to 100%.
4. Dimensions: 10" diameter x 9".
5. Weight: less than 11 lbs.
6. The camera shall include an ultra-wide-angle lens.
7. The camera shall feature a heater or other mechanism to prevent the formation of ice and condensation. This shall not interfere with the operation of the camera electronics, and it shall not cause interference with video signal.
8. The camera, when properly installed and configured, shall be able to concurrently observe at least 5 lanes of traffic per approach.
9. The camera shall be able to concurrently observe more than one approach.

Machine Vision Processor (MVP)

1. Power: 120-240 VAC, requiring 150 watts or less.
2. Operating Temp: -34C to +74C.
3. Humidity: Up to 95% non-condensing.
4. Dimensions: 12.25" wide x 11.25" depth x 5" high.
5. Weight: 12 lbs.
6. Enclosure: Rack mount in traffic cabinet.
7. The MVP shall save configurations and zone plans locally to maintain operation with or without monitoring equipment connected.

SPECIAL PROVISIONS: BID ITEMS AND SPECIFICATIONS

8. The MVP shall be designed to function dependably in the adverse environment found in the typical roadside traffic cabinet.
9. The MVP shall include at least 24 detector outputs.
10. The MVP shall include an SDLC connection for TS2 type controllers.
11. The MVP shall include a USB on the front surface for simple data collection on non-networked systems.
12. The MVP shall include both LAN and WAN RJ-45 interface ports on the front surface of the unit.

Application Software

1. The application software shall support the creation and modification of at least twenty-four (24) polygonal detection zones within the graphical user interface.
2. The application software will show images of the detection zones superimposed on the video image of traffic.
3. The application software shall support the assignment of a detector output(s) to each zone. These assignments can be modified at any time through the software.
4. The application software shall support assignment of direction of travel within detection zones. The vehicle detection zone shall not activate for objects traveling any direction other than the one specified for detection. Cross-street and wrong way traffic shall not cause detection. Programming delay timings (within the MVP or controller) will not be allowed to correct for cross-street or wrong way detection.
5. The application software shall support the import and export of detector configurations and zone plans.
6. The application software shall change the color of the zone within the graphical user interface as vehicles enter or exit a detection zone, changing its occupancy status. This will be required for real-time or historical monitoring, and may be turned on or off by the user at any time.
7. The application software shall feature the ability to digitally pan, tilt, and zoom around the entire intersection without movement of the camera and without disrupting the primary fully actuated vehicle detection.
8. The application software shall maintain a database of current and historical traffic data, and allow for the user to run reports against this data to include as a minimum the following data: traffic counts, turning movement counts, average speed, and vehicle classification by length.

SPECIAL PROVISIONS: BID ITEMS AND SPECIFICATIONS

9. The SPVDS shall collect vehicle data at an accuracy at or above 95%, excluding issues of occlusion due to limitations imposed by camera placement.
10. The application software shall feature the ability to mask objects that occlude the camera field of view and/or disrupt the camera automatic gain and exposure control.
11. The application software shall feature an optional reporting interface offering point and click reporting for turning movement counts and vehicle classification.

Installation

1. The camera assembly(ies) shall be capable of accurate detection when mounted greater than 30 feet (9.14 m) above the road surface.
2. The camera assembly(ies) shall be capable of accurate detection when mounted up to 150 feet (45.72 m) from the stopbar.
3. With proper equipment and infrastructure, the entire intersection SPVDS shall be installed and operational in less than 6 hours.
4. Installation of the camera shall require no aiming or focusing of the camera assembly.
5. The system shall be able to be setup and configured entirely with a mouse and monitor connection to the SPVDS processor unit. No additional equipment shall be required for setup and configuration.

Warranty and Maintenance

1. The SPVDS shall be warranted free of defects in material and workmanship for a minimum of three (3) years following installation and warranty registration. During the warranty period, the supplier shall repair with new or refurbished materials, or replace at no charge, any product containing a warranty defect provided the product is returned FOB to the supplier's factory or authorized repair site. Product repair or replaced under warranty by the supplier will be returned with transportation prepaid. This warranty does not apply to products damaged by accident, improper operation, abuse, serviced by unauthorized personnel or unauthorized modification.
2. The camera shall feature an additional warranty to require no aiming or focusing for a period of five (5) years, following successful installation and configuration by trained and certified installers. This excludes any changes required due to lane shifts or due to extraordinary impact or duress on the camera.
3. Ongoing software support by the supplier shall include updates of the application software and detection algorithms. These updates shall be provided free of charge during the warranty period or while under an active extended warranty agreement.

