



STATE OF MAINE  
DEPARTMENT OF TRANSPORTATION  
16 STATE HOUSE STATION  
AUGUSTA, MAINE 04333-0016

Janet T. Mills  
GOVERNOR

Dale F. Doughty  
COMMISSIONER

April 14, 2026  
Subject: Intersection Improvements  
with Mast Arm Replacements  
WIN: 028480.00  
Location: Brewer  
**Amendment No. 1**

Dear Sir/Ms.:

Make the following changes to the Bid Documents

In the Bid book:

**Remove** pages 15 through 17 titled Proposal Schedule of Items dated 3/10/2026 and **Replace** with the attached Proposal Schedule of Items 4/14/2026

**Remove** pages 67 through 95 titled SPECIAL PROVISION SECTION 718 TRAFFIC SIGNAL MATERIAL totaling twenty-nine pages and **Replace** with the attached SPECAIL PROVISION SECTION 718 TRAFFIC SIGNAL

In the Plan Set:

**Remove** Sheets 1 through 5 totaling five pages dated 2/19/2026 and **Replace** with the attached five sheets dated 4/14/2026

The following questions have been received:

**Question:** Please provide a mounting height and luminaire arm length for the luminaire to be mounted to the 30' mast arm.

**Response:** 40' height to luminaire on the 36' pole, 20' arm length.

**Question:** Please provide sign sizes for the proposed blank-out signs.

**Response:** Two proposed 30"x30" dual message blank out signs, one proposed 30"x36" blank out sign.

**Question:** Under the 718.13 Spec an Edaptive Signal Control 10-year license is requested. We understand that the system is currently active in Centracs. As such, does the 10-year license begin when the current system expires? Of are we to provide an extension of the current license to ensure 10-years from contract close? What is the current expiration date of the active license? Are any FMU license extensions or modifications required?

**Response:** A revised 718.13 Spec has been provided, removing references to Edaptive licensing. Extensions to the FMU license and communications are not required as part of this project.

**Question:** Can the mast arm bid item be broken into three bid items by mast arm length?

**Response:** An updated item list with three separate items for the different mast arm lengths.

**Question:** The plans call for the mast arm foundation on the southeast corner to be vacuum excavated. Will it be acceptable to use the same excavation method for all foundations?

**Response:** Vacuum excavation will be acceptable for all locations, but is required for the southeast corner.

**Question:** How will the conduit to control the signals B4 and B5 be paid for? Is the intent to directionally drill or is trenching acceptable?

**Response:** The City places a five year moratorium for street openings after paving. There has not been any paving or reconstruction of the roadway within the last five years, therefore trenching is acceptable. It should be noted that the conduit between B4 and B5 has been revised to be Item 626.221.

**Question:** Please define what the contractor should provide under item 643.81 Traffic Signal Control System. The intersection is currently connected to Maine DOTs CMS through the existing FMU.

**Response:** The intersection should maintain current communication connections. Item 643.81 has been removed from the bid.

Consider these changes and information prior to submitting your bid on **April 15, 2026.**

Sincerely,



George M. A. Macdougall P.E.  
Contracts & Specifications Engineer

Maine Department of Transportation

Proposal Schedule of Items

Proposal ID: 028480.00

Project(s): 028480.00

SECTION: 1 INITIAL GROUP

Alt Set ID: Alt Mbr ID:

Contractor: \_\_\_\_\_

Proposal Line Number	Item ID Description	Approximate Quantity and Units	Unit Price		Bid Amount	
			Dollars	Cents	Dollars	Cents
0010	626.11 PRECAST CONCRETE JUNCTION BOX	1.000 EA	_____	 _____	_____	 _____
0020	626.22 NON-METALLIC CONDUIT	100.000 LF	_____	 _____	_____	 _____
0030	626.36 REMOVE OR MODIFY CONCRETE FOUNDATION	4.000 EA	_____	 _____	_____	 _____
0040	626.44 36 INCH DIAMETER FOUNDATION	35.000 LF	_____	 _____	_____	 _____
0050	626.451 42 INCH DIAMETER FOUNDATION	17.000 LF	_____	 _____	_____	 _____
0060	627.73 4 INCH YELLOW PAVEMENT MARKING LINE	90.000 LF	_____	 _____	_____	 _____
0070	627.75 WHITE OR YELLOW PAVEMENT & CURB MARKING	15.000 SF	_____	 _____	_____	 _____
0080	629.05 HAND LABOR, STRAIGHT TIME	10.000 HR	_____	 _____	_____	 _____
0090	631.12 ALL PURPOSE EXCAVATOR (INCLUDING OPERATOR)	24.000 HR	_____	 _____	_____	 _____
0100	631.172 TRUCK - LARGE (INCLUDING OPERATOR)	24.000 HR	_____	 _____	_____	 _____
0110	631.50 BUCKET TRUCK CREW	24.000 HR	_____	 _____	_____	 _____
0120	643.71 TRAFFIC SIGNAL MODIFICATION	LUMP SUM	_____	 LUMP SUM	_____	 _____

Maine Department of Transportation

Proposal Schedule of Items

Proposal ID: 028480.00

Project(s): 028480.00

SECTION: 1 INITIAL GROUP

Alt Set ID: Alt Mbr ID:

Contractor: \_\_\_\_\_

Proposal Line Number	Item ID Description	Approximate Quantity and Units	Unit Price		Bid Amount	
			Dollars	Cents	Dollars	Cents
0130	643.81 TRAFFIC SIGNAL CONTROL SYSTEM	LUMP SUM	LUMP SUM		_____	_____
0140	643.88 TRAFFIC SIGNAL BLANKOUT SIGN	3.000 EA	_____	_____	_____	_____
0150	643.91 MAST ARM POLE 30' ARM	1.000 EA	_____	_____	_____	_____
0160	643.91 MAST ARM POLE 40' ARM	1.000 EA	_____	_____	_____	_____
0170	643.91 MAST ARM POLE 50' ARM	1.000 EA	_____	_____	_____	_____
0180	643.94 DUAL PURPOSE POLE	1.000 EA	_____	_____	_____	_____
0190	645.271 REGULATORY, WARNING, CONFIRMATION AND ROUTE MARKER ASSEMBLY SIGNS, TYPE I	125.000 SF	_____	_____	_____	_____
0200	652.33 DRUM	15.000 EA	_____	_____	_____	_____
0210	652.34 CONE	35.000 EA	_____	_____	_____	_____
0220	652.35 CONSTRUCTION SIGNS	250.000 SF	_____	_____	_____	_____
0230	652.361 MAINTENANCE OF TRAFFIC CONTROL DEVICES	LUMP SUM	LUMP SUM		_____	_____
0240	652.38 FLAGGER	800.000 HR	_____	_____	_____	_____

Maine Department of Transportation

Proposal Schedule of Items

Proposal ID: 028480.00

Project(s): 028480.00

SECTION: 1 INITIAL GROUP

Alt Set ID: Alt Mbr ID:

Contractor: \_\_\_\_\_

Proposal Line Number	Item ID Description	Approximate Quantity and Units	Unit Price		Bid Amount	
			Dollars	Cents	Dollars	Cents
0250	652.381 TRAFFIC OFFICER	40.000 HR	_____	 _____	_____	 _____
0260	652.41 PORTABLE CHANGEABLE MESSAGE SIGN	4.000 EA	_____	 _____	_____	 _____
0270	654.351 CONNECTED ROADSIDE UNIT (RSU)	1.000 EA	_____	 _____	_____	 _____
0280	656.75 TEMPORARY SOIL EROSION AND WATER POLLUTION CONTROL	LUMP SUM	LUMP SUM		_____	 _____
0290	659.10 MOBILIZATION	LUMP SUM	LUMP SUM		_____	 _____
<b>Section: 1</b>			<b>Total:</b>		_____	 _____
			<b>Total Bid:</b>		_____	 _____

SPECIAL PROVISION  
SECTION 718  
TRAFFIC SIGNALS MATERIAL

The provisions of Section 718 of the Standard Specifications shall apply with the following additions and modifications:

**718.13 Traffic Signal Control System** The expanded traffic signal control system shall meet the following minimum performance standards:

a. General The expanded Central Management System (CMS) shall satisfy the following basic requirements:

1. The CMS system shall be able to provide multiple signal group operation. Individual intersections within a group must be able to be reassigned to a different operational group by manual, time-of day, or traffic responsive command.
2. No additional hardware, software items and/or subscription fees/costs shall be needed/allowed to satisfy the requirements as defined in these specifications.
3. All communications between the expanded CMS and the local controller shall comply with NTCIP protocol consistent with other similar MaineDOT projects. Compatibility is required for all currently approved mandatory NTCIP standards and with the optional NTCIP consistent with the similar MaineDOT projects. To help assure this compatibility, the system manufacturer shall certify and list what level of NTCIP compliance is supported for all current mandatory and optional NTCIP objects and standards. In addition, the list shall describe all manufacturer-specific NTCIP objects and functions available. The system supplier shall also list the non-approved NTCIP objects and standards in the system and furnish a description of the company's involvement in and input to the various NTCIP standards committees, their degree of involvement, and present efforts including timetables for meeting proposed NTCIP standards under review. All communications between the local field controller to the CMS shall be Ethernet based protocols, serial or FSK communications shall not be allowed.
4. The expanded system and all system controllers shall be able to provide signal priority routing to support Snowplow CV Operations through different signal groups.
5. The expanded CMS shall be installed on the MaineDOT furnished and configured cloud-based system. The Contractor shall supply all additional software and hardware accessories to provide a complete and functional cloud-based CMS system.
6. The expanded cloud-based CMS shall be configured to provide remote access to the intersection as well as system users as designated by MaineDOT and or the Engineer.

7. The expanded cloud-based CMS shall be configured to require a multi-factor authentication to gain access to the system. The Contractor shall coordinate and submit for approval all proposed network security setting with MaineDOT IT and the Engineer.
8. The Contractor shall coordinate with MaineDOT IT to create a site to site VPN connection between MaineDOT internal network and the Contractor expanded cloud system for the CMS, SPM and the Connected Vehicle (CV) system. This site to site connection shall be in conjunction with MaineDOT IT and follow all network security protocols, permissions and procedures.
9. All access to the expanded cloud-based CMS shall be configured to utilize a secure VPN connection. No unsecured network access shall be allowed to access the cloud-based system. The Contractor shall reconfigure all manufacture default passwords on all supplied devices to custom, unique complex alpha numeric passwords comprised of special symbols, upper case, lower case and numbers that are a minimum of 8 characters in length. The Contractor shall generate a complete list of all proposed passwords. That list shall be submitted to MaineDOT and the Engineer for approval. No manufacture default passwords shall be allowed and no duplicate passwords shall be allowed.
10. The Contractor shall configure within the expanded cloud based CMS the ability to remotely access, configure and view all detection systems installed within the project.
11. All client and device based remote access operations to the expanded CMS shall be performed via a secure VPN tunnel using encryption methods to ensure network security. The Contractor shall create a network security connection document to be submitted to MaineDOT and the Engineer for approval.
12. The expanded CMS, SPM and the Connected Vehicle (CV) system shall communicate directly to all ATC controllers, cabinet assemblies and all in cabinet devices capable of supporting remote access; remote interface units are unacceptable. The system shall provide continuous communications, once per second at a minimum, to all controllers and connected devices supplied under the project.

## **SIGNAL PERFORMANCE MEASURES (SPM)**

The system shall be furnished within the existing MaineDOT dashboard monitoring system. No additional hardware, software items and/or subscription fees/costs shall be needed/allowed to fully comply with the requirements as defined in these specifications. Intersections must be able to remotely report to the system:

- i. Intersection Status
  1. Flash
  2. Door Status
  3. Temperature
  4. ATC Time
- ii. Current Phase in operation
- iii. Cycle Length
- iv. Adaptive or non-adaptive operation
- v. ATC alarms
- vi. CV system alarms
- vii. Detector faults
- viii. SPM reports

### SPM Reports

SPM reports shall be provided which can be used by MaineDOT for planning, operations and maintenance purposes. The reports shall be user definable as to format (hardcopy and/or electronic). The generation of reports shall be user definable and include manual and/or a time scheduled basis. These reports shall include the following:

#### Planning

1. Turning Movement Counts (TMC)
2. Approach Volumes
3. Pedestrian Delay
4. Purdue Coordination Diagrams

#### Operations

5. Arrival on Green (AOG)
6. Arrival on Red (AOR)
7. Split Monitoring
8. Preempt Service Requests
9. Approach Delay
10. Split Failure

#### Maintenance

11. Vehicle Detector Faults (Constant Call/No Call)
12. Pedestrian Detector Fault (Stuck Button)
13. Signal on Flash
14. Power Failure
15. Communications Failure
16. Manual Control Active

## CONNECTED VEHICLE (CV) SYSTEM

The work under this Item shall include furnishing and installation of a Connected Vehicle (CV) system required to interface vehicles equipped with authorized CV devices with the local controller. This work includes all software licenses, cloud-based costs, system testing, and all other equipment, materials, appurtenances and incidental costs necessary to provide a complete, fully operational Connected Vehicle (CV) system as specified herein and as shown on the plans. The Signal Phase and Timing (SPaT) Infrastructure System consists of all the hardware and software devices supplied under the project to support connected vehicle operations. The Contractor shall integrate the proposed Connected Vehicle (CV) system to be installed under this project on a Contractor created cloud-based system architecture. The Contractor shall furnish and install the means whereby MaineDOT and others shall be able to monitor and control the system remotely, as allowed by the system administrator. No additional hardware, software items and/or subscription fees/costs shall be needed/allowed to fully comply with the requirements as defined in these specifications. The CV system shall initially be programmed to support the following applications without the need for additional costs and/or subscription services:

1. Signal Phase and Timing (SPaT),
2. Traveler Information Messages (TIM),
3. Work Zone Alert,
4. Emergency Vehicle Preemption (EVP),
5. Snowplow Signal Priority,
6. Freight Signal Priority,
7. Pedestrian Warning (PedSafe),
8. Queue Warning, and
9. Curve Speed Warning,
10. User Data Pass through.

