

**TOWN OF BURLINGTON, MASSACHUSETTS**  
**APRIL 20, 2021**  
**ADDENDUM NO. 2**  
**TO**  
**CONTRACT DOCUMENTS**  
**FOR**  
**2021 TRAFFIC SIGNAL IMPROVEMENT PROJECT**  
**WINN STREET AT PEACH ORCHARD ROAD**  
**CONTRACT #21C-411-0054**

The following changes and additional information are hereby made part of the Contract Documents:

Under *Item 816.01 – Traffic Signal Reconstruction Location No. 1*, **delete** section “Connected Vehicle Hybrid Bridge Traffic Signal System (CVHBTSS)” on pages 55 through 60. **Replace** with the following:

**Field Monitoring Units (FMU)**

Under this item the Contractor shall consist of furnishing and installing a Field Monitoring Unit (FMU) and software, as well as all needed accessories required for a full and complete installation, including but not limited to power adapters, Ethernet cables, and interface cables, as described herein.

**MATERIALS:** The materials for this work shall conform to the following requirements:

1. The FMU shall operate independent of the brand/type of intersection controller deployed in the traffic cabinets.
2. The FMU shall conform to the following requirements:
  - 2.1 The FMU shall function correctly between -34 degrees C and +74 degrees C.
  - 2.2 The maximum size of the FMU shall be 19" x 7,455" by 1.719" (1U) and shall be suitable for placing in a traffic cabinet.
  - 2.3 The FMU shall be provided with appropriately rated connectors that allows the FMU to be exchanged by unplugging connectors, without tools.
  - 2.4 The FMU shall monitor and log all traffic controller and cabinet faults and or alarms.
  - 2.5 The FMU shall be wired directly to the traffic cabinet for all connections power and data.

- 2.6 The FMU shall have an internal cellular modem running at 4G LTE.
  - 2.6.1 The Cellular modem shall be designed to be replaced / upgraded to 5G service when available.
- 2.7 The FMU shall have two or more remotely switchable 120 Volt AC outlets.
- 2.8 The FMU shall incorporate an integrated GPS and cell modem.
- 2.9 The FMU and or GPS antenna shall be connected to the traffic signal to provide for clock time sync pulse.
- 2.10 The configuration of the FMU shall be accomplished by accessing the internal web server with a browser. It shall be possible to configure the FMU without any special software.
- 2.11 The FMU shall be powered via a standard 120V input power.
- 2.12 The FMU shall allow for the routing of the controller configuration packets to and from the controller (either by Ethernet or serial communications) for any type of controller utilized by the City. In this way it shall be possible to configure the controller and utilize the controller specific software to interrogate the controller, and the FMU shall provide the communications pipe which allows this to be accomplished.
- 2.13 The FMU shall allow the City to live stream the video detection cameras via the FMU internal cellular modem and the FMU manufacturers cloud hosted website. There shall be no cellular over charges to the City for this feature.
- 2.14 The FMU shall allow and be configured to provide access to the traffic signal controller front panel display via the FMU manufacturers cloud hosted website.
- 2.15 The FMU shall be configured to broadcast the traffic controller SPaT messages via the FMU mobile application.
- 2.16 The FMU shall, within the size limitations above, include a battery and battery charging/monitoring circuit, to allow the FMU to function correctly even when all power to the intersection has failed. The battery shall continue to power the FMU for a minimum of 5 hours after all power has failed to the intersection.
- 2.17 The FMU shall incorporate an integrated GPS which will allow the FMU to geolocate itself on the FMU management software map, without configuration.
- 2.18 The FMU shall operate without requiring a static IP address. The only configuration required at the FMU is to enter the URL of where the FMU management software is hosted.
- 2.19 In the event that the cell service is interrupted or is not available, the FMU shall store any events that occur in internal memory and forward these events automatically to the FMU management software when the cell service is restored. In this way, a

complete record of events at the device can be maintained even if cell service is interrupted for a period. The system will store 5000 events.

- 2.20 The FMU shall utilize HTTPS protocols, and XML data structures, for communication with the FMU management software. In this way the data will be open for future expansion and competition. The use of secret proprietary protocols is not permitted.
- 2.21 The FMU shall be a 1U 19" rack mount device, with all connections on the rear, and LED indicators, power switches and selector switches on the front.
- 2.22 The FMU shall include Ethernet communications via four Ethernet Ports with RJ45 connectors.
- 2.23 The FMU shall be powder coated aluminum enclosures.
- 2.24 The FMU shall include weatherproof antennas.
- 2.25 The FMU shall include the ability to remotely cycle power to the outlets on the back of the FMU. In this way it shall be possible to cycle power to ancillary connected equipment such as network switches, cameras and similar equipment.
- 2.26 The user interface shall display the status of the outlets and provide confirmation via an associated input whether the sockets are energized or not.