SPECIAL PROVISIONS: BID ITEMS AND SPECIFICATIONS

4. The manufacturer shall maintain an adequate inventory of parts to support maintenance and repair of all systems under warranty or extended warranty agreement, or for a period of 10 years, whichever occurs last.

Environmental and Certifications

1. The system shall be designed to operate reliably in an operating temperature ranging from -34° C (-30° F) to +74° C (+165° F) at 0 percent to 95 percent relative humidity, non-condensing.
2. The camera, mounting hardware, and any related material, when properly installed, can withstand 150 mph (241.4 kph) wind speeds.
3. The camera enclosure shall be waterproof and dust-tight to the latest (National Electrical Manufacturers Association) NEMA-4 and IP66 specifications.
4. The camera shall meet FCC class B requirements for electromagnetic interference emissions.
5. Vibration and shock resistance meet the requirements of Sections 2.1.9 and 2.1.10, respectively, of NEMA TS-2.
6. System components comply with the environmental requirements detailed in the NEMA TS-2 standard.
7. Detection system field hardware meets the requirements in the Federal Communications Commission (FCC) 2005 Code of Federal Regulation (CFR) Title 47, Part 15 and does not interfere with any known equipment.
8. All system components shall be manufactured according to ISO 9001:2000 standards.

Load Switches

Load switches shall comply with Subsection 6.2 of the NEMA TS 2 Standard. All load switches shall utilize optically isolated encapsulated modular solid-state relays. Discrete components on circuit boards are not acceptable.

Load switch indicator lights shall be LED-type and wired on the input side of the device.

Note: The controller cabinet assembly shall be initially supplied with a full complement of load switches to accommodate each available position of the backpanel.

Flasher

Flashers shall comply with Section 6.3.3, No. 10 of the NEMA TS 2 Standard.

Flash Transfer Relays

Flash transfer relays shall comply with Subsection 6.4 of the NEMA TS 2 Standard.

Note: The controller cabinet assembly shall be initially supplied with a full complement of flash transfer relays to accommodate each available position of the back panel.

Mast Arm Poles and Foundations

Mast arm poles and foundations shall be fabricated and constructed in conformance with the MassDOT Standard Drawings included in the plans.

All mast arm poles shall be Type II steel monolevers with shoe bases, unless otherwise directed. All mast arms and mast arm poles shall be painted black. Acceptance of Type II mast arm poles shall be contingent upon review and approval of the shop drawings submitted by the Contractor. Longhand design calculations shall be submitted for all Type II Mast Arms Assemblies.

The Contractor shall conduct soil borings at each of the proposed mast arm locations, and shall submit copies of all soil boring logs to the Engineer. Based on the soil borings collected by the Contractor and the Standard Drawings cited above, the Contractor shall select the appropriate foundation design for each mast arm and submit to the Engineer for approval.

Where soil conditions are such that, in the opinion of the Engineer, the typical foundation design is not suitable, the Contractor shall provide a modified design for the foundation stamped by a Massachusetts Professional Engineer.

Post and Bases

Signal posts and bases shall be aluminum shafts with cast aluminum transformer bases. All signal posts shall be painted black. Signal base foundations shall not obstruct a sidewalk or crosswalk so that passage by physically-challenged persons is impaired.

Signal Heads

All signal heads shall be equipped with 12" red/yellow/green ball or red/yellow/green arrow light emitting diode (LED) traffic module. All signal heads shall be painted black. The back plates shall be painted black with a retroreflective tape border along the edges of the back plates.