The CV system and the CMS shall operate as an integrated system allowing for the CMS to report on alarms generated by the CV system.

The CV system shall consist of a Roadside Unit (RSU) compatible with existing MaineDOT On-Board Units (OBU) procured under previous projects. In addition, the CV system shall allow for the broadcast of SPaT, BSM and Personal Information Message (PIM) to mobile devices utilizing a mobile application for IOS and Android. The mobile application shall be branded with MaineDOT information for deployment to the general public. There shall not be any fees associated with the downloading or using the CV application.

The Contractor shall be responsible for all costs and fees associated with integration and maintenance of this CV system onto the cloud-based system during the construction and fine-tuning period. Additionally, the Contractor is responsible for all costs associated to support operations, ongoing access, maintenance and any other incidental fees related to the

cloud-based system to maintain proper operation and remote system access for this CV system for a period of 120 months from the end of the fine-tuning period.

In addition to the requirements contained within the specification, the CV system shall be supplied and installed with the following functionality:

- Broadcast of SPaT, BSM, PIM messages to registered OBU and mobile device applications.
- Allow for the use of “GEO Fencing” to provide for “Pre-emption and Priority” calls to the ATC controller based on location of the OBU and mobile device application.
- Have the ability to support both DSRC and 5G communications.
- Shall receive traffic signal data from the Traffic Signal Controller that is compliant with the standard NTCIP 1202 v3.
- In locations where the SPaT Infrastructure System supports Signal Preemption, the SPaT Infrastructure System shall receive preemption status from the Traffic Signal System.
- In locations where the SPaT Infrastructure System supports signal priority applications, the system shall receive signal control and preemption/priority requests.
- Shall support Connected Vehicle enabled Pedestrian in Signalized Crosswalk Warning and/or Mobile Accessible Pedestrian Signal Systems (PED-SIG) applications.
- Shall synchronize an internal system clock with Coordinated Universal Time (UTC) and be accurate within 10 milliseconds (ms) of UTC at all times.
- Shall use a point in time – also referred to as time marks (i.e. minutes and seconds of the year) as opposed to countdowns (e.g. “for the next 12 seconds”) to define start and end times.
- The SPaT Intersection status shall include whether the intersection is operating in failure flash.
- The SPaT message shall uniquely identify the intersection for which it applies.
- The SPaT message shall support the ECO Departure application as implemented, each SPaT message shall include maneuver assist data.
- The SPaT message shall show the intersection status including whether the intersection is operated as fixed time or actuated control.
- The SPaT message shall show the intersection status including whether the intersection is currently operating in preemption or priority.
- The SPaT message shall contain Movement States. The number of Movement States shall correspond to the number of controller traffic and pedestrian phases that are currently in use at the intersection.
  - Movement State shall describe the current interval for each movement.

- Movement State shall indicate when the current interval will end for each movement.
- Movement State shall indicate when that movement is estimated to next be green if it is not currently green.
- SPaT message shall include a minimum end time defined to be the earliest time mark when the current phase will end.
- SPaT message shall contain a maximum end time defined to be the latest time mark when the current phase will end.
- SPaT message shall contain a likely end time that is the most likely end time of the current phase.
- The SPaT Infrastructure System shall make the maximum end time equal to the minimum end time when maximum end time is included in the SPaT message for fixed signal time.
- The SPaT Infrastructure System shall assemble SPaT messages that conform to the SAE J2735 standard format.
- The SPaT Infrastructure System shall include an interface for users to manage the SPaT Infrastructure System and its data.
- The SPaT Infrastructure System User Interface shall be browser-based and provide access to authorized users for all management, configuration and support functionality as described in Groups 3 and 12.
- The SPaT Infrastructure System User Interface shall be accessible via remote portable devices through the Internet.
- The SPaT Infrastructure System shall comply with the agency's security policy for remote access.
- The SPaT Infrastructure System User Interface shall include security compliant with agency policy to limit user access.
- The SPaT Infrastructure System User Interface shall only be accessible to authorized users.
- The SPaT Infrastructure System shall have a mechanism for an administrator to configure user roles such that different users are limited to different subsets of functionalities.
- The SPaT Infrastructure System User Interface shall display information to users.
- The SPaT Infrastructure System shall provide a GIS-based digital map to geographically view the System and manage data.
- The SPaT Infrastructure System User Interface shall display information to users on the operation, configuration and diagnostics of the System.
- The SPaT Infrastructure System User Interface shall provide information to users in text and graphical formats as appropriate.

- The SPaT Infrastructure System User Interface shall notify users of system alerts as defined in Group 12.
- The SPaT Infrastructure System shall manage a MAP database.
- The SPaT Infrastructure System shall include a database to store MAP data.
- The SPaT Infrastructure System shall have a mechanism to configure the MAP data to be applied to the intersection associated with the SPaT Infrastructure System.
- The SPaT Infrastructure System shall store a unique MAP message for each SPaT intersection.
- The SPaT Infrastructure System shall manage MAP dynamic features.
  - At intersections with reversible lanes, or movements restricted during selected periods (e.g. left turn not allowed during peak periods), the MAP messages shall designate these lanes as revocable.
  - In situations of reversible lanes, MAP messages shall define two lanes in the same location, one an ingress lane, and one an egress lane. Each lane shall be revocable.
  - In situations of turn restrictions (e.g. not permitting right turn on red or left turn allowed/not allowed), the MAP message shall define two lanes in the same location – one allowing the movement, the other not allowing the movement. Each lane shall be revocable.
- The SPaT Infrastructure System shall assemble the content for standard MAP messages.
  - The Intersection Geometry shall be changed if and only if the map information is updated.
  - Each MAP message shall uniquely identify the intersection for which it applies.
- The SPaT Infrastructure System shall increment the MAP message count whenever any data element in the message except the time stamp changes.
  - Each Map message shall identify each lane approaching and departing from the intersection and shall provide an intersection unique ID for the lane.
  - Each MAP message shall provide the directionality of each lane.
  - Each MAP messages shall identify all ingress and egress lanes.
  - Each ingress and egress lane shall be described by at least two node points that depict the center of the lane.
  - Each MAP message shall separately identify each possible connection between ingress and egress lanes and provide an intersection unique ID for the connection.
  - Each MAP message shall include, for each connection, the lane, maneuver and signal group associated with the connection.

- Each ingress and egress lane shall be depicted by enough nodes such that the distance between the actual curved lane center line and the straight line connecting nodes shall not be more than half of the lane width.
- When a single connection between an ingress lane and an egress lane is controlled by more than one signal group, such as a protected/permissive left turn movement, the MAP message shall separately identify each signal group that controls the movement on that connection.
- In locations where PED-SIG or Pedestrian Warning applications are deployed, MAP messages shall include crosswalk lane types.
- MAP message shall define ingress lanes from the stop bar to a minimum of 300 meters before the stop bar.
- When connecting to another intersection, each MAP message shall identify the remote intersection to be connected.
- The SPaT Infrastructure System shall assemble MAP messages that conform to the SAE J2735 standard message format.
- The SPaT Infrastructure System shall assemble the MAP messages that adhere to the SAE J2735 March 2016 standard.
- The SPaT Infrastructure System shall assemble other standardized MAP messages, as needed.
- The SPaT Infrastructure System shall obtain position correction data.
- The SPaT Infrastructure System shall either calculate or obtain GPS position correction data in the RTCM 10403 Message Type 1001 format that corrects for the current atmospheric conditions in the area surrounding the intersection.
- The SPaT Infrastructure System shall either generate or obtain the coordinates of the antenna reference point in the RTCM 10403 Message Type 1005 format.
- The SPaT Infrastructure System shall assemble standard RTCM correction messages.
- The SPaT Infrastructure System shall assemble standard RTCM correction messages for the following RTCM version 3.0 message types:
  - Message Type 1001 – GPS L1 observations
  - Message Type 1005 – Antenna Reference Point coordinates.
- The SPaT Infrastructure System shall generate new RTCM Correction messages with the most current correction data at a minimum frequency of 5 Hz.
- The SPaT Infrastructure System shall assemble RTCM correction messages that conform to the SAE J2735 standard message format.
- The SPaT Infrastructure System shall assemble position correction messages that comply with additional standards, as needed.
- The SPaT Infrastructure System shall broadcast standard 5.9 GHz DSRC messages.

- The SPaT Infrastructure System broadcast of data shall be compliant with the USDOT's RSU Specification "DSRC Roadside Unit (RSU) Specification Document v4.1."
- The SPaT Infrastructure System shall broadcast SPaT, MAP, and RTCM messages using Dedicated Short Range Communications (DSRC) on channel 172.
- The SPaT Infrastructure shall broadcast the SPaT messages with a minimum frequency of 10 Hz.
- The SPaT Infrastructure system shall broadcast MAP messages with a minimum frequency of 1 HZ.
- The SPaT Infrastructure System shall broadcast RTCM Correction messages containing the most recent RTCM 10403 Message Type 1001 data with a minimum frequency of 5 Hz.
- The SPaT Infrastructure System shall broadcast RTCM Correction messages containing the most recent RTCM 10403 Message Type 1005 data with a minimum frequency of 2 Hz.
- In locations supporting preemption/priority applications, when there are active priority requests, the SPaT Infrastructure System shall broadcast Signal Status Messages (SSM) on Channel 182 with a minimum frequency of 10 Hz.
- The SPaT Infrastructure System shall broadcast messages such that they can be received by DSRC on-board units in each lane approaching the intersection.
- The SPaT Infrastructure System shall broadcast messages such that the data incurs no loss in fidelity to a distance of at least 300 meters upstream of the stop bar for each approaching lane.
- The SPaT Infrastructure System shall sign outgoing broadcast messages with a valid security key.
- The SPaT Infrastructure System shall validate received messages based on signed certificate associated with the messages.
- In locations where BSM data is collected, the SPaT Infrastructure System shall receive and process all valid DSRC broadcasts of the Basic Safety Message (BSM) received by the DSRC radio on Channel 172 at the SPaT Infrastructure System.
- In locations support signal priority and preemption, the SPaT Infrastructure System shall receive valid DSRC Signal Request Messages (SRM) received by the DSRC radio on Channel 182 at the SPaT Infrastructure System.
- In locations where vehicle data is received, the SPaT Infrastructure System shall receive and process security credentials and digital signatures to be used to validate message received.
- In locations where probe data is being collected by the SPaT Infrastructure System, the SPaT Infrastructure System shall receive and process valid Probe Vehicle Data

(PVD) data broadcast received by the DSRC radio at the SPaT Infrastructure System.

- In locations supporting PED-SIG applications, the SPaT Infrastructure System shall receive valid Personal Safety Message (PSM) data broadcast by the Personal Information Device Systems within range of the SPaT Infrastructure System.
- The SPaT Infrastructure System shall publish data over alternate communication mediums.
- The SPaT Infrastructure System shall receive data over alternate communication mediums.
- The SPaT Infrastructure System shall monitor for signal preemption and priority requests.
- The SPaT Infrastructure System shall process Signal Request Messages (SRM) that adhere to the SAE J2735 March 2016 standard from SPaT Vehicle Systems as soon as they are received.
- The SPaT Infrastructure System shall process preemption/priority request cancellations received from SPaT Vehicle Systems.
- The SPaT Infrastructure System shall request preemption and priority.
- The SPaT Infrastructure System shall assemble Signal Status Messages in other standard formats with a maximum latency of 10 ms from the time the System receives information from the Traffic Signal System.
- The SPaT Infrastructure System shall monitor BSM, PVD, and PSM.
- The SPaT Infrastructure System shall receive BSM from vehicles.
- The SPaT Infrastructure System shall receive PVD from vehicles.
- The SPaT Infrastructure System shall receive PSM from Personal Information Devices (PIDs).
- The SPaT Infrastructure System shall convert BSM and PSM to detector calls.
- In locations where the intent is to convert BSMs to detector calls, the SPaT Infrastructure System shall have defined BSM geographic detection zones that define the geographic area assigned to each signal phase at each intersection detecting BSM.
- In locations where the intent is to convert PSMs into detector calls, the SPaT Infrastructure System shall have defined PSM geographic detection zones that define the geographic area assigned to each signal pedestrian phase at each intersection detecting PSM.
- The SPaT Infrastructure System shall convert the BSM and PSM messages received into detector calls for their corresponding detection zones.

