

Updated 05/15/2020

FEDERAL PROJECT

BIDDING INSTRUCTIONS

FOR ALL PROJECTS:

1. Use pen and ink to complete all paper Bids.
2. As a minimum, the following must be received prior to the time of Bid opening:

For a Paper Bid:

- a) a copy of the Notice to Contractors, b) the completed Acknowledgement of Bid Amendments form, c) the completed Schedule of Items, d) two copies of the completed and signed Contract Offer, Agreement & Award form, e) a Bid Guaranty, (if required), and f) any other certifications or Bid requirements listed in the Bid Documents as due by Bid opening.

For an Electronic Bid:

NOTE: Not all projects accept Electronic Bids. Please review the Notice to Contractors and see if it specifically states that Electronic Bids will be accepted.

- a) a completed Bid using Expedite® software and submitted via the Bid Express™ web-based service, b) an electronic Bid Guaranty (if required) or a faxed copy of a Bid Bond (with original to be delivered within 72 hours), and c) any other Certifications or Bid requirements listed in the Bid Documents as due by Bid opening.
3. Include prices for all items in the Schedule of Items (excluding non-selected alternates).
4. Bid Guaranty acceptable forms are:
 - a) a properly completed and signed Bid Bond on the Department's prescribed form (or on a form that does not contain any significant variations from the Department's form as determined by the Department) for 5% of the Bid Amount or
 - b) an Official Bank Check, Cashier's Check, Certified Check, U.S. Postal Money Order or Negotiable Certificate of Deposit in the amount stated in the Notice to Contractors or
 - c) an electronic bid bond submitted with an electronic bid.
5. If a paper Bid is to be sent, "FedEx First Overnight" delivery is suggested as the package is delivered directly to the DOT Headquarters Building located at 16 Child Street in Augusta. Other means, such as U.S. Postal Service's Express Mail has proven not to be reliable.

IN ADDITION, FOR FEDERAL AID PROJECTS:

6. Complete the DBE Proposed Utilization form, and submit with your bid. If you are submitting your bid electronically, you must FAX the form to (207) 624-3431. This is a curable defect.

*If you need further information regarding Bid preparation, call the DOT
Contracts Section at (207) 624-3410.*

*For complete bidding requirements, refer to Section 102 of the Maine Department
of Transportation, Standard Specifications, March 2020 Edition.*

NOTICE

The Maine Department of Transportation is attempting to improve the way Bid Amendments/Addendums are handled and allow for an electronic downloading of bid packages from our website, while continuing to maintain an optional plan holders list.

Prospective bidders, subcontractors or suppliers who wish to download a copy of the bid package and receive a courtesy notification of project specific bid amendments must fill out the on-line plan holder registration form and provide an email address to the MDOT Contracts mailbox at: MDOT.contracts@maine.gov. Each bid package will require a separate request.

Additionally, interested parties will be responsible for reviewing and retrieving the Bid Amendments from our web site, and acknowledging receipt and incorporating those Bid Amendments in their bids using the Acknowledgement of Bid Amendment Form.

The downloading of bid packages from the MDOT website is not the same as providing an electronic bid to the Department. Electronic bids must be submitted via <http://www.BIDX.com>. For information on electronic bidding contact Rebecca Snowden at rebecca.snowden@maine.gov or Diane Barnes at diane.barnes@maine.gov.

NOTICE

For security and other reasons, all Bid Packages which are mailed, shall be provided in double (one envelope inside the other) envelopes. The *Inner Envelope* shall have the following information provided on it:

Bid Enclosed - Do Not Open

PIN:

Town:

Date of Bid Opening:

Name of Contractor with mailing address and telephone number:

In Addition to the usual address information, the *Outer Envelope* should have written or typed on it:

Double Envelope: Bid Enclosed

PIN:

Town:

Date of Bid Opening:

Name of Contractor:

This should not be much of a change for those of you who use Federal Express or similar services.

Hand-carried Bids may be in one envelope as before, and should be marked with the following information:

Bid Enclosed: Do Not Open

PIN:

Town:

Name of Contractor:

October 16, 2001

STATE OF MAINE DEPARTMENT OF TRANSPORTATION
Bid Guaranty-Bid Bond Form

KNOW ALL MEN BY THESE PRESENTS THAT _____

_____, of the City/Town of _____ and State of _____

as Principal, and _____ as Surety, a

Corporation duly organized under the laws of the State of _____ and having a usual place of

Business in _____ and hereby held and firmly bound unto the Treasurer of

the State of Maine in the sum of _____ for payment which Principal and Surety bind

themselves, their heirs, executors, administrators, successors and assigns, jointly and severally.