### **3. Map Display FMU Management Software**

- 3.1 The FMU shall include a scrollable, zoomable map display, with the intersections and other monitored devices shown as representative icons on the map. The map shall include the ability to see the intersections using Google Streetview.
- 3.2 The alarm status of the intersection shall be clearly indicated on the icon on the map, so that the user can see at a glance which intersections are in alarm.
- 3.3 The map display shall also include a list of intersections, with the number and priority of alarms indicated on the list. Intersections in high priority alarm shall be moved to the top of the list, followed by medium priority, low priority and then finally by intersections not in alarm.
- 3.4 The icons shall change to be able to clearly indicate if an intersection is offline.
- 3.5 Clicking on the icon on the map shall expose a box with the current parameters of the intersection shown.
- 3.6 The default map display position and zoom shall be configurable by user, so that the user's view will default to show the intersections that the user is responsible for managing.
- 3.7 The map view shall have the ability to show Google traffic overlays on the map.

### **4. Intersection Detail Display FMU Management Software**

4.1 It shall be possible to drill down, either from the map icon or from the list, to a device level detail for the intersection, which as a minimum shall display the following parameters:

4.1.1 The alarm status, with priority indicated, and a text description of the alarm (if an alarm is present for this device).

4.1.2 The time since the last communication with the device

4.1.3 The following parameters (real time now values, minimum for the day values, maximum for the day values, and average for the day values)

4.1.3.1 The AC mains voltage (value)

4.1.3.2 The battery back-up voltage (value)

4.1.3.3 The cabinet temperature (value)

4.1.3.4 The cabinet humidity (value)

4.1.3.5 The presence of AC power (OK or Fail)

4.1.3.6 The flashing status of the intersection (OK or Flashing)

4.1.3.7 Stop Time status (OK or Stop Time Active)

4.1.3.8 The cabinet door status (Open or Closed)

4.1.3.9 The intersection fan status (Fan On or Fan off)

4.1.4 It shall be possible to view graphs of each of the value parameters in graphical form, over the recent two-week period. This includes real time graphs of:

4.1.4.1 The AC mains voltage

4.1.4.2 The battery back-up voltage

4.1.4.3 The cabinet temperature

4.1.4.4 The cabinet humidity

## **5. Diagnostics and Log Display FMU Management Software**

5.1 From the device level detail within the FMU management software, it shall be possible to drill down to get the raw data; the error logs; and the communications logs to allow a technician to fault-find problems.

5.2 It shall be possible to filter the logs by Device; by Device Type and/or by Group as well as between dates.

5.3 It shall be possible to print these selected logs to a local printer or a PDF file.

5.4 It shall be possible to export these logs to Excel on the local computer for further analysis.

## **6. Alarms FMU Management Software**

- 6.1 The FMU management software shall have a comprehensive alarm generation capability
- 6.2 It shall be possible to configure alarms to be generated on any parameter becoming out of tolerance, including analog values, digital values and enumerated values.
- 6.3 Alarms shall be configurable to be of Low, High or Critical Priority.
- 6.4 The alarm priority shall be displayed throughout the FMU management software, on all displays, using color codes such as red-critical; yellow – high; and amber-low to indicate the priority of the alarm.
- 6.5 The current active alarms shall be accessible for view via an expandable window, to see which alarms are active and when the alarm occurred. The highest priority alarms shall rise to the top of the list.

## **7. Alerts FMU Management Software**

- 7.1 The FMU management software shall have comprehensive alerting capability, to enable the response personnel to be notified when an abnormal situation has occurred.
- 7.2 It shall be possible to configure alerts to one or more personnel for each alarm. This will cause, as selected, an SMS and/or an email to be sent to the person when an alarm occurs.
- 7.3 The alert shall be configurable to optionally send via email and/or via SMS a message when an alarm clears.
- 7.4 The intention is that the FMU management software provides the alerts to the user in near real time. The SMS and email shall be issued within 30 seconds of the occurrence of event which results in an alert being issued.

## **8. Hosting and Connectivity and Service FMU / FMU Management Software**

- 8.1 The Contractor shall supply the FMU with the FMU manufacturers 10-year Connectivity and Service, as part of the purchase price. The Connectivity and Service agreement shall include at a minimum:
  - 8.1.1 Cellular Connectivity
  - 8.1.2 Upgrade the cellular modem if the technology is not supported by the cellular networks.
  - 8.1.3 Telephone and email support
  - 8.1.4 No cellular overage charges
  - 8.1.5 Extended warranty on the hardware for the period of the Connectivity and Service Agreement
  - 8.1.6 Over-the-air software updates
  - 8.1.7 Over-the-air security updates
  - 8.1.8 Future Connected Vehicles Service