- When the SPaT Infrastructure System receives a BSM located within the respective detection zone, the SPaT Infrastructure System shall generate detector calls for the appropriate signal phase.
- The SPaT Infrastructure System shall continue to generate detector calls whenever it receives BSM from one or more vehicles in a detection zone for BSM.
- When the SPaT Infrastructure System receives a PSM located within the respective detection zone, the SPaT Infrastructure System shall convert each PSM that is requesting a WALK signal into a pedestrian crossing detector call for the signal pedestrian phase assigned to the PSM detection zone.
- The SPaT Infrastructure System shall assemble pedestrian crossing detector calls to include the relevant crosswalk the pedestrian is requesting to access.
- When multiple PSM messages are received from more than one PID for a single WALK, the SPaT Infrastructure System shall generate no more than one detector call for a given phase within each cycle.
- The SPaT Infrastructure System shall prepare actuation reports to be sent to the Traffic Signal System in compliance with NTCIP 1202 v3, at a minimum.
- In locations where BSM and PVD data is collected, the SPaT Infrastructure System shall aggregate BSM and PVD data.
- The SPaT Infrastructure System shall exchange data with the Traffic Data System.
- In locations where the Traffic Data System utilizes data from the SPaT Infrastructure System, the SPaT Infrastructure System shall send traffic data messages to the Traffic Data System.
- The SPaT Infrastructure System shall exchange aggregated BSM data.
- The SPaT Infrastructure System shall exchange aggregated PVD data.
- The SPaT Infrastructure System shall obtain valid security credentials.
- The SPaT Infrastructure System shall comply with all security credentials, certification, and processes defined by the National Security Credentials Management System (SCMS), or another credential management system used by the SPaT Infrastructure System.
- The SPaT Infrastructure System certification shall include all of the security credentials necessary to support each application.
- The SPaT Infrastructure System shall have a mechanism for receiving updated security credential certification from the Security Back End System.
- The SPaT Infrastructure System shall store security credential certifications for use in broadcasting messages to SPaT Vehicle Systems for their validation purposes.
- The SPaT Infrastructure System shall request updated security credentials from the Security Back End System a configurable period of time in advance of when the current security credential expires.

- The SPaT Infrastructure System shall receive updates from the Security Back End System regarding revoked security credentials.
- The SPaT Infrastructure System shall store data regarding revoked security credentials.
- The SPaT Infrastructure System shall ignore data received from SPaT Vehicle Systems whose security credentials have been revoked.
- The SPaT Infrastructure System shall send data to the Security Back End System regarding invalid security credentials received from SPaT Vehicle Systems.
- The SPaT Infrastructure System shall verify the credentials it receives.
- The SPaT Infrastructure System shall have a mechanism for validating the security credentials received from SPaT Vehicle Systems.
- The SPaT Infrastructure System shall check the security credentials of messages that include security credential data received from SPaT Vehicle Systems.
- The SPaT Infrastructure System shall validate the security credentials of messages received from SPaT Vehicle Systems with valid credentials.
- The SPaT Infrastructure System shall identify as revoked the security credentials of messages received from SPaT Vehicle Systems that match a revoked security credential.
- The SPaT Infrastructure System shall ignore messages received from SPaT Vehicle Systems without a valid security credential.
- The SPaT Infrastructure System shall apply security credentials to broadcasts.
- The SPaT Infrastructure System shall broadcast valid security credentials in the form of digital certificates signed by a trusted certificate authority for those messages broadcast with security credential information.
- The SPaT Infrastructure System shall sign and validate DSRC messages using the IEEE 1609.2 security standard.
- The SPaT Infrastructure System shall manage access to the system network.
- The SPaT Infrastructure System shall comply with agency security policy to block malicious attempts, such as Distributed Denial of Service (DDOS) attacks, malware distribution, or other hacking efforts, to infiltrate the agency networks and systems.
- The SPaT Infrastructure System to provide a mechanism for users to configure data exchanges.
- The SPaT Infrastructure System shall provide a mechanism for users to configure data exchanges between the SPaT Infrastructure System and the Security Back-End System that are compliant with agency security and network policies.
- The SPaT Infrastructure System shall provide a mechanism for users to configure the Security Back-end System that are compliant with agency security and network policies.

- The SPaT Infrastructure System shall have a mechanism for managing logs of system activity.
- The SPaT Infrastructure System shall log and store records of data obtained by the System, including:
  - Traffic Signal System data.
  - GPS correction data.
  - MAP data.
  - Messages from SPaT Vehicle Systems and PIDs, including BSM, PVD, PSM and SRM.
- The SPaT Infrastructure System shall log and store the messages assembled by the System, including the content, time of generation and time of broadcast.
- The SPaT Infrastructure System shall log and store the SPaT messages assembled by the System.
- The SPaT Infrastructure System shall log and store the MAP messages assembled by the System.
- The SPaT Infrastructure System shall log and store the RCTM messages assembled by the System.
- The SPaT Infrastructure System shall log and store the SSM messages assembled by the System.
- The SPaT Infrastructure System shall log and store the location of origin for all stored data, such as the location/intersection for each message broadcast and received.
- The SPaT Infrastructure shall log and store user-initiated changes in System configuration, including the user, date and time, and configuration change.
- The SPaT Infrastructure System shall log and store system errors and alerts, such as for loss of power, loss of connection to other systems, failure to process data and messages.
- The SPaT Infrastructure System shall log and store user activity, including, at a minimum, the user and time of log in and log out for each session, and the time and location of failed login attempts.
- The SPaT Infrastructure System shall have a mechanism for selecting stored data for deletion and then deleting that data.
- The SPaT Infrastructure System shall have a mechanism for configuring multiple logs to reflect:
  - Log start and end times.
  - Data types and activities to be included in log.
  - Locations and/or devices to be included in log.

- The SPaT Infrastructure System shall provide a mechanism for users to configure the messages broadcast by the System.
- The SPaT Infrastructure System shall provide a mechanism for users to select the appropriate standardized format(s) for messages to be broadcast.
- The SPaT Infrastructure System shall have a mechanism for users to configure the data elements to include in:
  - SPaT Messages
  - MAP Messages
  - RTCM Messages
  - SSM
  - PSM
- The SPaT Infrastructure System shall have a mechanism for users to configure the frequency of broadcast for:
  - SPaT Messages
  - MAP Messages
  - RTCM Messages
  - SSM
  - PSM
- The SPaT Infrastructure System shall have a mechanism for managing MAP data.
- The SPaT Infrastructure System shall have a mechanism for the user to select the format of MAP data to be imported from the SPaT Infrastructure System's usable formats, including:
  - XML
- The SPaT Infrastructure System shall have a mechanism for the user to submit MAP data.
- The SPaT Infrastructure System shall notify the user of successful MAP data submissions.
- The SPaT Infrastructure System shall provide a mechanism for graphically displaying the location and layout of submitted MAP data.
- The SPaT Infrastructure System shall notify the user of errors in the structure of the submitted data, such as missing required data in the wrong format, or data outside the range of allowable values.
- The SPaT Infrastructure System shall have a mechanism for the user to create MAP data within the interface.
- The SPaT Infrastructure System shall include a "wizard" environment for data entry that describes the type of data expected in each field. For example, the User Interface

may inform the user of the number of digits of precision required for latitudes and longitudes.

- The SPaT Infrastructure System shall have a mechanism for graphically displaying the location and layout of entered MAP data.
- The SPaT Infrastructure System shall allow the user to name, copy, modify and delete MAP data of one or more configurations for each intersection.
- The SPaT Infrastructure System shall have a mechanism for users to configure GPS correction.
- The SPaT Infrastructure System shall have a mechanism for users to configure the source of GPS position correction data (e.g. define the source, define the polling mechanism and approach).
  - In locations where the source of position correction data is a regional or national source of data (e.g. Internet accessible data), the configuration shall include the location of the intersection to enable the acquisition of GPS correction data to obtain the correct values.
  - At locations where messages are received from SPaT Vehicle Systems and PIDS, the SPaT Infrastructure System shall have a mechanism for the user to manage the detection zones defined for receiving data from SPaT Vehicle Systems and PIDs.
- The SPaT Infrastructure System shall have a mechanism for the user to create and modify detection zones and associate the detection zones to received message types and to vehicle and pedestrian movements at each intersection.
- The SPaT Infrastructure System shall have a mechanism for the user to graphically define detection zones within a digital map environment.
- The SPaT Infrastructure System shall have a mechanism to automatically identify when a vehicle or pedestrian movement does not have an associated detection zone and notify the user.
- The SPaT Infrastructure System User Interface shall be accessible via workstations on the agency network.
- The SPaT Infrastructure System User Interface shall be browser-based and provide access to authorized users for all management, configuration and support functionality.
- The SPaT Infrastructure System User Interface shall be accessible via the cloud-based system or via secure VPN connection.
- The SPaT Infrastructure System User Interface shall be accessible via remote Microsoft/Android/IOS devices through a secure internet connection.
- The SPaT Infrastructure System User Interface shall be configured by the Contractor to be only be accessible by authorized users.

- The SPaT Infrastructure System shall comply with MaineDOT IT security policy for remote access.
- The SPaT Infrastructure System shall have a mechanism for an administrator to configure user roles such that different users are limited to different subsets of functionalities.
- The SPaT Infrastructure System shall provide a GIS-based digital map to geographically view the System and manage data
- The SPaT Infrastructure System User Interface shall display information to users on the operation, configuration and diagnostics of the System.
- The SPaT Infrastructure System User Interface shall provide information to users in text and graphical formats as appropriate.
- The SPaT Infrastructure System shall include a database to store MAP data.
- The SPaT Infrastructure System shall have a mechanism to configure the MAP data to be applied to the intersection associated with the SPaT Infrastructure System.
- The SPaT Infrastructure System shall store a unique MAP message for the intersection, that shall be stored locally within the intersection Road Side Unit (RSU) as well as the cloud based system.
- At intersections with reversible lanes, or movements restricted during selected periods (e.g. left turn not allowed during peak periods), the MAP messages shall designate these lanes as revocable.
- In situations of reversible lanes, MAP messages shall define two lanes in the same location, one an ingress lane, and one an egress lane. Each lane shall be revocable.
- In situations of turn restrictions (e.g. not permitting right turn on red or left turn allowed/not allowed), the MAP message shall define two lanes in the same location – one allowing the movement, the other not allowing the movement. Each lane shall be revocable.
- The Intersection Geometry shall be changed if and only if the map information is updated.
- Each MAP message shall uniquely identify the intersection for which it applies.
- The SPaT Infrastructure System shall increment the MAP message count whenever any data element in the message except the time stamp changes.
- Each Map message shall identify each lane approaching and departing from the intersection and shall provide an intersection unique ID for the lane.
- Each MAP message shall provide the directionality of each lane.
- Each MAP messages shall identify all ingress and egress lanes.
- Each ingress and egress lane shall be described by at least two node points that depict the center of the lane.

- Each MAP message shall separately identify each possible connection between ingress and egress lanes and provide an intersection unique ID for the connection.
- In locations where PED-SIG or Pedestrian Warning applications are deployed, MAP messages shall include crosswalk lane types.
- MAP message shall define ingress lanes from the stop bar to a minimum of 1000 feet before the stop bar.
- When connecting to another intersection, each MAP message shall identify the remote intersection to be connected.
- The SPaT Infrastructure System shall sign outgoing broadcast messages with a valid security key.
- In locations where BSM data is collected, the SPaT Infrastructure System shall receive and process all valid DSRC broadcasts of the Basic Safety Message (BSM) received by the DSRC radio on Channel 172 at the SPaT Infrastructure System
- In locations support signal priority and preemption, the SPaT Infrastructure System shall receive valid DSRC Signal Request Messages (SRM) received by the DSRC radio on Channel 182 at the SPaT Infrastructure System
- In locations where vehicle data is received, the SPaT Infrastructure System shall receive and process security credentials and digital signatures to be used to validate message received
- The SPaT Infrastructure System shall comply with all security credentials, certification, and processes defined by the National Security Credentials Management System (SCMS).

The Contractor shall configure the system to provide for the generation and broadcast of Signal Phasing and Timing (SPaT) data. This CV function shall be fully programmed in all related CV devices to enable SPaT messages to be broadcast and received by properly equipped vehicles with the appropriate CV elements. The Contractor shall coordinate with MaineDOT and the Engineer to identify per intersection parameters needed to support the SPaT CV functions. No additional hardware, software items and/or subscription fees/costs shall be needed/allowed to enable the SPaT function as described. Any hardware, software and subscription fees shall be considered incidental and included as part of the bid price.

The Contractor shall define and create geo-fence zones at maximum broadcast distance at all intersections as part of the project. The geo-fence zones shall initially be programmed by the Contractor to broadcast the per phase/per lane SPaT message data to properly equipped vehicles containing authorized CV devices.

The Contractor shall create and submit a text narrative for approval prior to installation describing how the SPaT system will operate.

### **Traveler Information Messages (TIM)**

The Contractor shall configure the system to provide for the generation and broadcast of Traveler Information Message data. This CV function shall be fully programed in all related CV devices to enable TIM messages to be broadcast and received by properly equipped vehicles with the appropriate CV elements. The Contractor shall coordinate with MaineDOT and the Engineer to identify per intersection parameters needed to support the TIM CV functions. No additional hardware, software items and/or subscription fees/costs shall be needed/allowed to enable the TIM function as described. Any hardware, software and subscription fees shall be considered incidental and included as part of the bid price.

The Contractor shall define and create geo-fence zones at maximum broadcast distance at the intersection as part of the project. The geo-fence zones shall initially be programed by the Contractor to broadcast the per phase/per lane TIM message data to properly equipped mobile CV systems, OBU and/or mobile devices.

The Contractor shall create and submit a text narrative for approval prior to installation describing how the TIM system will operate.

### **Work Zone Alert**

The Contractor shall configure the system to provide for the generation and broadcast of Work Zone Alert Message data. This CV function shall be fully programed in all related CV devices to enable Work Zone Alert messages to be broadcast and received by properly equipped vehicles with the appropriate CV elements. The Contractor shall coordinate with MaineDOT and the Engineer to identify per intersection parameters needed to support the Work Zone Alert CV functions. No additional hardware, software items and/or subscription fees/costs shall be needed/allowed to enable the Work Zone Alert function as described. Any hardware, software and subscription fees shall be considered incidental and included as part of the bid price.

The Contractor shall define and create geo-fence zones at maximum broadcast distance at the intersection as part of the project. The geo-fence zones shall initially be programed by the Contractor to broadcast the per phase/per lane Work Zone Alert message data to properly equipped vehicles containing authorized CV devices.