LED Vehicle Signal Module

All LED Vehicle Signal Modules used on this project shall conform to the following:

The LED signal module shall conform to "Interim LED Purchase Specification of the Institute of Transportation Engineers, Vehicle Traffic Control Signal Heads – Part 2: Light Emitting Diode (LED) Vehicle Traffic Signal Modules", July, 1998, or most current version, Institute of Transportation Engineers (ITE), 525 School St., S.W., Suite 410, Washington, DC 20024-2797, Telephone: (202) 554-8050, FAX: (202) 863-5486, and shall conform to the following: (In the case of a conflict, the following special provision shall overrule.)

Proposed Roadway Reconstruction of Parker Street (Route 27)
Maynard, MA

SPECIAL PROVISIONS: BID ITEMS AND SPECIFICATIONS

An independent laboratory shall certify that the LED signal module complies with Section 6 Quality Assurance of the above state ITE LED Purchase Specification. LED Modules shall be approved and on the MassDOT Traffic Signal Approved equipment List.

The LED signal 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 signal module will be replaced or repaired by the manufacturer if it exhibits either a greater than 40 percent light output degradation or a fall below the minimum intensity levels within the first 36 months of field operation.

Pedestrian Heads

The pedestrian signal head indications shall be illuminated LED type displaying the graphical symbols of a walking person and/or upraised hand and countdown timers. The countdown timers shall be right of the overlaid of the walking person and upraised hand symbols. All pedestrian signal heads shall be equipped with cap visors. All proposed pedestrian signal heads shall be equipped with audible “chirping” indicators. All pedestrian signal heads shall be painted black.

Pedestrian Push Buttons

Pedestrian push button controls shall be raised from or flush with their housings and shall be a minimum of 2” in the smallest dimension. The force required to activate the controls shall be no greater than 5 Pound Force.

Pedestrian push buttons shall be located as close as practicable to the sidewalk curb ramp serving the controlled crossing and shall permit operation from a clear ground space. If two crosswalks, oriented in different directions, end at or near the same location, the positioning of pedestrian pushbuttons and/or legends on the pedestrian push button signs should clearly indicate which crosswalk signal is actuated by each pedestrian push button.

Pedestrian pushbuttons shall be mounted at a height of 42 inches above the finish sidewalk grade.

All pedestrian push buttons as supplied and installed shall comply with ADA/MAAB standards.

Emergency Vehicle Preemption

Emergency Vehicle Preemption equipment shall be installed.

Optically actuated emergency preemption equipment shall be installed for local control of the signals during the passing of appropriately equipped emergency vehicles through intersections. Traffic Signal Plans illustrate the proposed location for the emergency preemption receivers and pre-empt control of the intersection.

The emergency vehicle preemption control system shall consist of a data-encoded phase selector to be installed within the traffic control cabinet. This unit will serve to validate, identify, classify

SPECIAL PROVISIONS: BID ITEMS AND SPECIFICATIONS

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 optical detectors shall be single input, single output units used to control one approach.

The Contractor shall install a confirmation strobe at the traffic signal location as shown on the plans.

The following description of work specifies the responsibilities involved in the installation of an optical Emergency Vehicle Preemption system.

The Contractor is required to supply material and labor, required or shown, for the complete installation of optical preemption equipment including optical detectors, cable, interfacing equipment to the local controller, making electrical connections and all required incidentals.

The following are the optical requirements of the emergency preemption system:

The Contractor shall arrange for a trained representative of the manufacturer of the optical energy preemption equipment to perform the following field supervision and turn-on services.

The representative shall initiate documentation for As-Built drawings.

The representative shall demonstrate the system and instruct the drivers of fire fighting vehicles in the operation of the system. Any operation problems occurring within the next 30-days shall be corrected by the Contractor or by a Field Service Representative if the Contractor cannot do so.

The cost of these field supervision and turn-on services shall be included in the Lump Sum Bid Price, and no additional payment shall be made therefore. Preemption System design and Documentation shall include the following:

Provide the controller manufacturer, Engineer, and Owner with electrical diagrams.

The installer shall install the equipment consistent with the preemption equipment, the manufacturer's recommended installation procedures and electrical diagrams in a neat and workmanlike manner.

The preemption equipment manufacturer shall be responsible for operational checkouts of the specified preemption functions prior to final acceptance and approval.

Operating checkouts includes the following:

- Verifying that the priority system timing and range are properly set.
- Preemption equipment warranties are put into effect.
- Signal Timing and Sequence under Preemption Control. See preemption data as shown on the Traffic Signal Plan(s).