The condition of this obligation is that the Principal has submitted to the Maine Department of

Transportation, hereafter Department, a certain bid, attached hereto and incorporated as a

part herein, to enter into a written contract for the construction of _____

_____ and if the Department shall accept said bid

and the Principal shall execute and deliver a contract in the form attached hereto (properly

completed in accordance with said bid) and shall furnish bonds for this faithful performance of

said contract, and for the payment of all persons performing labor or furnishing material in

connection therewith, and shall in all other respects perform the agreement created by the

acceptance of said bid, then this obligation shall be null and void; otherwise it shall remain in full

force, and effect.

Signed and sealed this _____ day of _____ 20_____

WITNESS:

WITNESS

PRINCIPAL:

By _____

By: _____

By: _____

SURETY:

By _____

By: _____

Name of Local Agency: _____

NOTICE

Bidders:

Please use the attached “Request for Information” form when submitting questions concerning specific Contracts that have been advertised for Bid, include additional numbered pages as required. RFI’s may be faxed to 207-624-3431, submitted electronically through the Departments web page of advertised projects by selecting the RFI tab on the project details page or via e-mail to RFI-Contracts.MDOT@maine.gov.

These are the only allowable mechanisms for answering Project specific questions. Maine DOT will not be bound to any answers to Project specific questions received during the Bidding phase through other processes.

When submitting RFIs by Email please follow the same guidelines as stated on the “Request for Information” form and include the word “RFI” along with the Project name and Identification number in the subject line.

NOTICE

Disadvantaged Business Enterprise Proposed Utilization

The Apparent Low Bidder shall submit the Disadvantaged Business Enterprise Proposed Utilization form with their bid. This is a curable bid defect.

The Contractor's Disadvantaged Business Enterprise Proposed Utilization Plan form contains additional information that is required by USDOT.

The Contractor's Disadvantaged Business Enterprise Proposed Utilization Plan form should be used.

A copy of the new Contractor's Disadvantaged Business Enterprise Proposed Utilization Plan and instructions for completing it are attached.

Note: Questions about DBE firms, or to obtain a printed copy of the DBE Directory, contact The Office of Civil Rights at (207) 624-3066.

MDOT's DBE Directory of Certified firms can also be obtained at <https://www.maine.gov/mdot/civilrights/dbe/>

INSTRUCTIONS FOR PREPARING THE MaineDOT CONTRACTOR'S DBE/SUBCONTRACTOR UTILIZATION FORM

The Contractor Shall Extend equal opportunity to MaineDOT certified DBE firms (as listed in MaineDOT's DBE Directory of Certified Businesses) in the selection and utilization of Subcontractors and Suppliers.

SPECIFIC INSTRUCTIONS FOR COMPLETING THE FORM:

Insert Contractor name, the name of the person(s) preparing the form, and that person(s) telephone, fax number and e-mail address.

Calculate and provide percentage of your bid that will be allocated to DBE firms, Federal Project Identification Number, and location of the Project work.

In the columns, name each subcontractor, DBE and non-DBE firm to be used, provide the Unit/Item cost of the work/product to be provided by the subcontractor, give a brief description and the dollar value of the work.

Revised 1/12

DBE GOAL NOTICE FFY 2019-2021
Maine Department of Transportation
Disadvantaged Business Enterprise Program

Notice is hereby given that in accordance with US DOT regulation 49 CFR Part 26, the Maine Department of Transportation (MaineDOT) has established a Disadvantaged Business Enterprise Program (DBE) for disadvantaged business participation in the federal-aid highway and bridge construction programs; MaineDOT contracts covered by the program include consulting, construction, supplies, manufacturing, and service contracts.

For FFY 2019-21 (October 1, 2018 through September 30, 2021) MaineDOT has established an annual DBE participation goal of **2.4%** to be achieved through race/gender neutral means. This goal has been approved by the Federal Highway Administration and remains in effect through September 30, 2021. Maine DOT must meet this goal each federal fiscal year. If the goal is not met, MaineDOT must provide a justification for not meeting the goal and provide a plan to ensure the goal is met, which may include placing contract goals on certain projects that contractors will be required to meet.