The Contractor shall create and submit a text narrative for approval prior to installation describing how the Work Zone Alert system will operate.

### **Emergency Vehicle Preemption (EVP)**

The Contractor shall configure the system to provide for an Emergency Vehicle Preemption (EVP) system operation (see also 718.15). This CV function shall be fully programmed in all related CV devices to enable EVP for properly equipped emergency vehicles with the appropriate CV elements to generate a preemption request. The Contractor shall coordinate with MaineDOT and the Engineer to coordinate the installation of CV devices into emergency vehicles. Any hardware, software and subscription fees shall be considered incidental and included as part of the bid price.

The Contractor shall define and create geo-fence detection zone at maximum broadcast distance at the intersection as part of the project. A preemption request message shall be generated upon entry of an emergency vehicle into a defined geo-fence detection zone. The preemption request message shall be transmitted via the OBU installed in the emergency vehicle. The preemption message shall be received by the DSRC/CV interface at each of the project intersections. The Contractor shall configure all relevant devices to accept the preemption signal request and initiate EVP operation. Emergency vehicle preemption shall override freight vehicle priority. The CMS shall log all CV actions into a system searchable database.

The Contractor shall create and submit a text narrative for approval prior to installation describing how the EVP system will operate.

### **Snowplow Signal Priority**

The Contractor shall configure the system to provide for a snowplow priority system operation. This CV function shall be fully programmed in all related CV devices to enable a snowplow vehicle, properly equipped with the appropriate CV elements to generate a priority request. The Contractor shall coordinate with MaineDOT maintenance operations to schedule a time to modify and install CV devices in MaineDOT designated snowplow vehicles. The installation of CV devices shall not have any adverse impact on the vehicle snowplow operations.

The Contractor shall define and create geo-fence detection zone at the intersection as part of the project. The geo-fence detection zone shall initially be programmed by the Contractor at a four hundred (400') foot distance from the intersection stop bar at each vehicle approach. A conditional priority request message shall be generated upon entry of a snowplow vehicle into a defined geo-fence detection zone and whenever the snowplow is in operation (i.e. snowplow blade down and/or spreader activated). The priority request message shall be transmitted via the OBU installed in the snowplow vehicle. The priority message shall be received by the DSRC/CV interface at each of the project intersections. The Contractor shall configure all relevant devices to accept the priority signal request and conditionally initiate snowplow vehicle priority operation. Emergency vehicle preemption shall override snowplow vehicle priority. Priority operation shall not cause the traffic controller to drop out of coordination. The CMS shall log all CV actions into a system searchable database.

When a priority request is received at the controller, a priority operation shall initiate. If the controller is active in the phase for the approach requesting priority operation the green display shall be extended. If the controller is active in a phase other than the one requested, that phase green time shall be reduced. The amount of time that a phase is extended or reduced shall be determined on a location by location basis. Final settings shall be provided by MaineDOT and/or the Engineer.

The Contractor shall create and submit a text narrative for approval prior to installation describing how the snowplow CV system will operate.

### **Freight Signal Priority**

The Contractor shall configure the system to provide for a freight priority system operation. This CV function shall be fully programmed in all related CV devices to enable a freight vehicle, properly equipped with the appropriate CV elements to generate a priority request. The Contractor shall coordinate with MaineDOT and freight companies identified by MaineDOT to coordinate the installation of CV devices into freight vehicles.

The Contractor shall define and create geo-fence detection zone at the intersection as part of the project. The geo-fence detection zone shall initially be programmed by the Contractor at a four hundred (400') foot distance from the intersection stop bar at each vehicle approach. A priority request message shall be generated upon entry of a freight vehicle into a defined geo-fence detection zone. The priority request message shall be transmitted via any OBU installed in the freight vehicle. The priority message shall be received by the DSRC/CV interface at each of the project intersections. The Contractor shall configure all relevant devices to accept the priority signal request and conditionally initiate freight vehicle priority operation. Emergency vehicle preemption shall override freight vehicle priority. Priority operation shall not cause the traffic controller to drop out of coordination. The CMS shall log all CV actions into a system searchable database.

When a priority request is received at the controller, a priority operation shall initiate. If the controller is active in the phase for the approach requesting priority operation the green display shall be extended. If the controller is active in a phase other than the one requested, that phase green time shall be reduced. The amount of time that a phase is extended or reduced shall be determined on a location by location basis. Final settings shall be provided by MaineDOT and/or the Engineer.

The Contractor shall create and submit a text narrative for approval prior to installation describing how the freight CV system will operate.

### **Pedestrian Warning (PedSafe)**

The Contractor shall configure the system to provide for the generation and broadcast of Pedestrian Warning Message data. This CV function shall be fully programmed in all related CV devices to enable Pedestrian Warning messages to be broadcast and received by properly equipped vehicles with the appropriate CV elements. The Contractor shall coordinate with MaineDOT and the Engineer to identify per intersection parameters needed to support the Pedestrian Warning CV functions. No additional hardware or software costs and/or subscription fees/costs shall be allowed to enable the Pedestrian Warning function as described. Any hardware, software and subscription fees shall be considered incidental and included as part of the bid price.

The Contractor shall define and create geo-fence zones at the intersection as part of the project. The geo-fence zones shall initially be programmed per location by the Contractor, as approved by MaineDOT, to broadcast the per phase Pedestrian Warning message data to properly equipped vehicles containing authorized CV devices.

The Contractor shall create and submit a text narrative for approval prior to installation describing how the Pedestrian Warning system will operate.

### **Queue Warning**

The Contractor shall configure the system to provide for the generation and broadcast of Queue Warning Message data. This CV function shall be fully programmed in all related CV devices to enable Queue Warning messages to be broadcast and received by properly equipped vehicles with the appropriate CV elements. The Contractor shall coordinate with MaineDOT and the Engineer to identify per intersection parameters needed to support the Queue Warning CV functions. No additional hardware or software costs and/or subscription fees/costs shall be allowed to enable the Queue Warning function as described. Any hardware, software and subscription fees shall be considered incidental and included as part of the bid price.

The Contractor shall define and create geo-fence zones at the intersection as part of the project. The geo-fence zones shall initially be programmed per location by the Contractor, as approved by MaineDOT, to broadcast the per phase Queue Warning message data to properly equipped vehicles containing authorized CV devices.

The Contractor shall create and submit a text narrative for approval prior to installation describing how the Queue Warning system will operate.

### **Curve Speed Warning**

The Contractor shall configure the system to provide for the generation and broadcast of Curve Speed Warning Message data. This CV function shall be fully programmed in all related CV devices to enable Curve Speed Warning messages to be broadcast and received by

properly equipped vehicles with the appropriate CV elements. The Contractor shall coordinate with MaineDOT and the Engineer to identify per intersection parameters needed to support the Curve Speed Warning CV functions. No additional hardware or software costs and/or subscription fees/costs shall be allowed to enable the Curve Speed Warning function as described. Any hardware, software and subscription fees shall be considered incidental and included as part of the bid price.

The Contractor shall define and create geo-fence zones at all intersections as part of the project. The geo-fence zones shall initially be programmed per location by the Contractor, as approved by MaineDOT, to broadcast the per phase Curve Speed Warning message data to properly equipped vehicles containing authorized CV devices.

The Contractor shall create and submit a text narrative for approval prior to installation describing how the Curve Speed Warning system will operate.

### **User Data Pass-Through**

The Contractor shall configure the system to provide for the ability to allow for User Data Pass-Through. This CV function shall be fully programmed in all related CV devices to enable User Data Pass-Through to be broadcast and received by properly equipped vehicles with the appropriate CV elements. The Contractor shall coordinate with MaineDOT and the Engineer to identify per intersection parameters needed to support the User Data Pass-Through CV functions. No additional hardware or software costs and/or subscription fees/costs shall be allowed to enable the User Data Pass-Through function as described. Any hardware, software and subscription fees shall be considered incidental and included as part of the bid price.

The Contractor shall define and create geo-fence zones at all intersections as part of the project. The geo-fence zones shall initially be programmed per location by the Contractor, as approved by MaineDOT, to broadcast the per approach User Data Pass-Through to properly equipped vehicles containing authorized CV devices.

The Contractor shall create and submit a text narrative for approval prior to installation describing how the User Data Pass-Through system will operate.

### **Technical Support**

Telephone technical support shall be provided to MaineDOT for ten (10) years by the ATC, SPM, Stop line vehicle detection system, Advanced vehicle detection system, and CV system manufactures. The cost for this telephone technical support shall be included in the bid price for the project. Telephone technical support shall be available to MaineDOT Monday through Friday, during normal business hours.

Local field technical support must be available for a period of 60 months after the “System Startup” project phase is completed.

## **Start-up and System Loading**

The system supplier shall initiate complete system operation including ATC, SPM, Stop line vehicle detection system, Advanced vehicle detection system, CV system, Hosted cloud-based systems, FMU, the communications system, and remote monitoring and control of CMS operations as shown on the plans and/or directed by MaineDOT and the Engineer. After the supplier has initiated system operation, the system shall be run for a continuous 7-day initial operational testing period. If any major functions of the system fail to operate during this testing period, as determined by MaineDOT and/or the Engineer, the supplier shall correct or repair the system and the continuous 7-day testing period shall be restarted. At the completion of a successful 7-day testing period, the supplier shall advise MaineDOT and/or the Engineer that the system is ready for the Start-up Phase. Any major system malfunctions encountered during this testing period shall be corrected by the supplier, and the test restarted. During this period, MaineDOT and/or the Engineer may make modifications to the system timing parameters, but this will not cause restarting of the testing period. At the completion of the testing period, the system will be deemed ready for final acceptance testing as described in Acceptance Testing.

## **Manuals and Documentation**

Operating manuals shall be supplied for all equipment and components of the system. Each set of operating manuals shall provide all necessary instructions for day-to-day use of the system by the end user. The manuals shall contain, as a minimum, the following information:

- Table of Contents
- System Overview (to include operation of all system features).
- Complete step-by-step instructions for performing each available function with sample screens, sample reports, and examples.
- Quick Start Guide with instructions for performing the basic and common functions.
- Updated manuals and system documentation must be provided as part of any system upgrade received by MaineDOT.

The cabinet shall additionally be provided with the following documentation:

- Operating and Maintenance manuals.
- ATC Database Printout

## System Maintenance

Under this Item the Contactor, through their Vendor, shall provide operations and maintenance services of the ATC, SPM, CV system, and all system related field elements including communications and control devices for a 3-year period. This maintenance period shall begin once the project is accepted by MaineDOT. In addition to the requirements contained elsewhere within these specifications, the Contractor shall provide the following tasks:

- Provide software upgrades for the CV/SPM systems;
  - At any time that operating software updates are released by the manufacturer, whether routine enhancement updates, releases to fix software issues, or a combination of both, it shall be possible for personnel from MaineDOT to update the software in all its devices supplied as part of this project without any assistance or supervision from any other agency, firm, or persons. The device shall log which user installed the updates and provide a rollback feature to go back to the previous version in the event the update is not compatible with other system elements.
  - At any time that operating software updates are released by the manufacturer, they shall be made available to MaineDOT immediately upon release to the distributor by the manufacturer, including the release notes of the new firmware.
  - Software updates by the manufacturer shall be made available to the MaineDOT for the operating life of the devices at no additional cost to MaineDOT, except as expressly identified in the Contract documents.
  - At any time that operating software updates are released by the manufacturer, whether routine enhancement updates, releases to fix software issues, or a combination of both, it shall be possible for personnel from MaineDOT to update the software on all of its cloud-based systems without any assistance or supervision from any other agency, firm, or persons. The system supplier shall provide phone based technical support to MaineDOT personnel installing software updates.
  - The cloud-based system software shall operate under the Windows™ operating system, current version available at the time of installation. In addition, during the support period, the system supplier shall provide updates to the CMS/CV/SPM software to allow continued operation with a new windows version when the current Windows™ version no longer receives support from Microsoft.
- After system acceptance the manufacturer and supplier shall be responsible for all system operations and maintenance for a period of three years.
- Preserve the CMS/CV/SPM system to operate as designed or mitigate issues when anomalies occur.
- Signal performance measures shall be collected and retained based on a daily time schedule by MaineDOT.
- Respond to alarms, faults and communication issues.

- Prior to system acceptance, the Contractor shall be responsible for all maintenance on the systems.
- The manufacturer and supplier shall warrant the system to be free of defects for a period of one year, except that some system elements shall have a warranty of greater than one year, as shown in these specifications.
- If a unit is found to be defective during this warranty period, it will be the responsibility of the manufacturer and/or representative to assume the cost of shipping the unit to and from the factory, supplying parts and making repairs at no cost to the agencies.
- During the warranty period, the vendor shall provide a unit of the same type to make the intersection operational per the design plans.
- Each piece of equipment shall carry its own individual warranty from the equipment manufacturer and the supplier.
- Standard maintenance practices and standards compliance shall be adhered to as set forth in the contract documents.
- In the absence of a defining standard or code, all work shall be conducted using the highest standards of care and methodology normally associated with the specific activity.

The Contractor/Vendor shall conduct monitoring of the CMS/CV/SPM system operations throughout the length of the maintenance period. In addition to monitoring the Contractor/Vendor shall implement changes to parameters associated with the CMS/CV/SPM system as approved by MaineDOT.

**Note:** The Contractor shall staff and provide resources to ensure a maximum twelve (12) hour response time to address signal operational issues identified and communicated by MaineDOT throughout the life on the maintenance period.

The Contractor shall be required to keep records of dates when parameter changes are implemented. These records shall be submitted by the Contractor/ Vendor to MaineDOT. A written copy shall be transmitted to MaineDOT by the first of each month.