Miscellaneous Requirements:

Proposed Roadway Reconstruction of Parker Street (Route 27)
Maynard, MA

Software

All local controller, malfunction management unit, SPVD and emergency vehicle preemption software shall be supplied with the latest available revision. Any software upgrades released by the manufacturer shall be supplied at no charge to the Town for a period of five years after

acceptance of the traffic signal installation. Software and/or hardware shall be provided to allow the owner to make adjustments to the detection equipment. Software needed to make changes or additions to equipment that is installed on this project must be provided on a DVD to the Town.

Documentation

Each programmable local hardware component (i.e. controller, malfunction management unit, SPVD, emergency vehicle preemption phase selector) shall be initially programmed by the Contractor based on information contained on the plans.

Note: Three bound sets of hard copy programming per device shall be supplied to the Town by the Contractor.

The Contractor shall supply two 8½”x11” laminated copies of the traffic signal design plan, sequence and timing chart, and chart specifying phases with corresponding controlling detectors. One copy is to be left in the cabinet documentation envelope mounted on the inside of the cabinet door, and the other is to be provided to the Town.

Testing Period

Upon completion of all work, the Contractor shall request a final inspection and test of signal equipment in writing at least thirty days prior to the inspection date. The testing date shall be established with mutual agreement among the Contractor, Capital Group Properties, the Town of Maynard, and the Engineer. Electrical tests shall be conducted by the Contractor, in the presence of the Engineer. The Contractor shall supply all necessary testing materials and labor for all tests and re-tests. The Contractor shall record the results of all tests and submit them to the Engineer for approval.

Fine Tuning and Adjustment Period

The Contractor shall employ the services of the manufacturer or his authorized representative to instruct Town personnel on the use of the system as installed and configured, and to provide fine tuning and adjustments to all timing functions programmed within the controller units. Fine tuning and adjustment shall be accomplished at the direction of the Engineer and shall take place over a three day period (8 hours per day). These days may or may not be consecutive and shall be established by the Engineer to allow for the study of the results of the adjustments. These events shall be scheduled and shall occur before final payment for this Item is approved.

Warranties on Equipment

Proposed Roadway Reconstruction of Parker Street (Route 27)
Maynard, MA

SPECIAL PROVISIONS: BID ITEMS AND SPECIFICATIONS

The warranties that the Contractor receives from each manufacturer of the equipment and materials pertinent to the complete and satisfactory installation and operation of the traffic signal systems shall be transferred to the Town at the time of acceptance of the project, and at no cost to the Town. Each warranty shall indicate its expiration date and be in effect for a minimum of one year from the date the traffic signals were placed in continuous operation.

If within one year from the date the traffic signal system is placed on continuous operation the equipment and materials do not meet the warrants specified above and the Town notifies the manufacturer or its authorized representative promptly, the manufacturer or its authorized representative shall correct all defects either by repairing or replacing all defective parts at no cost to the Town.

The Contractor shall replace, at his own expense, all parts of the traffic signal control equipment found to be defective in workmanship, material or manner of functioning within six months from the final date of acceptance of all installations.

Compensation

The Lump Sum price bid for Items 815. unless otherwise specified, shall constitute full compensation for all labor, materials shown on the major items lists and equipment necessary for or incidental to the installation of a complete intersection connection functioning as specified. The work shall include maintenance of the existing traffic control until the new system is operational. Pull boxes shall be paid for under Item 811.30 and Item 811.31 and 3" conduit (NM) shall be paid for under Item 804.3.

ITEM 815.11 RECTANGULAR RAPID FLASHING BEACON SYSTEM (AC) EACH

The work under these items shall conform to the relevant provisions of Section 800 of the Standard Specifications and the following:

This work shall consist of furnishing rectangular rapid flashing beacon (RRFB) assemblies at the locations shown on the Plans. Assemblies shall be hardwired and shall be pedestrian activated. The RRFB shall include the service connection in accordance with Subsection 813.