MaineDOT asks all contractors, consultants and subcontractors to seek certified DBE firms for projects and to work to meet the determined 2.4% goal without the need to impose contract goals. DBE firms are listed on the MaineDOT website at:

<https://www.maine.gov/mdot/civilrights/docs/dbe/WeeklyDBEVendorList.pdf>

Interested parties may view MaineDOT's DBE goal setting methodology, also posted on this website. If you have questions regarding this goal or the DBE program you may contact Sherry Tompkins at the Maine Department of Transportation, Civil Rights Office by telephone at (207) 624-3066 or by e-mail at: sherry.tompkins@maine.gov

**MaineDOT CONTRACTOR'S DBE/SUBCONTRACTOR
PROPOSED UTILIZATION FORM**

All Bidders must furnish this form with their bid on Bid Opening day

Contractor: _____ Telephone: _____ Ext _____

Contact Person: _____ Fax: _____

E-mail: _____

BID DATE: _____

FEDERAL PROJECT PIN # _____ PROJECT LOCATION: _____

TOTAL ANTICIPATED DBE _____% PARTICIPATION FOR THIS CONTRACT

W B E	D B E	Non DBE	Firm Name	Item Number & Description of Work	Quantity	Cost Per Unit/Item	Anticipated \$ Value
Subcontractor Total >							
DBE Total >							

**NOTE: THIS INFORMATION IS USED TO TRACK AND REPORT ANTICIPATED DBE PARTICIPATION IN ALL
FEDERALLY FUNDED MAINE DOT CONTRACTS. THE ANTICIPATED DBE AMOUNT IS VOLUNTARY AND WILL
NOT BECOME A PART OF THE CONTRACTUAL TERMS.**

Equal Opportunity Use:

Form received: ___/___/___ Verified by: _____

FHWA FTA FAA

**For a complete list of certified firms and company designation (WBE/DBE) go to
<http://www.maine.gov/mdot/civilrights/>**

Maine Department of Transportation Civil Rights Office

Directory of Certified Disadvantaged Business Enterprises

Listing can be found at:

<https://www.maine.gov/mdot/civilrights/dbe/>

For additional information and guidance contact:

Civil Rights Office at (207) 624-3066

It is the responsibility of the Contractor to access the DBE Directory at this site in order to have the most current listing.

Vendor Registration

Prospective Bidders must register as a vendor with the Department of Administrative & Financial Services if the vendor is awarded a contract. Vendors will not be able to receive payment without first being registered. Vendors/Contractors will find information and register through the following link –

<http://www.maine.gov/purchases/venbid/index.shtml>

**STATE OF MAINE DEPARTMENT OF TRANSPORTATION
NOTICE TO CONTRACTORS**

Sealed Bids addressed to the Maine Department of Transportation, Augusta, Maine 04333 and endorsed on the wrapper "Bids for **Statewide Traffic Signal Updates** various locations" will be received from contractors at the Reception Desk, MaineDOT Building, Capitol Street, Augusta, Maine, until 11:00 o'clock A.M. (prevailing time) on January 13, 2021 and at that time and place, publicly opened and read. Bids will be accepted from all bidders. The lowest responsive bidder must have completed, or successfully complete, a **(Traffic Signals/ Lighting prequalification)**, to be considered for the award of this contract. **We now accept electronic bids for bid packages posted on the bidx.com website. Electronic bids do not have to be accompanied by paper bids. Please note: The Department will accept a facsimile of the bid bond; however, the original bid bond must then be received at the MDOT Contract Section within 72 hours of the bid opening.** Until further notice, dual bids (one paper, one electronic) will be accepted, with the paper copy taking precedence.

Description: Maine Federal Aid Project No. 2430100 WIN. 024301.00

Location: In Franklin, Kennebec, Somerset, Waldo, and York Counties, project is located at various locations as described in the bid documents.

Outline of Work: Statewide Traffic Signal Updates and other incidental work.