The system must come with a minimum five (5) year software maintenance agreement to become effective when the proposed system has been accepted, in writing, by MaineDOT.

Software updates shall be provided free of charge for five (5) years from date of system acceptance. Software corrections or required modifications for proper system operation per these specifications shall be furnished to MaineDOT at no additional cost during the warranty period.

Hardware equipment shall be warrantied for three (3) years, effective when the proposed system has been accepted in writing by MaineDOT.

Third party hardware and software licenses and warranties shall be passed to MaineDOT.

## **License Agreement**

The suppliers of the CV/SPM shall provide an unlimited software seat license to MaineDOT. If additional systems are installed and connected, any additional software licenses required shall be at the same cost as the remote licenses furnished for the initial project. Suppliers shall attach a copy of its standard Software License Agreement (SLA). The SLA, as negotiated, shall be made a part of the final equipment ordering contract. The licensing arrangement must address access to the system by agencies other than MaineDOT. The supplier shall carry out no work that will infringe on the licensing of third party hardware and software.

## **System Integration Testing Requirements**

Upon completion of work, tests shall be conducted to ensure that the system integration has been performed properly and all requirements described and required as part of this project have been met. This includes all hardware and all software installed as part of this project. All tests shall be conducted in accordance with the approved test procedures developed by the Contractor. The Contractor shall submit test procedures and forms/checklists for review and approval to the Resident and Design Engineers. As part of the system integration testing, the Contractor will be required to verify all system and intersection dynamic graphic displays against observed field conditions. This will require that a person be in the field while another person is at central during this central to field verification of graphic displays and logging data to ensure that what the operator observes at central matches what is actually occurring in the field at each local intersection.

Verification confirms that a system meets all its specified requirements. Validation confirms that a system has achieved all of the operational needs identified in the Concept of Operations. The Contractor will be required to develop and submit a detailed system test plan. This test plan, when approved and executed, must demonstrate that the system achieves all of the operational needs identified in the Concept of Operations, all of the system requirements identified in the System Requirements document, and all of the requirements contained in the project Plans and Specifications. The successful execution of this test plan will therefore meet the requirements for system verification and validation.

The Contractor shall propose testing plans and submit the test plan(s) and procedures as detailed herein to the Resident and Design Engineers for approval prior to testing. Each of the test plans shall contain the following elements:

- Proposed date, time, and location of the testing
- Names of the Contractor personnel who will be conducting the testing
- Descriptive overview of the proposed test procedure
- List of test equipment required to perform the testing
- Test cases and test logging forms which detail every step of the test procedure:

Test logging forms shall be presented in tabular format, with separate columns for each of the following:

- Test case description detailing the test step to be performed.
- Expected result
- Actual result
- Pass/Fail
- Comments

The Contractor shall supply separate test logging forms at the time of testing for each test plan, and for each device location. The test logging forms shall show the device location, date, and the start and end times of the test.

At the end of each test logging form, there shall be signature and date locations for each of the following:

- Contractor personnel conducting the test
- MaineDOT representative witness
- Design Engineer witness

Signatures on the test logging form will signify only that the test was performed and witnessed, not that it passed or failed.

The detailed Test Plans shall be submitted to the Resident Engineer and Design Engineer no later than thirty (30) days prior to the beginning of each test phase.

The Contractor shall have approved test plans prior to submitting a request to schedule the start of any test activities. The Contractor shall notify the Resident and Design Engineers no less than fourteen (14) days prior to the beginning of any equipment or systems testing.

Testing shall provide verification and documentation that all requirements included in the Contract Documents are met. The Test Plans shall be developed by the Contractor to provide a mechanism that ensures that all contract requirements have been tested fully and verified.

If any deviations or changes to the approved Test Plans arise, it shall be resubmitted by the Contractor for review and approval by the Engineer at least fourteen (14) calendar days prior to any planned test activity stage. No tests shall be conducted until the Resident Engineer, Design Engineers have approved the test plan.

A summary of all tests shall be produced at the completion of each testing phase of the project to ensure that all requirements defined by the system are satisfied.

MaineDOT reserves the right to examine and test or retest any or all materials furnished by the Contractor for the project to determine if they meet the requirements specified within the Contract Documents.

If the MaineDOT decides that any material used in the construction of this project is defective or otherwise unsuitable, and the workmanship does not conform to the requirements of this Contract,

the Contractor shall replace such defective parts and material at no cost to the Project. The times and dates of the tests shall be approved by the Resident and Design Engineers. The Contractor shall conduct all tests in the presence of the Resident and Design Engineers. Testing shall take place only on weekdays, which are official working days, unless the Resident and Design Engineers allows the test to be conducted and/or continued on weekends and non-working days. The Contractor shall make a request in writing at least fourteen (14) days prior to the proposed testing, and schedule tests only if permission is granted by MaineDOT in writing.

The Contractor shall be responsible for the conduct and documentation of the results of these tests that will be countersigned by the Resident and Design Engineers at the end of each test. The signature of the Engineers implies only proof of presence. Test results shall be packaged and submitted to the Engineers within one week of test completion. No test phase shall begin until all prior test phases have been completed, and test results have been approved by the Engineers.

The Contractor shall utilize vendor supplied or any test specific software for testing, as needed, at no additional cost.

### **Acceptance Testing**

Upon completion of the 7-day testing period, MaineDOT and/or the Engineer shall evaluate system operations. It is expected that the complete system shall operate fully functional for a period of 30 consecutive days without malfunction. Minor malfunctions of inoperability not the fault of the Contractor, as judged by MaineDOT and/or the Engineer, are not included in the 30-day period. If the system fails to operate as intended by this specification the malfunction shall be corrected by the Contractor at its cost and a new 30- day testing period shall begin. This process shall continue until a completely operable system is demonstrated for a consecutive 30-day period.

Acceptance testing must demonstrate to MaineDOT and/or the Engineer's reasonable satisfaction that the hardware and licensed software function in accordance with the specifications, requirements, functionalities, performance criteria or other benefits stated in documentation, proposals, and/or demonstrations given to MaineDOT.

**718.15 Emergency Vehicle Preemption System** The emergency vehicle preemption systems shall be retained but provided with all apparatus needed to integrate into the Advanced Transportation Controller.

The Contractor shall be responsible for the proper reprogramming of the phase selector, orientation of the optical detectors, and all other work necessary to provide a complete and operating emergency vehicle preemption system. The Contractor may be required to field adjust the location of the optical detectors in the presence of the Engineer and the municipal Fire Department to properly detect preemption calls from approaching vehicles.

The emergency vehicle preemption installed under this project shall be functionally compatible with the traffic signal control system and allow CMS based remote access to the phase selectors via the existing FMU and/or Ethernet switch by secure VPN connection. In addition, the system shall be configured such that preemption or priority control can be initiated through the Dedicated Short-Range Communications (DSRC)/4GLTE – 5G Roadside Unit (RSU) by means of an approaching authorized vehicle with an On-Board Unit (OBU).

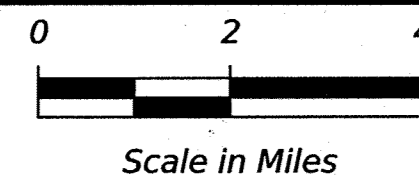
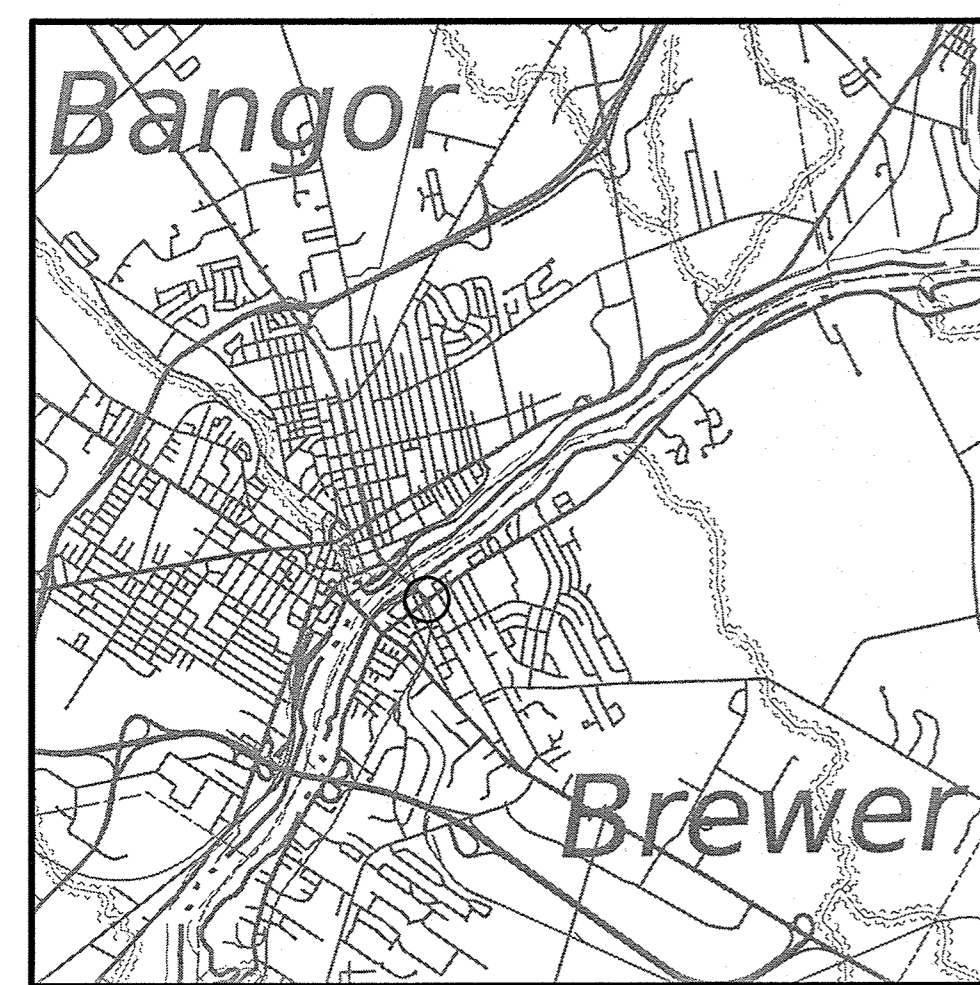
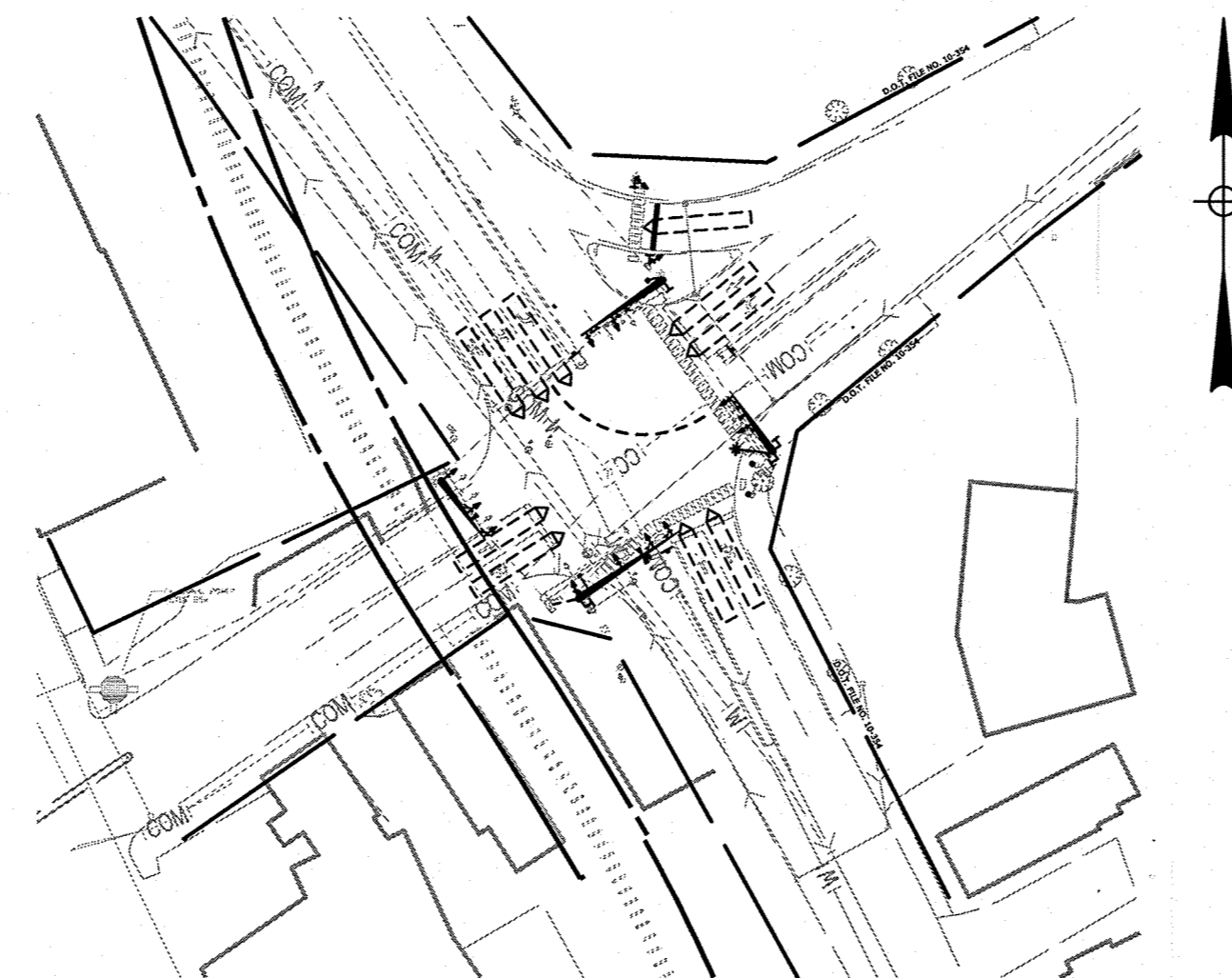
# STATE OF MAINE DEPARTMENT OF TRANSPORTATION