Each RRFB system shall be a complete system for each crossing location including the complete assembly that consists of but is not limited to:

- both poles and foundations; the poles shall be painted black
- signage for each pole and each direction
- sign mounting onto each pole
- 8 LED lights on 2 Light bars on each pole (4 Lights per bar):
 - 2 bars per pole
- down arrow signage for each pole and each direction
- push buttons
- pole kits
- control cabinet with electrical components (wiring, solid-state circuit boards, etc.).

The RRFB shall be manufactured by Tapco Traffic and Parking Control Co, Inc. and shall be a Rectangular Rapid Flashing Beacon LED Light Assembly with Large LED Arrays (RRFB-XL2™).

Each RRFB assembly shall consist of eight rapidly and alternately flashing rectangular yellow indications having LED array based pulsing light sources (four per direction), and shall be in conformance with all applicable MUTCD standards and guidelines, and shall exceed the minimum requirements specified in FHWA Memorandum IA-11, Interim Approval for Optional Use of Rectangular Rapid Flashing Beacons.

Each RRFB shall be activated by an ADA compliant push button. The RRFB shall be normally dark and shall initiate operation only upon pedestrian actuation. The RRFB shall cease operation after a predetermined time limit (based on MUTCD procedures). When activated, the RRFB unit indications shall flash in a rapidly alternating “wigwag” flashing sequence (left light on, then right light on) and flash in a 2-4...1 pattern per FHWA requirements. Each of the RRFB’s indications shall have 70 to 80 periods of flashing per minute.

The activation length of the flashing lights shall be programmable 1 second to 24 hours in one second, minutes and hours. The flash duration shall be programmed to be 15 seconds to allow for an adequate pedestrian clearance time. The system shall provide an actuation counter which can be downloaded at site to a PC using standard cables.

All signs shall conform to MUTCD standards and sign 0.080-gauge aluminum. Crossing signs shall be 30” x 30” W11-2 accompanied with crossing plaques 24” x 12” W16-7P. The W11-2 and W16-7P signs shall consist of black opaque legends, symbols, and borders on fluorescent Proposed Roadway Reconstruction of Parker Street (Route 27)
Maynard, MA

SPECIAL PROVISIONS: BID ITEMS AND SPECIFICATIONS

yellow/green high intensity prismatic (HIP) backgrounds conforming to ASTM D4956 Type IX or better. Pedestrian pushbutton instruction 9"x12" R10-25 signs shall be furnished and mounted adjacent to or integral with each pedestrian pushbutton.

The RRFB shall be mounted on a 4.5" OD pedestal pole with breakaway base and bolt kits.

Light Bar

The Light Bar housing shall be constructed of durable, corrosion-resistant powder-coated aluminum with stainless steel fasteners. The enclosed components shall be modular in design whereby any component can be easily replaced using common hand tools, without having to remove the housing from the pole. All mounting hardware required for mounting the Light Bar housing shall be provided and universal to multiple poles.

Each of the four vehicle RRFB-XL2™ LED Modules (2 per pole, 1 per direction) shall be approximately 7.00" wide x 2.8" high. A pedestrian LED indication, approximately 0.5" wide x 1.75" high, shall be side-mounted in the Light Bar housing to be directed at and visible to pedestrians in the crosswalk. Dimensions of the Light Bar when mounted are 23.56"W x 3.76"H x 1.37"D.

Each Light Head shall have 8 amber LEDs with a minimum output of 600,000 mCd.

Push Button

The Push Button shall be ADA compliant and be capable of continuous operation within a temperature range of -30° to 165°F (-34° to 74°C). The push button shall have an audible tone and LED light.

Hardwired RRFB

The control circuit shall have the capability of independently flashing up to two independent outputs, and shall be able to flash RRFB, beacons or LED signs. The LED light outputs and flash pattern shall be completely programmable.

The flashing output shall have 70 to 80 periods of flashing per minute with a 100 – millisecond duration on time. The output shall reach the output current as programmed for the duration of the pulse. The flashing output shall be programmable. The initial flash pattern shall have a cycle length of 800 milliseconds and shall have the following sequence:

- The left side beacon is on for 50 milliseconds
- Both beacons are off for 50 milliseconds
- The right side beacon is on for 50 milliseconds
- Both beacons are off for 50 milliseconds
- The left side beacon is on for 50 milliseconds
- Both beacons are off for 50 milliseconds
- The right side beacon is on for 50 milliseconds
- Both beacons are off for 50 milliseconds

SPECIAL PROVISIONS: BID ITEMS AND SPECIFICATIONS

- Both beacons are on for 50 milliseconds.
- Both beacons are off for 50 milliseconds
- Both beacons are on for 50 milliseconds
- Both beacons are off for 250 milliseconds

The control circuit shall be installed in a NEMA rated aluminum enclosure (12"x10"x15").

