SPECIAL PROVISIONS

Proposed Intersection Improvements at Various Locations

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.

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^{o}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^{o}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 al 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^{o} 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^{o}F and 550^{o}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^{o}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^{o}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.

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 directly outside of the project limits 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 816.01 TRAFFIC SIGNAL RECONSTRUCTION LUMP SUM
LOCATION NO. 1

Work under this Item shall consist of the traffic signal improvements, as shown on the plans, at the following intersection:

Parker Street (Route 27) at Great Road (Route 117)

Work shall include furnishing and installing new pedestrian signal heads with countdown display indications, and removing & stacking the existing pedestrian signal heads. The existing pedestrian signal heads shall be delivered to the Town of Maynard's Department of Public Works Winter Street garage. Work at this location shall also include changing the traffic signal timing plans to match the timing plans shown on the plans. 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), the Manual on Uniform Traffic Control Devices (2009 Edition) and the following:

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:

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. Where noted on the plans, bi-modal green/yellow LED arrows shall be provided. 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.)

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 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. All wiring

and connections to the existing controller shall utilize existing underground conduit at the intersection.

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.

Traffic Signal Timing

The Contractor shall implement the traffic signal timing plans, as indicated on the plans.

Documentation

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 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

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 816.01 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 traffic control signal, functioning as specified. 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 816.02 TRAFFIC SIGNAL RECONSTRUCTION LOCATION NO. 2 LUMP SUM

Work under this Item shall consist of the traffic signal improvements, as shown on the plans, at the following intersection:

Parker Street (Route 27) / Powder Mill Road (Route 62) / Waltham Street

Work shall include furnishing and installing a new video vehicle detection system, and replacing the existing green arrow lenses on Signal Heads B and F with green/yellow bi-model arrow lenses. Work at this location shall also include changing the traffic signal timing plans to match the timing plans shown on the plans. The work shall include all incidental materials and labor necessary to provide a fully functional video vehicle detection system, and shall include the following:

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:

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.)

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.

Traffic Signal Timing

The Contractor shall implement the traffic signal timing plans, as indicated on the plans.

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. All wiring and connections to the existing controller shall utilize existing underground conduit at the intersection.

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.

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.

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.

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.

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 (+l65° 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.

Documentation

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 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

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 816.02 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 video vehicle detection system and bi-model signal lenses, functioning as specified. 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 816.03 TRAFFIC SIGNAL RECONSTRUCTION LUMP SUM
LOCATION NO. 3

Work under this Item shall consist of the traffic signal improvements, as shown on the plans, at the following intersection:

Main Street (Route 62) at Great Road (Route 117)

Work shall consist of replacing the existing green ball lenses with green right-arrow LED lenses for Signal Head B and Signal Head F, for the Main Street southbound approach.

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.)

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.

Compensation

The Lump Sum price bid for Items 816.03 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 two new LED signal lenses, functioning as specified.

ITEM 864.04	**PAVEMENT ARROWS AND LEGENDS REFL. WHITE (THERMOPLASTIC)**	**SQUARE FOOT**
ITEM 866.04	**4 INCH REFLECTORIZED WHITE LINE (THERMOPLASTIC)**	**FOOT**
ITEM 867.04	**4 INCH REFLECTORIZED YELLOW LINE (THERMOPLASTIC)**	**FOOT**
ITEM 867.08	**8 INCH REFLECTORIZED YELLOW LINE (THERMOPLASTIC)**	**FOOT**

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

All stop lines shall be installed as 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

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.

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. This 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 and compacted. 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.

899.01 RADAR SPEED FEEDBACK DISPLAY SIGN EACH

Radar Speed Feedback Sign, Solar Panel, Sign Post, and Post Foundation shall be included in the lump sum cost, shall conform to the relevant provisions of Section 824 of the Standard Specifications and the following:

The speed feedback sign shall be 12" Radar Speed Display Sign with 20 Watt Solar Panel and data collection. The data collection shall be purchased for each individual sign. The manufacturer and product name shall conform to one of the models listed below, which are approved fabricators by MassDOT:

- Information Display Company – SC-15
- Radarsign, LLC – TC-500
- TraffiCalm Systems, Inc. – M75-12DFB-000x

No other products will be accepted by the Town.

The battery shall be a user-replaceable battery rated at 30 AH or higher. The Speed Feedback Display Signs shall be installed at approximately the following locations depicted on Sheet 13 of the plan set for Proposed Intersection at Various Locations. The final location for each assembly shall be determined and field verified by the Town of Maynard and the engineer prior to installation.

The speed feedback sign shall be mounted on and a MassDOT Standard Traffic Signal Post and Base. The bottom of the speed feedback shall be mounted 7'-0" above finished grade, per MUTCD. A speed limit (R2-1) sign shall be mounted above the speed feedback sign.

The speed feedback sign shall have the words "YOUR SPEED" in black letters and a white background. The sheeting shall meet the requirements of the Standard Specifications.

The digital display shall consist of amber LEDs and have a full letter height of 12-inches and shall be capable of displaying 2-digits. The display shall be capable of displaying a "SLOW DOWN" message using a 3-inch letter height, if the detected speed is more than 15 MPH above the posted speed limit. The speed shall be displayed in 1 MPH increments.

The Support for Sign shall be galvanized and powder coated with at least two coats of exterior grade powder coat paint suitable for a low speed traffic environment subject to high levels of salt. All steel components, except for stainless steel and anchor plates, shall be galvanized, pre-treated, and shop painted except as noted. Hardware need not be painted after galvanizing except for the portions exposed to view after installation, such as bolt heads, ends, nuts, and washers, which may be field painted. Touch-up and repairs shall be made using paint from the same batch run as sued for the shop-applied coats and supplied by the shop applicator.

The wiring of the speed feedback sign shall be completed by a licensed electrician holding "Certificate B" issued by the Board of State Examiners of Electricians. All wiring shall be considered incidental to the cost for the Speed Feedback Sign.

All materials furnished, assembled, installed and used in the fabrication and erection of the Speed Feedback Sign shall be new and installed per the contract documents and manufacturer's instructions. Materials not specifically covered in these specifications shall be in accordance with the current, accepted standards of the National Electric Manufacturers Association (NEMA), the Underwriters Laboratories (UL), the National Electric Code (NEC) and the American Society for Testing and Materials (ASTM).

The Contractor shall orient the fixtures in such a manner as to optimize viewing and detection angles using the manufacturer's recommendations for installation instructions.

The Contractor shall conduct approved stand-alone, system performance tests of the equipment installed. The tests shall, as a minimum, satisfactorily exercise all stand-alone functional requirements of the field equipment. Following successful completion of the system performance tests, a 90 calendar-day test shall be performed. The purpose of the operational test is to demonstrate reliability of the system equipment for a 90-day period. Final acceptance shall be based on the satisfactory completion of the 90-day test.

The setup and programming of the speed feedback sign shall be completed and coordinated by the Contractor. The display options shall be coordinated with the Maynard DPW Highway division. The Contractor shall provide training to the Maynard DPW Highway division and the Maynard Police Department on the use and functionalities of the Speed Feedback Sign. The training shall consist of hands-on training using installed system equipment. The cost of the coordinating and training shall be considered incidental to the Speed Feedback Sign.

The Contractor shall furnish three (3) sets of maintenance and operation manuals. The equipment manuals shall contain schematic diagrams, complete installation/operation procedures, maintenance/troubleshooting procedures, and a list of replacement parts including names of vendors.

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.

ITEM 999.001 POLICE DETAIL HOUR

Work under this item shall be performed in accordance with 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.