## BREWER PENOBSCOT COUNTY TRAFFIC SIGNAL AND FLASHING BEACON DESIGN WIN: 28480.00

Description	Sheet No.
Title Sheet .....	1
General Notes .....	2
Traffic Signal Plans .....	3-4
Foundation Design Plan .....	5

PLAN LEGEND	
Town, County, State	-----
Property Lines	-----
R/W Lines-Existing	-----
R/W Lines-Proposed	-----
Culvert-Existing	-----
Culvert Proposed	-----
Curbing	Existing Proposed
Type 1	-----
Type 3	-----
Type 5	-----
Outline of Bodies of Water	-----
Exposed Bedrock	-----
Buildings	-----
Trees	Conifer Deciduous
Tree Line	-----
Clearing Limit Line	CLL
Railroad	-----
Boring	HB-XXX-###
Pavement Core	PC-#
Test Pit	TP-XXX-###
Catch Basins	Existing Proposed
Manholes	Existing Proposed
Proposed Underdrain	-----
Proposed Ditch	-----
Existing Ditch	-----
Utility Poles	Existing Proposed
Fire Hydrants	Existing Proposed
Existing Water Line	-----
Existing San. Sewer	-----
Existing San. Sewer Manhole	-----
Guardrail-Existing	-----
Guardrail-Proposed	-----
Centerline-Existing	-----
Centerline-Proposed	-----
Travelway-Existing	-----
Travelway-Proposed	-----
Probe	P-#. #X
	#.# = Depth
	X = W (Weathered Rock)
	R (Refusal)
	NR (No Refusal)
Accessible Pedestrian Signal (APS) Button	-----
Pedestrian Signal Head w/ Pushbutton	-----
Pedestrian Signal Post w/ equipment	-----
Mast Arm Pole	-----
Receiver	-----
Signal Head (w/ Backplate)	-----
Confirmation Strobe	-----
Mast Arm Mounted Sign	-----
Controller Cabinet	-----
Meter Pedestal	-----
Video Detection Camera	-----
Dual Mode DSRC/C-V2X (Dedicated Short Range Communications)	-----
Detection Zone (& ID)	-----

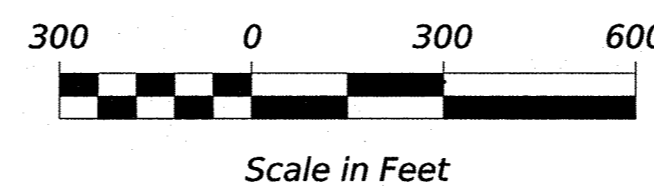


Scale in Miles  
**LOCATION MAP**

### TRAFFIC DATA

Current (2024) AADT .....	14,880
Future (2034) AADT .....	15,640
DHV - % of AADT .....	9.5%
Design Hour Volume .....	1408
% Heavy Trucks (AADT) .....	1 %
% Heavy Trucks (DHV) .....	2 %
Directional Distribution (DHV) .....	55 %
Design Speed (mph) .....	25
Corridor Priority .....	1

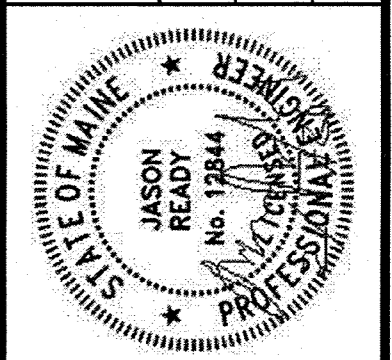
### LAYOUT SCALE



Scale in Feet

<b>PROJECT LOCATION:</b>	BREWER - STATE STREET AT NORTH MAIN STREET
<b>PROGRAM AREA:</b>	MULTIMODAL
<b>SCOPE OF WORK:</b>	TRAFFIC SIGNAL UPGRADES AND OTHER INCIDENTAL WORK

STATE OF MAINE DEPARTMENT OF TRANSPORTATION	APPROVED	DATE
COMMISSIONER: <i>[Signature]</i>	3-11-24	3-10-26
CHIEF ENGINEER: <i>[Signature]</i>		



SIGNATURE <i>[Signature]</i>	P.E. NUMBER 12844	DATE 02/17/26
---------------------------------	----------------------	------------------

PROJECT INFORMATION	
PROGRAM	Multimodal
PROJECT MANAGER	Joseph Stillwell
DESIGNER	Jason Ready
CONSULTANT	VHB
PROJECT RESIDENT	
CONTRACTOR	
COMPLETION DATE	

BREWER  
N MAIN ST  
TITLE SHEET

1  
OF 5

**GENERAL NOTES:**

1. WORK FOR THIS PROJECT WILL RESULT IN THE MODERNIZATION OF TRAFFIC CONTROL SIGNALS AND PEDESTRIAN CROSSING FACILITIES IN BREWER. EQUIPMENT INCLUDES BUT IS NOT LIMITED TO, FURNISHING AND INSTALLING NEW MAST ARMS POLES AND FOUNDATIONS, VEHICULAR AND PEDESTRIAN SIGNAL HEADS WITH COUNTDOWN TIMERS, NEW LIGHT-EMITTING DIODE INDICATIONS, RETROREFLECTIVE BACKPLATES ON VEHICLE SIGNAL HEADS, WIRING, SIGNAL CABLE, OVERHEAD MAST ARM MOUNTED SIGNS, NEW D-HARNESS FOR EMERGENCY VEHICLE PREEMPTION, AND ALL APPURTENANCES AND INCIDENTALS REQUIRED FOR COMPLETE FUNCTIONING INSTALLATIONS. IN ADDITION, THE PROJECT WILL MAINTAIN REMOTE COMMUNICATIONS TO THE TRAFFIC SIGNAL CONTROL CABINET EQUIPMENT BY EXISTING FIELD MONITORING UNIT WITH A CLOUD-BASED CENTRAL MANAGEMENT SYSTEM VIA A SECURE VIRTUAL PRIVATE NETWORK TUNNEL AND A REPLACEMENT OF SELECT EXISTING LOCAL WIRELESS RADIO INTERCONNECT EQUIPMENT. THE PROJECT ADDITIONALLY PROVIDES FOR DUAL MODE DEDICATED SHORT RANGE COMMUNICATIONS/4GLTE 5G ROAD SIDE UNITS PROVIDING SELECTED CONNECTED VEHICLE APPLICATIONS INTEGRATED INTO THE ADVANCED TRANSPORTATION CONTROLLER AND MAINEDOT TRAFFIC MANAGEMENT CENTER.
2. ALL WORK SHALL BE COMPLETED IN CONFORMANCE WITH THE LATEST REVISIONS OF THE STATE OF MAINE DEPARTMENT OF TRANSPORTATION STANDARD SPECIFICATIONS FOR HIGHWAY AND BRIDGES, MAINEDOT STANDARD DETAILS, SUPPLEMENTAL SPECIFICATIONS AND SPECIAL PROVISIONS FOR THIS CONTRACT, THE MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES, THE NATIONAL ELECTRIC CODE, AND ANY REQUIREMENTS OF THE POWER COMPANY.
3. LOCATIONS OF ANY EXISTING UNDERGROUND UTILITIES SHOWN ARE APPROXIMATE. THE CONTRACTOR IS RESPONSIBLE FOR FINDING EXACT LOCATIONS OF EXISTING UTILITIES PRIOR TO CONSTRUCTION. IN ACCORDANCE WITH MRSA TITLE 23 SECTION 3360-A, THE CONTRACTOR SHALL CONTACT DIG-SAFE AND APPROPRIATE AUTHORITIES PRIOR TO ANY SUBSURFACE ACTIVITIES.
4. THE CONTRACTOR SHALL NOTIFY UTILITY COMPANIES AT LEAST 48 HOURS BEFORE ANY OPERATIONS ARE CONDUCTED THAT COULD POTENTIALLY CONFLICT WITH AERIAL UTILITIES.
5. ANY RELOCATIONS OR ADJUSTMENTS OF EXISTING UTILITY FACILITIES WILL BE MADE BY THE RESPECTIVE UTILITIES IN COORDINATION WITH THE WORK OF THE CONTRACTOR.
6. THE CONTRACTOR WILL BE RESPONSIBLE FOR THE REMOVAL AND/OR RELOCATION OF EXISTING POWER METERS AND PEDESTALS IF REQUIRED. THIS WORK WILL BE INCIDENTAL TO ITEM 643.71.
7. THE CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING ANY NECESSARY OPENING PERMITS.
8. WHERE NOTED ON THE PLANS, ALL NEW VEHICULAR SIGNAL HEADS SHALL BE EQUIPPED WITH NEW LED LENSES 12 INCHES IN DIAMETER AND EQUIPPED WITH NEW 5-INCH LOUVERED BACK PLATES, INCLUDING 3-INCH RETROREFLECTIVITY.
9. ALL NEW SIGNAL HEADS SHALL BE FIX MOUNTED TO MAST ARMS WITH ASTROBRACKETS, MOUNTED TO MAST ARM POLES WITH BRACKET ARMS, OR MOUNTED TO EXISTING PEDESTAL POSTS.
10. PROPOSED TRAFFIC SIGNAL MOUNTING HEIGHTS SHALL BE CHECKED FOR MEETING VERTICAL CLEARANCE REQUIREMENTS IN CONFORMANCE TO MAINEDOT STANDARD SPECIFICATIONS AND DETAILS AND ADJUSTED WHERE NEEDED.
11. EXISTING LUMINAIRES ON MAST ARM POLES TO BE REPLACED SHALL BE RELOCATED TO PROPOSED MAST ARM POLES WITH PAYMENT INCIDENTAL TO ITEM 643.71.
12. TRAFFIC SIGNAL WORK SHALL BE COMPLETED IN A MANNER AND ORDER THAT WILL CAUSE THE MINIMUM DISRUPTION TO TRAFFIC.
13. ALL EXISTING DRIVEWAY ACCESSES SHALL BE MAINTAINED AT ALL TIMES.
14. ALL STOP LINES SHALL BE 24-INCHES WIDE.
15. THE CONTRACTOR SHALL PROVIDE THE RESIDENT ENGINEER AND MAINEDOT WITH A SCHEDULE OF WORK FOR CONSTRUCTING THE TRAFFIC IMPROVEMENTS AT LEAST TWO WEEKS PRIOR TO THE COMMENCEMENT OF WORK.
16. THE CONTRACTOR SHALL PERFORM THE WORK IN A MANNER THAT WILL REQUIRE THE LEAST AMOUNT OF DOWNTIME TO THE TRAFFIC SIGNAL OPERATIONS.
17. ALL NON-PAVED AREAS DISTURBED DURING CONSTRUCTION SHALL BE LOAMED AND SEEDED, UNLESS OTHERWISE DIRECTED BY THE OWNER. ALL PAVED AREAS DISTURBED DURING CONSTRUCTION SHALL BE REPAIRED BY THE CONTRACTOR. COSTS FOR REPAIR OF DISTURBED AREAS SHALL BE INCIDENTAL TO OTHER CONTRACT ITEMS.
18. TWO COPIES OF AS-BUILT PLANS, WIRING DIAGRAMS, BOX PRINTS, AND EQUIPMENT MANUALS SHALL BE LEFT IN THE CONTROLLER CABINET.

19. ALL MATERIAL SCHEDULES SHOWN ON THE PLANS ARE FOR GENERAL INFORMATION ONLY. THE CONTRACTOR SHALL PREPARE THEIR OWN MATERIAL SCHEDULES BASED UPON THEIR PLAN REVIEW. ALL SCHEDULES SHALL BE VERIFIED IN THE FIELD BY THE CONTRACTOR PRIOR TO ORDERING MATERIALS OR PERFORMING WORK.

**20. TRAFFIC SIGNAL EQUIPMENT**

THE EQUIPMENT ITEMS SHOWN ON THE PLANS SHALL BE FURNISHED AND INSTALLED BY THE CONTRACTOR. THE CONTRACTOR SHALL BE SOLELY RESPONSIBLE FOR SYSTEM START-UP AND SYSTEM LOADING, ACCEPTANCE TESTING, AND TRAINING. IN ADDITION, THE CONTRACTOR SHALL FURNISH AND INSTALL THE LIGHT-BASED EMERGENCY VEHICLE PREEMPTION SYSTEM, NOTING THAT THE SYSTEM SHALL BE CONFIGURED SUCH THAT PREEMPTION OR PRIORITY CONTROL CAN ALSO BE INITIATED THROUGH DEDICATED SHORT-RANGE COMMUNICATIONS (DSRC)/4GLTE 5G THROUGH A ROADSIDE UNIT BY WAY OF AN APPROACHING AUTHORIZED VEHICLE WITH AN ON-BOARD UNIT. THE CONTRACTOR SHALL BE SOLELY RESPONSIBLE FOR FURNISHING AND INSTALLING ALL OTHER EQUIPMENT DETAILED IN GENERAL NOTE 1 AND SHALL BE AWARE OF AND CONFORM TO ALL THE DETAILS FOR THE MATERIAL SPECIFICATIONS IN SPECIAL PROVISION 718.