For general information regarding Bidding and Contracting procedures, contact George Macdougall at (207) 624-3410. Our webpage at <http://www.maine.gov/mdot/contractors/> contains a copy of the Schedule of Items, Plan Holders List, written portions of bid amendments, drawings, bid results and an electronic form for RFI submittal. For Project-specific information fax all questions to **Project Manager** Brian Keezer at (207) 624-3431, use electronic RFI form or email questions to RFI-Contracts.MDOT@maine.gov, project name and identification number should be in the subject line. Questions received after 12:00 noon of Monday (or if that Monday is a state holiday, Friday) prior to bid date will not be answered. Bidders shall not contact any other Departmental staff for clarification of Contract provisions, and the Department will not be responsible for any interpretations so obtained. TTY users call Maine Relay 711.

Plans, specifications and bid forms may be seen at the MaineDOT Building in Augusta, Maine, and at the Department of Transportation's Regional Office in Wilton and Scarborough. They may be purchased from the Department between the hours of 8:00 a.m. to 4:30 p.m. by cash, credit card (Visa/Mastercard) or check payable to Treasurer, State of Maine sent to Maine Department of Transportation, Attn.: Mailroom, 16 State House Station, Augusta, Maine 04333-0016. They also may be purchased by telephone at (207) 624-3536 between the hours of 8:00 a.m. to 4:30 p.m. Full size plans **\$358.00 (\$374.00 by mail)**. Half size plans **\$179.00 (\$186.00 by mail)**, Bid Book \$10 (\$13 by mail), Single Sheets \$2, payment in advance, all non-refundable.

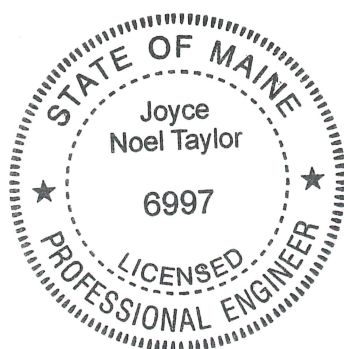
Each Bid must be made upon blank forms provided by the Department and must be accompanied by a bid bond at 5% of the bid amount or an official bank check, cashier's check, certified check, certificate of deposit, or United States postal money order in the amount of **\$975,000.00** payable to Treasurer, State of Maine as a Bid guarantee. A Contract Performance Surety Bond and a Contract Payment Surety Bond, each in the amount of 100 percent of the Contract price, will be required of the successful Bidder.

This Contract is subject to all applicable Federal Laws. This contract is subject to compliance with the Disadvantaged Business Enterprise program requirements as set forth by the Maine Department of Transportation.

All work shall be governed by *State of Maine, Department of Transportation, Standard Specifications, March 2020 Edition*, price \$10 [\$15 by mail], and *Standard Details, March 2020 Edition*, price \$10 [\$15 by mail]. They also may be purchased by telephone at (207) 624-3536 between the hours of 8:00 a.m. to 4:30 p.m. *Standard Detail* updates can be found at <http://www.maine.gov/mdot/contractors/publications/>.

The right is hereby reserved to the MaineDOT to reject any or all bids.

Augusta, Maine
December 23, 2020



JOYCE NOEL TAYLOR P. E.
CHIEF ENGINEER

NOTICE

All bids for Federal Projects **shall** be accompanied by the DBE Proposed Utilization form. If you are submitting an electronic bid, the DBE Utilization Form may be faxed to 207-624-3431. Failure to submit the form with the bid will be considered a curable defect.

NOTICE

(COVID-19 Pandemic)

The Department considers the COVID-19 Pandemic an Uncontrollable Event as defined in Section 101.2 of the Department's Standard Specifications.

Accordingly, any documented delay to the project's Critical Path due to COVID-19 related issues, such as impacted workforce, subcontracts, or material supply, will be considered an Excusable Delay as defined in Section 109.5(A)(3) of the Department's Supplemental Specifications.

As an Excusable Delay, the Contractor is entitled to an extension of time provided that other associated notification, documentation, and procedural requirements set forth in the Contract are met.

SPECIAL PROVISION 102.7.3
ACKNOWLEDGMENT OF BID AMENDMENTS

With this form, the Bidder acknowledges its responsibility to check for all Amendments to the Bid Package. For each Project under Advertisement, Amendments are located at <http://www.maine.gov/mdot/contractors/> . It is the responsibility of the Bidder to determine if there are Amendments to the Project, to download them, to incorporate them into their Bid Package, and to reference the Amendment number and the date on the form below. The Maine DOT will not post Bid Amendments any later than noon the day before Bid opening without individually notifying all the planholders.