The hardwired RRFB shall require 110VAC. The input voltage ranges from 100 to 130 volts. The service connection shall be provided in accordance with Subsection 813. All conduit, riser, wire and other incidentals required to complete the service connection shall be included under this item.

Warranty

Systems shall have a warranty of 3 years with the warranty period beginning on the date the RRFB's are accepted by the Town.

Measurement and Payment

These items will be measured for payment by the unit each, complete in place and fully operating.

These items will be paid for at the Contract unit price per each; which price shall include all labor, materials, equipment, wiring, service connection and incidental costs required to complete the work.

SPECIAL PROVISIONS: BID ITEMS AND SPECIFICATIONS

<u>ITEM 864.04</u>	<u>PAVEMENT ARROWS AND LEGENDS REFL.</u>	<u>SQUARE FOOT</u>
	<u>WHITE (THERMOPLASTIC)</u>	
<u>ITEM 866.04</u>	<u>4 INCH REFLECTORIZED</u>	<u>FOOT</u>
	<u>WHITE LINE (THERMOPLASTIC)</u>	
<u>ITEM 866.112</u>	<u>12 INCH REFLECTORIZED</u>	<u>FOOT</u>
	<u>WHITE LINE (THERMOPLASTIC)</u>	
<u>ITEM 867.04</u>	<u>4 INCH REFLECTORIZED</u>	<u>FOOT</u>
	<u>YELLOW LINE (THERMOPLASTIC)</u>	
<u>ITEM 867.08</u>	<u>8 INCH REFLECTORIZED</u>	<u>FOOT</u>
	<u>YELLOW LINE (THERMOPLASTIC)</u>	

The work under these Items shall conform to the relevant provisions of Section 860 of the Standard Specifications and the following:

All crosswalks and stop lines shall be installed as shown and in the locations shown on the plans.

All edge lines and centerline markings shall be 4-inch wide (minimum).

All gore lines shall be 8-inch wide (minimum) with 4-inch yellow double yellow center lines.

Measurement and Payment

Cross Walks, Stop Lines, 4 Inch White Lines, 4 Inch Yellow Lines and 8 Inch Yellow Lines shall be measured per foot, complete and in place. Pavement Arrows and Legends shall be measured per Square Foot, complete and in place.

Cross Walks, Stop Lines, 4 Inch White Lines, 4 Inch Yellow Lines and 8 Inch Yellow Lines shall be paid at the contract unit price bid per foot, which price shall include all material, labor and equipment, including machinery to provide pavement markings as shown on the plans. Pavement Arrows and Legends shall be paid at the contract unit price bid per Square Foot, which shall include all material, labor and equipment, including machinery to provide pavement markings as shown on the plans.

ITEM 874.2

TRAFFIC SIGN REMOVED AND RESET

EACH

The work under this Item shall conform to the relevant provisions of Section 840 of the Standard Specifications and the following:

The work to be done consists of removing and resetting the existing street, warning and regulatory signs and their supports to new locations as shown on the Plans or as required by the Engineer.

The Contractor shall replace at his own expense, all sign panels and supports that are damaged or lost either directly or indirectly as a result of his actions.

The sign shall be mounted in accordance with the Manual on Uniform Traffic Control Devices (MUTCD) and the 1990 Standard Drawings for Signs and Supports.

When the visibility of the relocated sign panels is obstructed by trees and other vegetation, the Contractor shall clear the obstruction for proper sight distance. All clearing shall be done within the roadway layout, as approved by the Engineer. This work shall be incidental to this item.

Traffic Sign panels, to be removed and reset, shall be cleaned before being reset. Damage during removal or resetting to any sign panel designated for reuse by the Engineer shall be repaired or replaced by the Contractor at his own expense. The Contractor shall furnish and install all necessary mounting fixtures (nuts, bolts and other miscellaneous items) required to complete the work.