**21. COMMUNICATIONS**

THE SYSTEM SHALL SUPPORT COMMUNICATIONS TO ADVANCED TRANSPORTATION CONTROLLERS, ASSOCIATED EQUIPMENT, AND VEHICLE DETECTION AS SHOWN IN THE PLANS. ALL CONNECTIONS TO THE EXISTING MAINEDOT CLOUD-BASED CENTRAL MANAGEMENT SYSTEM SHALL BE VIA A SECURE VPN NETWORK. COMMUNICATIONS FROM THE CLOUD-BASED SYSTEM TO THE ON-STREET TRAFFIC SIGNAL CONTROLLER SHALL BE MADE THROUGH THE EXISTING WIRELESS NETWORK AND THE EXISTING FIELD MONITORING UNIT.

**22. SALVAGE RIGHTS**

MAINEDOT SHALL HAVE FIRST RIGHTS TO ALL EQUIPMENT REMOVED OR REPLACED BY THE PROJECT (CONTACT BROOKE GLIDDEN AT BROOKE.GLIDDEN@MAINE.GOV). THE CITY OF BREWER SHALL HAVE SECOND SALVAGE RIGHTS TO ALL EQUIPMENT NOT CLAIMED BY MAINEDOT. THE CONTRACTOR SHALL CAREFULLY REMOVE AND STORE ALL EQUIPMENT CLAIMED BY EITHER MAINEDOT OR THE CITY FOR RETRIEVAL BY MAINEDOT OR THE CITY. THE STORAGE AREA SHALL BE SECURE AND ALL CONTROL EQUIPMENT REMOVED THAT HAS COMPUTER CHIP TECHNOLOGY SHALL BE STORED IN AN INTERIOR CLIMATE-CONTROLLED ENVIRONMENT.

ANY EQUIPMENT NOT CLAIMED BY EITHER MAINEDOT OR THE CITY OF BREWER FOR SALVAGE SHALL BE REMOVED FROM THE SITE BY THE CONTRACTOR AND DISPOSED OF IN A MANNER ACCEPTABLE TO THE RESIDENT.

23. THE RESIDENT AND MAINEDOT SHALL HAVE THE RIGHT AND AUTHORITY TO DETERMINE THE ACCEPTABILITY OF WORK AND MATERIALS IN PROGRESS OR COMPLETED AND SHALL HAVE THE RIGHT TO REJECT ANY WORK OR MATERIALS WHICH DO NOT CONFORM, IN ITS SOLE OPINION, TO THE PLANS OR SPECIFICATIONS.

24. THE MAINTENANCE OF TRAFFIC SIGNALS SHALL REMAIN THE RESPONSIBILITY OF THE CONTRACTOR UNTIL FINAL ACCEPTANCE BY MAINEDOT.

25. THE CONTRACTOR SHALL BE RESPONSIBLE FOR SUBMITTING RED-LINE AS-BUILT DRAWINGS OF THE FINAL WORK TO THE RESIDENT. THOSE DRAWINGS SHALL BE ON A CLEAN SET OF PLANS SHOWING ALL CHANGES OR MODIFICATIONS TO THE BID PLANS.

26. THE CONTRACTOR IS DIRECTED TO PROJECT SPECIAL PROVISION 718 FOR ADDITIONAL INFORMATION RELATED TO THE FOLLOWING:

-718.15 EMERGENCY VEHICLE PREEMPTION SYSTEM

SPECIAL PROVISION 718 EXPANDS UPON THE INFORMATION FOUND IN THESE GENERAL NOTES, MAINEDOT STANDARD SPECIFICATIONS DATED MARCH 2020, AND MAINEDOT STANDARD DETAILS DATED MARCH 2020. AS SUCH, THE MORE RESTRICTIVE LANGUAGE BETWEEN THESE GENERAL NOTES, MAINEDOT STANDARD SPECIFICATIONS, MAINEDOT STANDARD DETAILS, AND SPECIAL PROVISION 718 SHALL GOVERN THE WORK TO BE PERFORMED UNDER THIS PROJECT.

**27. RIGHT-OF-WAY**

RIGHT-OF-WAY WHERE NOTED IN THE PLANS IS APPROXIMATE.

STATE OF MAINE  
DEPARTMENT OF TRANSPORTATION  
PROJECT NO. 2848000  
WIN  
28480.00



PROJ. MANAGER	J. STILLWELL	BY	J. ROBERT	DATE	4/14/2026
DESIGN-DETAILED	J. READY	CHECKED-REVIEWED	C. BOBBAY		4/14/2026
CHECKED-REVIEWED	J. READY	DESIGN-DETAILED			
DESIGN-DETAILED		REVISIONS 1			
		REVISIONS 2			
		REVISIONS 3			
		REVISIONS 4			
		FIELD CHANGES			

BREWER  
N MAIN ST  
GENERAL NOTES

SHEET NUMBER  
**2**  
OF 5

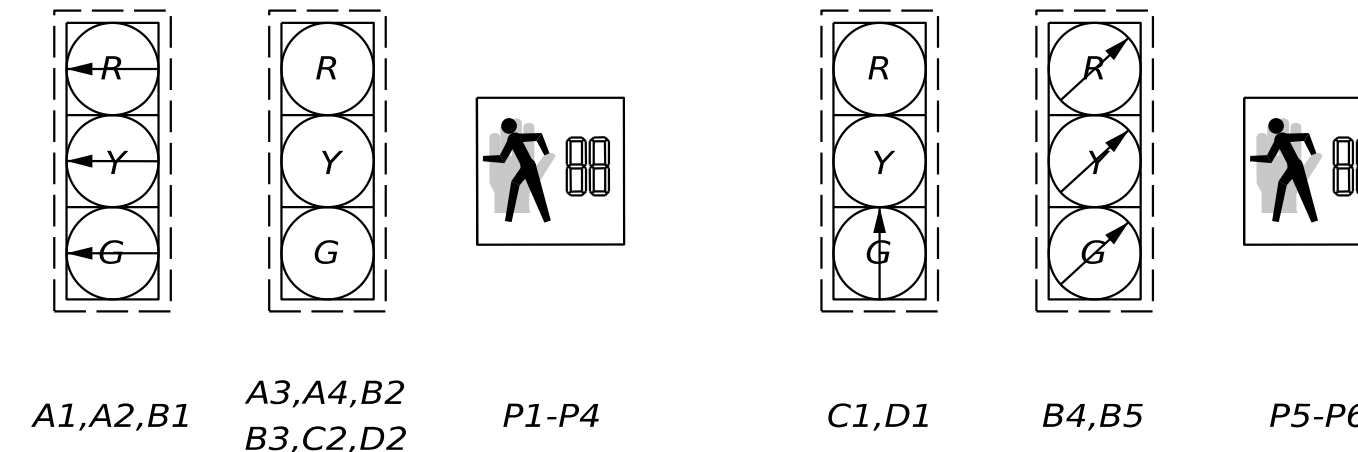
**LIST OF WORK ITEMS**

EQUIPMENT AND WORK ITEMS 643.71	QUANTITY
FURNISH AND INSTALL 4-CHANNEL PREEMPTION PHASE SELECTOR	1
FURNISH AND INSTALL LIGHT-BASED PREEMPTION RECEIVERS WITH DETECTOR CABLE	4
FURNISH AND INSTALL PREEMPTION CONFIRMATION RED STROBE WITH CABLE	1
FURNISH AND INSTALL MAST ARM MOUNTED SIGNS	12
FURNISH AND INSTALL POST MOUNTED SIGNS	8
FURNISH AND INSTALL 16-INCH L.E.D. COUNTDOWN PEDESTRIAN LENS IN NEW HOUSING	2
FURNISH AND INSTALL ADA COMPLIANT ACCESSIBLE PEDESTRIAN SIGNAL (APS) BUTTON WITH EXTENSION BRACKET AND 9"X15" R10-3e INFORMATIONAL SIGNS	2
FURNISH AND INSTALL ONE-WAY 3-SECTION, 12-INCH SIGNAL HEADS WITH LED MODULES, TUNNEL VISORS, 5-INCH LOUVERED BACK PLATE WITH 3-INCH RETROREFLECTIVITY	4
FURNISH AND INSTALL DUAL MODE DSRC/C-V2X ROADSIDE UNIT (ITEM 645.271)	1
IMPLEMENT LOCAL SIGNAL TIMINGS	-

THE LISTED QUANTITIES ARE APPROXIMATE AND ARE FURNISHED FOR INFORMATION ONLY.

**EXISTING INDICATIONS**

**PROPOSED INDICATIONS**



NOTE: ALL INDICATIONS SHALL BE 12" LIGHT EMITTING DIODES (LED'S) WITH 5" LOUVERED RETROREFLECTIVE BACKPLATES

**DETECTOR SCHEDULE**

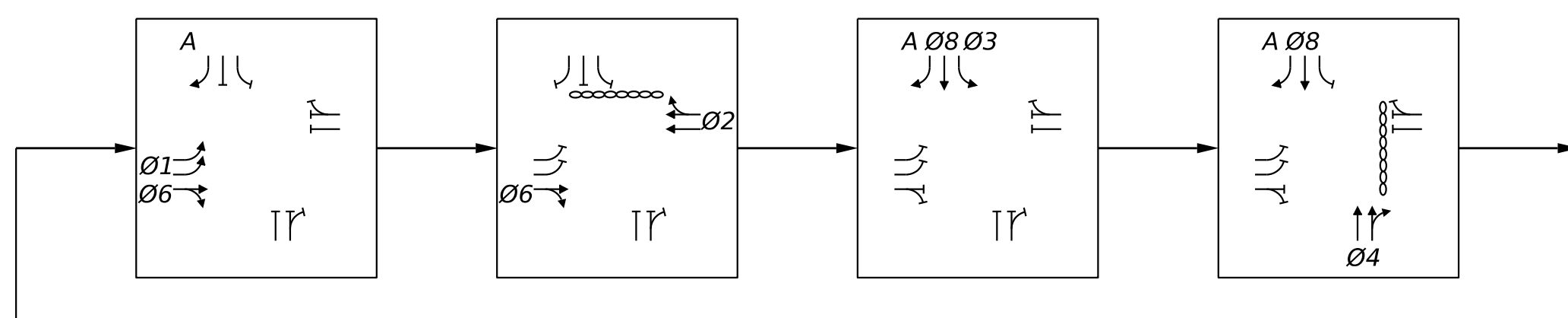
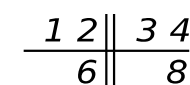
DETECTOR ZONE NO.	LOCATION	Ø CALLED	Ø EXT.	MODE A=ADVANCE B=STOPLINE	DELAY TIME	EXT. TIME
1	STATE ST NB THRU	2	2	B	-	-
2	STATE ST NB THRU-RIGHT	2	2	B	-	-
3	STATE ST SB LEFT	1	1	B	-	-
4	STATE ST SB LEFT	1	1	B	-	-
5	STATE ST SB THRU-RIGHT	6	6	B	-	-
6	N MAIN ST EB THRU	4	4	B	-	-
7	N MAIN ST EB THRU-RIGHT	4	4	B	-	-
8	N MAIN ST WB LEFT	3	3	B	-	-
9	N MAIN ST WB THRU	8	8	B	-	-
10	N MAIN ST WB RIGHT	8	8	B	5	-

**STRUCTURE LIST**

STRUCTURE	DESCRIPTION	FOUNDATION
(A-M1)	50' MAST ARM	3.5' DIA. x 17'
(B-M1)	30' MAST ARM	3.0' DIA. x 13'
(C-M1)	40' MAST ARM	3.0' DIA. x 13'
(D-M1)	30' MAST ARM W/ LUMINAIRE	3.0' DIA. x 8.5'

**PROPOSED PHASE SEQUENCE**

NEMA RING AND BARRIER DIAGRAM



PHASING NOTES:  
1. PEDESTRIAN PHASE UPON PUSH BUTTON ACTIVATION ONLY  
2. OLA = 1+8

REMOVE AND SALVAGE EXISTING MAST ARM POLE AND C1 SIGNAL HEAD. REMOVE EXISTING MAST ARM FOUNDATION. INSTALL NEW MAST ARM AND FOUNDATION. RELOCATE EXISTING C2 AND P1 TO NEW MAST ARM.

REMOVE AND SALVAGE EXISTING MAST ARM POLE AND D1 SIGNAL HEAD. REMOVE EXISTING MAST ARM FOUNDATION. INSTALL NEW MAST ARM AND FOUNDATION. RELOCATE EXISTING D2, P2 AND P3 TO NEW MAST ARM.

REMOVE AND SALVAGE EXISTING PED BUTTONS AND SOLAR PANELS. INSTALL NEW SIGNAL HEADS AND ADA COMPLIANT PED BUTTONS

REMOVE AND RESET EXISTING DETECTION EQUIPMENT

REMOVE AND SALVAGE EXISTING MAST ARM POLE. REMOVE EXISTING MAST ARM FOUNDATION. INSTALL NEW MAST ARM AND FOUNDATION. REMOVE EXISTING SIGNAL CABINET. RELOCATE EXISTING B1, B2 AND B3 TO NEW MAST ARM.

REMOVE AND SALVAGE EXISTING MAST ARM POLE. REMOVE EXISTING MAST ARM FOUNDATION. INSTALL NEW MAST ARM AND FOUNDATION. INSTALL NEW ROADSIDE UNIT (RSU). RELOCATE EXISTING A1, A2 A3, A4 AND P4 TO NEW MAST ARM. FOUNDATION TO BE VACUUM EXTRACTED.