Amendment Number	Date

The Contractor, for itself, its successors and assigns, hereby acknowledges that it has received all of the above referenced Amendments to the Bid Package.

CONTRACTOR

Date

Signature of authorized representative

(Name and Title Printed)

Maine Department of Transportation

Proposal Schedule of Items

Proposal ID: 024301.00

Project(s): 024301.00

SECTION: 1 Project Items

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	203.20 COMMON EXCAVATION	157.000 CY	_____	 _____	_____	 _____
0020	403.210 HOT MIX ASPHALT 9.5 MM	435.000 T	_____	 _____	_____	 _____
0030	604.15 MANHOLE Fiber Optic Manhole	1.000 EA	_____	 _____	_____	 _____
0040	608.07 PLAIN CONCRETE SIDEWALK	3,235.000 SY	_____	 _____	_____	 _____
0050	608.15 BRICK SIDEWALK WITH BITUMINOUS BASE	183.000 SY	_____	 _____	_____	 _____
0060	608.26 CURB RAMP DETECTABLE WARNING FIELD	4,020.000 SF	_____	 _____	_____	 _____
0070	608.45 CONSTRUCT SIDEWALK	155.000 SY	_____	 _____	_____	 _____
0080	608.46 REGRADING SIDEWALK	4,435.000 SY	_____	 _____	_____	 _____
0090	609.11 VERTICAL CURB TYPE 1	657.000 LF	_____	 _____	_____	 _____
0100	609.12 VERTICAL CURB TYPE 1 - CIRCULAR	452.000 LF	_____	 _____	_____	 _____
0110	609.21 CONCRETE SLIPFORM CURB	23.000 LF	_____	 _____	_____	 _____
0120	609.21 CONCRETE SLIPFORM CURB 4' Terminal End	20.000 LF	_____	 _____	_____	 _____

Maine Department of Transportation

Proposal Schedule of Items

Proposal ID: 024301.00

Project(s): 024301.00

SECTION: 1 Project Items

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	609.21 CONCRETE SLIPFORM CURB 8' Terminal End	56.000 LF	_____	 _____	_____	 _____
0140	609.221 TERMINAL CURB TYPE 1	1,410.000 LF	_____	 _____	_____	 _____
0150	609.222 TERMINAL CURB TYPE 1 - CIRCULAR Circular	2,225.000 LF	_____	 _____	_____	 _____
0160	609.31 CURB TYPE 3	192.000 LF	_____	 _____	_____	 _____
0170	609.34 CURB TYPE 5	305.000 LF	_____	 _____	_____	 _____
0180	609.35 CURB TYPE 5 - CIRCULAR	58.000 LF	_____	 _____	_____	 _____
0190	626.11 PRECAST CONCRETE JUNCTION BOX	31.000 EA	_____	 _____	_____	 _____
0200	626.22 NON-METALLIC CONDUIT 3 inch Conduit	4,065.000 LF	_____	 _____	_____	 _____
0210	626.22 NON-METALLIC CONDUIT Concrete Encased	1,145.000 LF	_____	 _____	_____	 _____
0220	626.25 UNDER PAVEMENT DUCT	925.000 LF	_____	 _____	_____	 _____
0230	626.35 CONTROLLER CABINET FOUNDATION	71.000 EA	_____	 _____	_____	 _____