Measurement and Payment

Traffic Signs Removed and Reset shall be measured per each as complete units, in place, as determined by actual count.

Traffic Sign Removed and Reset shall be paid for at the contract unit price per each which price shall include all labor, materials, equipment and incidental costs required to complete the work.

If required by the Engineer, new Traffic Sign panels shall be furnished, installed and paid for under Item 832. Warning - Regulatory and Route Marker - Aluminum Panel (Type A).

ITEM 874.41 **TRAFFIC SIGN REMOVED AND DISCARDED** **EACH**

Work under this Item consists of removing and discarding existing regulatory, warning and directional signs, supports and foundations.

Signs and attached hardware shall be carefully removed from their supports. The supports and existing foundations shall be completely removed and the holes backfilled with gravel borrow. The surface shall be patched with a material to match the existing ground or as required by the Engineer.

Sign panels, posts and foundations shall be disposed of offsite in a manner that meets all applicable local, state and federal requirements.

If signs are attached to existing light poles, utility poles or traffic poles, only the sign and attached hardware shall be removed and discarded.

The existing signs shall not be removed and discarded without the prior approval of the Engineer.

Measurement and Payment

Traffic signs removed and discarded shall be measured as complete units per each, in place, as determined by actual count.

Traffic sign removed and discarded shall be paid for at the contract unit price per each which price shall include all labor, materials, equipment and incidental costs required to complete the work.

ITEM 996.33 **CONTRACTOR DESIGNED RETAINING WALL** **LUMP SUM**

Work under this item shall be performed according to applicable sections of the Standard Specifications and the following:

Contractor to design and construct a retaining wall at the location shown on plans. Disturbance related to the wall must be limited to within than 6 feet of the back of walk to avoid impacts to wetlands. Contractor shall perform borings and soil analysis necessary for proper wall design, including acquisition of police details, and permits necessary to perform borings. Shop drawings and loading calculations stamped by a structural engineer, registered in the commonwealth of Massachusetts, shall be provided by contractor for engineer's approval. Retaining wall must accommodate 8' deep post guard, as shown on plans, and provide sufficient bench to allow for deflection of guard in the event of an impact. Wall to include 4' high chain link installed according to section 644 of the Standard Specifications and as shown on plans. Wall shall incorporate opening to accommodate 24" drainage pipe, to outlet on west side of wall at approximately station 6+06, as shown on plans.

Contractor Designed Retaining Wall shall be paid at the contract unit price bid per Lump Sum which price shall include all material, labor and equipment, including police details, permit acquisitions, borings, soil analysis, and preparation of wall design.

No separate payment will be made under item 999.001 for police details.

No separate payment will be made for Chain Link fence.

Payment for guard to be paid under item 620.1 steel W Beam Highway Guard (Single Faced)

SPECIAL PROVISIONS: BID ITEMS AND SPECIFICATIONS

ITEM 999.001

POLICE DETAIL

HOUR

Work under this item shall be performed according to Section 7.00, Subsection 7.11 of the Standard Specifications and the following:

All police details will be paid a minimum of four hours per day.

The Contractor will only be reimbursed for Police Details up to 8 hours per calendar day, per detail officer. It is the responsibility of the Contractor to ensure all work requiring detail officers is completed with the 8 hour police detail shift. The Contractor will not be reimbursed for hours charged by the detail officer over the 8 hour detail shift, unless otherwise approved by the Town on a Day-to-Day basis.

Payment will be on a per hour basis, which rate will be set by the Town of Maynard Police Department. The hourly rate shown in the Bid Sheets is for bidding purposes only. Payment shall be based upon the invoices submitted by the Maynard Police Department less all administrative fees.

The Contractor shall pay the Police Department directly prior to being reimbursed by the Town. At the end of each month, the Contractor shall submit to the Engineer receipted copies of all bills for reimbursable police details. The bills will be included for reimbursement in the next monthly estimate. The bills must be paid to and signed by a representative of the Police Department before being accepted by the Engineer for payment. All costs to the Contractor for processing police detail payments shall be included in the overall cost of the other items in the Contract.