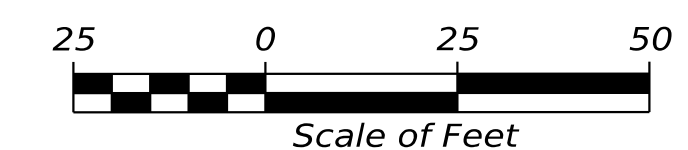
RETAIN EXISTING ATCC ADDING PROPOSED EMERGENCY VEHICLE PREEMPTION CARD TO EXISTING DETECTOR RACK

**SIGNAL TIMING SCHEDULE**

ITEM / PHASE	Ø 1	Ø 2	Ø 3	Ø 4	Ø 5	Ø 6	Ø 7	Ø 8
MOVEMENT	SB L	NB T	WB L	EB T	-	SB T	-	WB T
MINIMUM INITIAL	5	5	5	5	-	5	-	5
PASSAGE TIME	3.0	3.0	3.0	3.0	-	3.0	-	3.0
MAXIMUM 1	5	22	5	23	-	34	-	39
MAXIMUM 2	14	22	5	23	-	44	-	39
YELLOW	3.0	3.5	3.0	4.5	-	3.5	-	4.5
ALL RED	3.5	3.5	3.0	2.0	-	3.5	-	2.0
PED WALK	-	7	-	7	-	-	-	-
PED CLEAR	-	20	-	21	-	-	-	-
DYN MAX LIMIT	-	-	-	-	-	-	-	-
DYN MAX STEP	-	-	-	-	-	-	-	-
RECALL	0	S	0	0	-	S	-	0
DETECTOR	-	-	-	-	-	-	-	-
PRE-EMPT PRIORITY	-	-	-	-	-	-	-	-
FLASH	-	-	-	-	-	-	-	-
DUAL ENTRY	-	-	-	-	-	-	-	-

NOTES: S = SOFT RECALL Y = YELLOW  
O = RECALL OFF R = RED  
MAX 2 UNDER COORDINATION  
IF APPLICABLE, COORDINATION PATTERNS AND TIME-OF-DAY PLANS SHALL BE PROVIDED AFTER CONTRACT AWARD.

PLAN



PROJ. MANAGER	J. STILLWELL	DATE	4/14/2026
DESIGN-DETAILED	J. READY	BY	J. ROBERT
CHECKED-REVIEWED	J. READY	DATE	4/14/2026
DESIGN-DETAILED	C. BOBBY	DATE	4/14/2026
DESIGN-DETAILED	UPDATED/CONDUIT	DATE	04/14/2026
REVISIONS 1			
REVISIONS 2			
REVISIONS 3			
REVISIONS 4			
FIELD CHANGES			

BREWER  
N MAIN ST  
TRAFFIC SIGNAL PLAN

**LIST OF WORK ITEMS**

EQUIPMENT AND WORK ITEMS XXX.YYZ	QUANTITY
FURNISH AND INSTALL PRECAST CONCRETE JUNCTION BOX (ITEM 626.11)	2 EA
FURNISH AND INSTALL NON-METALLIC (3-INCH) CONDUIT (ITEM 626.22)	110 LF
FURNISH AND INSTALL NON-METALLIC (3-INCH) UNDER PAVEMENT CONDUIT (SCHEDULE 80 OR GREATER RATING) (ITEM 626.221)	30 LF
REMOVE EXISTING CONCRETE FOUNDATION (ITEM 626.36)	4 EA
FURNISH AND INSTALL 36-INCH DIAMETER FOUNDATION (ITEM 626.44)	34.5 LF
FURNISH AND INSTALL 42-INCH DIAMETER FOUNDATION (ITEM 626.451)	17.0 LF
FURNISH AND INSTALL 4" WHITE OR YELLOW PAVEMENT MARKING LINE (ITEM 627.73)	90 LF
FURNISH AND INSTALL WHITE PAVEMENT AND CURB MARKING (ITEM 627.75)	38 LF
FURNISH AND INSTALL TRAFFIC SIGNAL BLANK-OUT SIGN (ITEM 643.88)	3 EA
FURNISH AND INSTALL 30' MAST ARM POLE (ITEM 643.91)	1 EA
FURNISH AND INSTALL 40' MAST ARM POLE (ITEM 643.91)	1 EA
FURNISH AND INSTALL 50' MAST ARM POLE (ITEM 643.91)	1 EA
FURNISH AND INSTALL DUAL PURPOSE POLE, W/30' ARM W/LUMINAIRE (ITEM 643.94)	1 EA

THE LISTED QUANTITIES ARE APPROXIMATE AND ARE FURNISHED FOR INFORMATION ONLY.

REMOVE AND SALVAGE EXISTING W11-2 AND W16-7P

INSTALL 24" STOP BAR

REMOVE AND SALVAGE EXISTING R4-7 AND OM1-1 SIGN

REMOVE AND SALVAGE EXISTING R1-2

**PROPOSED SIGNS**

R3-5L 30"x36" 3-PROPOSED	R3-5A 30"x36" 3-PROPOSED	R3-6R 30"x36" 3-PROPOSED	R10-11(BLANK OUT)* 1-PROPOSED	R10-11a/R10-15R (DUAL MESSAGE BLANK OUT)** 2-PROPOSED
R3-2 24"x24" 4-PROPOSED	R10-11a 24"x30" 1-PROPOSED	OM1-1 18"x18" 3-PROPOSED	R4-7 24"x30" 3-PROPOSED	R10-3eL 9"x15" 1-PROPOSED

\* BLANK OUT SIGN SHALL OPERATE SUCH THAT ACTUATIONS TURN THE SIGN TO MUTCD R10-11a DURING WALK INDICATION AND THE ABSENCE OF ACTUATION SHALL CAUSE THE SIGN TO REMAIN UNLIT

\*\* DUAL MESSAGE BLANK OUT SIGN SHALL OPERATE SUCH THAT ACTUATIONS TURN THE SIGN TO MUTCD R10-11a DURING WALK INDICATION AND COUNTDOWN AND THE ABSENCE OF ACTUATION SHALL TURN THE SIGN TO MUTCD R10-15R

**EXISTING SIGNS**

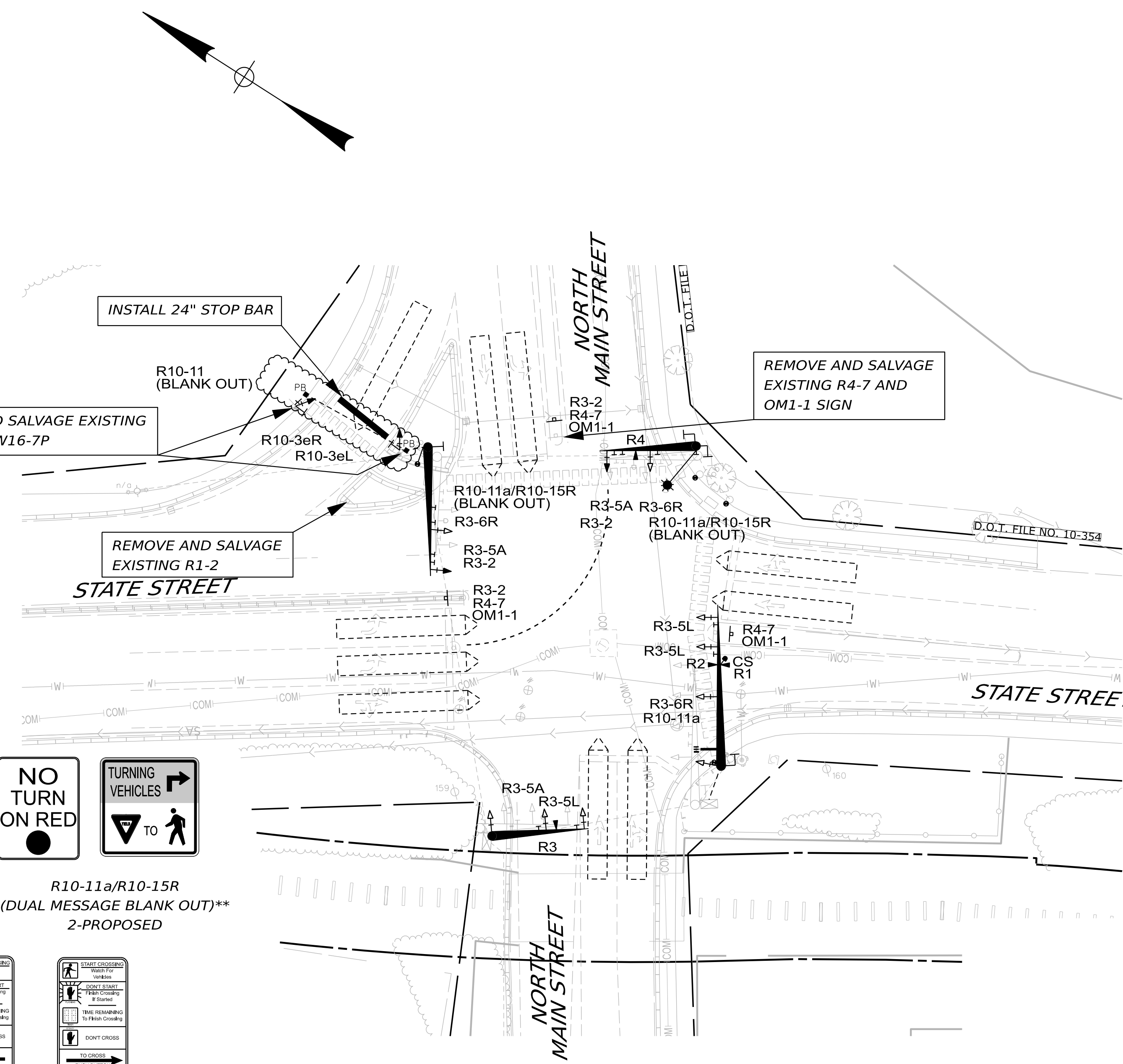
R3-5L 2-REMOVED	R3-5A 3-REMOVED	R3-6R 3-REMOVED	R10-15R 2-REMOVED	R4-7 1-REMOVED	W11-2 2-REMOVED	W16-7p 2-REMOVED	R10-11b 2-REMOVED	R3-2 2-REMOVED	R10-3eL 2-RETAINED	R10-3eR 2-RETAINED	OM1-1 1-REMOVED	R1-2 1-REMOVED

**EMERGENCY VEHICLE PREEMPTION OPERATION**

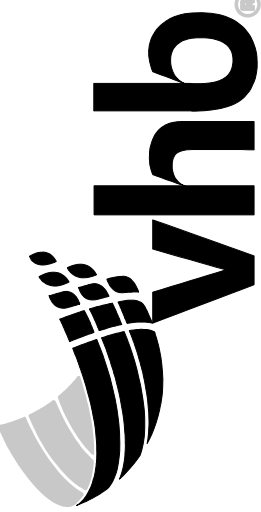
ID	PREEMPT ASSIGNMENT	RECEIVER PRIORITY	ACTIVE PHASE
	1	NOT USE/RESERVED	
	2	NOT USE/RESERVED	
R1	3	7	Ø2(NB)
R2	4	8	Ø1&Ø6(SB)
R3	5	9	Ø3&Ø8(WB)
R4	6	10	Ø4(EB)

**PRE-EMPTION NOTES:**

- EMERGENCY VEHICLE PRE-EMPTION SIGNALS SHALL BE TRANSMITTED BY OPTICAL EMITTERS (TYPICALLY EXISTING, BUT WHERE APPLICABLE PROVIDED BY OTHERS) AND/OR BY A DUAL MODE DSRC/C-V2X ON-BOARD UNIT (OBU) MOUNTED IN EMERGENCY VEHICLES COMMUNICATING WITH THE PROPOSED DUAL MODE DSRC/C-V2X ROAD SIDE UNIT (RSU) AND/OR RECEIVED BY OPTICAL DETECTORS LOCATED AT THE INTERSECTION.
- PRE-EMPTION SIGNALS SHALL BE SERVICED ON A PRIORITY BASIS WITH RECEIVERS ASSIGNED DESCENDING PRIORITIES (1 = HIGHEST, 4 = LOWEST)
- IN RESPONSE TO A PRE-EMPTION SIGNAL RECEIVED AT AN INTERSECTION BY AN OPTICAL DETECTOR AND/OR RSU, THE CONTROLLER SHALL HOLD OR ADVANCE TO AND HOLD THE EMERGENCY ACTIVE PHASE GREEN FOR A MINIMUM OF 10 SECONDS OR UNTIL THE PRE-EMPTION SIGNAL CEASES. THE CONTROLLER SHALL THEN TIME PRE-EMPTION PHASE CLEARANCE (3.5 SECONDS YELLOW AND 3.5 SECONDS ALL RED) AND SERVICE SUBSEQUENT EMERGENCY ACTIVE PHASES AS NECESSARY. AT THE COMPLETION OF THE PRE-EMPTION CYCLE, THE CONTROLLER SHALL TIME THE PRE-EMPTION CLEARANCE AND RESUME NORMAL SIGNAL OPERATION.
- MINIMUM GREEN AND NORMAL VEHICLE CLEARANCE SHALL BE PROVIDED ON PHASES THAT ARE TO BE TERMINATED BY PRE-EMPTION DEMAND.
- CONFIRMATION STROBES SHALL BE ILLUMINATED WHENEVER ANY PREEMPTION GREEN IS ON.



PLAN



PROJ. MANAGER	J. STILLWELL	DATE	4/14/2026
DESIGN-DETAILED	J. ROBERT	BY	J. ROBERT
CHECKED-REVIEWED	J. READY	DATE	4/14/2026
DESIGN-DETAILED	J. READY	DATE	4/14/2026
DESIGN-DETAILED	J. READY	DATE	4/14/2026
REVISIONS 1	UPDATED/CONDUIT	DATE	04/14/2026
REVISIONS 2		DATE	
REVISIONS 3		DATE	
REVISIONS 4		DATE	
FIELD CHANGES		DATE	

**BREWER  
N MAIN ST  
TRAFFIC SIGNAL PLAN**

SHEET NUMBER

4

OF 5