Maine Department of Transportation

Proposal Schedule of Items

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Project(s): 024301.00

SECTION: 1 Project Items

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
0240	626.36 REMOVE OR MODIFY CONCRETE FOUNDATION	24.000 EA	_____	 _____	_____	 _____
0250	626.421 24 INCH DIAMETER FOUNDATION	847.000 LF	_____	 _____	_____	 _____
0260	626.451 42 INCH DIAMETER FOUNDATION	130.000 LF	_____	 _____	_____	 _____
0270	626.46 48 INCH DIAMETER FOUNDATION	74.000 LF	_____	 _____	_____	 _____
0280	626.47 54 INCH DIAMETER FOUNDATION	29.000 LF	_____	 _____	_____	 _____
0290	626.48 60 INCH DIAMETER FOUNDATION	48.000 LF	_____	 _____	_____	 _____
0300	626.60 GROUTED, ROCK- ANCHORED FOUNDATION	7.000 CY	_____	 _____	_____	 _____
0310	627.711 WHITE OR YELLOW PAINTED PAVEMENT MARKING LINE (PLAN QUANTITY)	70.000 LF	_____	 _____	_____	 _____
0320	627.75 WHITE OR YELLOW PAVEMENT & CURB MARKING	12,795.000 SF	_____	 _____	_____	 _____
0330	627.77 REMOVING PAVEMENT MARKINGS	10,380.000 SF	_____	 _____	_____	 _____
0340	643.21 NON-INVASIVE DETECTION - STOP LINE: Bangor St and Linden St/Quimby St	LUMP SUM		 LUMP SUM	_____	 _____

Maine Department of Transportation

Proposal Schedule of Items

Proposal ID: 024301.00

Project(s): 024301.00

SECTION: 1 Project Items

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
0350	643.21 NON-INVASIVE DETECTION - STOP LINE: Bangor St and N Belfast Ave/Locke St	LUMP SUM	LUMP	SUM	_____	_____
0360	643.21 NON-INVASIVE DETECTION - STOP LINE: Bridge St and Maine Ave	LUMP SUM	LUMP	SUM	_____	_____
0370	643.21 NON-INVASIVE DETECTION - STOP LINE: Capitol St and Sewall St	LUMP SUM	LUMP	SUM	_____	_____
0380	643.21 NON-INVASIVE DETECTION - STOP LINE: China Rd and Cushman Rd	LUMP SUM	LUMP	SUM	_____	_____
0390	643.21 NON-INVASIVE DETECTION - STOP LINE: Civic Center Dr and Commerce Dr	LUMP SUM	LUMP	SUM	_____	_____
0400	643.21 NON-INVASIVE DETECTION - STOP LINE: Civic Center Dr and I-95 NB Ramps	LUMP SUM	LUMP	SUM	_____	_____
0410	643.21 NON-INVASIVE DETECTION - STOP LINE: Civic Center Dr and I-95 SB Ramps	LUMP SUM	LUMP	SUM	_____	_____
0420	643.21 NON-INVASIVE DETECTION - STOP LINE: Civic Center Dr and Leighton Rd	LUMP SUM	LUMP	SUM	_____	_____
0430	643.21 NON-INVASIVE DETECTION - STOP LINE: Civic Center Dr and Townsend Rd	LUMP SUM	LUMP	SUM	_____	_____
0440	643.21 NON-INVASIVE DETECTION - STOP LINE: Civic Center Dr and University Dr	LUMP SUM	LUMP	SUM	_____	_____

Maine Department of Transportation

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Contractor: _____

Proposal Line Number	Item ID Description	Approximate Quantity and Units	Unit Price		Bid Amount	
			Dollars	Cents	Dollars	Cents
0450	643.21 NON-INVASIVE DETECTION - STOP LINE: CMD and Cushman Rd	LUMP SUM	LUMP	SUM	_____	_____
0460	643.21 NON-INVASIVE DETECTION - STOP LINE: College Ave and Hazelwood Ave	LUMP SUM	LUMP	SUM	_____	_____
0470	643.21 NON-INVASIVE DETECTION - STOP LINE: Cony St and Willow St/City Center Dr	LUMP SUM	LUMP	SUM	_____	_____
0480	643.21 NON-INVASIVE DETECTION - STOP LINE: Eastern Ave and Cony Rd	LUMP SUM	LUMP	SUM	_____	_____
0490	643.21 NON-INVASIVE DETECTION - STOP LINE: Eastern Ave and Hospital St/Stone St	LUMP SUM	LUMP	SUM	_____	_____
0500	643.21 NON-INVASIVE DETECTION - STOP LINE: Eastern Ave and Spring St/Togus Rd	LUMP SUM	LUMP	SUM	_____	_____
0510	643.21 NON-INVASIVE DETECTION - STOP LINE: Elm St and Park St	LUMP SUM	LUMP	SUM	_____	_____
0520	643.21 NON-INVASIVE DETECTION - STOP LINE: Elm St and Western Ave	LUMP SUM	LUMP	SUM	_____	_____
0530	643.21 NON-INVASIVE DETECTION - STOP LINE: Hospital St and Piggery Rd/Tyson Dr	LUMP SUM	LUMP	SUM	_____	_____

Maine Department of Transportation

Proposal Schedule of Items

Proposal ID: 024301.00

Project(s): 024301.00

SECTION: 1 Project Items

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
0540	643.21 NON-INVASIVE DETECTION - STOP LINE: KMD and 1st Rangeway	LUMP SUM	LUMP	SUM	_____	_____
0550	643.21 NON-INVASIVE DETECTION - STOP LINE: KMD and Airport Rd	LUMP SUM	LUMP	SUM	_____	_____
0560	643.21 NON-INVASIVE DETECTION - STOP LINE: KMD and CMD	LUMP SUM	LUMP	SUM	_____	_____
0570	643.21 NON-INVASIVE DETECTION - STOP LINE: KMD and Cool St	LUMP SUM	LUMP	SUM	_____	_____
0580	643.21 NON-INVASIVE DETECTION - STOP LINE: KMD and First Park Dr	LUMP SUM	LUMP	SUM	_____	_____
0590	643.21 NON-INVASIVE DETECTION - STOP LINE: KMD and Hannaford Dr	LUMP SUM	LUMP	SUM	_____	_____
0600	643.21 NON-INVASIVE DETECTION - STOP LINE: KMD and I-95 NB	LUMP SUM	LUMP	SUM	_____	_____
0610	643.21 NON-INVASIVE DETECTION - STOP LINE: KMD and I-95 SB	LUMP SUM	LUMP	SUM	_____	_____
0620	643.21 NON-INVASIVE DETECTION - STOP LINE: KMD and Shaws Dr	LUMP SUM	LUMP	SUM	_____	_____
0630	643.21 NON-INVASIVE DETECTION - STOP LINE: KMD and Washington St	LUMP SUM	LUMP	SUM	_____	_____

Maine Department of Transportation

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Proposal ID: 024301.00

Project(s): 024301.00

SECTION: 1 Project Items

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
0640	643.21 NON-INVASIVE DETECTION - STOP LINE: KMD and West River Rd	LUMP SUM	LUMP	SUM	_____	_____
0650	643.21 NON-INVASIVE DETECTION - STOP LINE: Main St and Armory St	LUMP SUM	LUMP	SUM	_____	_____
0660	643.21 NON-INVASIVE DETECTION - STOP LINE: Main St and Eustis Pkwy	LUMP SUM	LUMP	SUM	_____	_____
0670	643.21 NON-INVASIVE DETECTION - STOP LINE: Main St and Fairfield St	LUMP SUM	LUMP	SUM	_____	_____
0680	643.21 NON-INVASIVE DETECTION - STOP LINE: Main St and High St	LUMP SUM	LUMP	SUM	_____	_____
0690	643.21 NON-INVASIVE DETECTION - STOP LINE: Main St and I-95 NB	LUMP SUM	LUMP	SUM	_____	_____
0700	643.21 NON-INVASIVE DETECTION - STOP LINE: Main St and I-95 SB	LUMP SUM	LUMP	SUM	_____	_____
0710	643.21 NON-INVASIVE DETECTION - STOP LINE: Main St and Perkins St	LUMP SUM	LUMP	SUM	_____	_____
0720	643.21 NON-INVASIVE DETECTION - STOP LINE: Main St and Route 202	LUMP SUM	LUMP	SUM	_____	_____
0730	643.21 NON-INVASIVE DETECTION - STOP LINE: Main St and Route 224	LUMP SUM	LUMP	SUM	_____	_____

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Proposal Line Number	Item ID Description	Approximate Quantity and Units	Unit Price		Bid Amount	
			Dollars	Cents	Dollars	Cents
0740	643.21 NON-INVASIVE DETECTION - STOP LINE: Main St and Shaw's Dr	LUMP SUM	LUMP	SUM	_____	_____
0750	643.21 NON-INVASIVE DETECTION - STOP LINE: Main St and Walmart Dr	LUMP SUM	LUMP	SUM	_____	_____
0760	643.21 NON-INVASIVE DETECTION - STOP LINE: Main St and Washington St	LUMP SUM	LUMP	SUM	_____	_____
0770	643.21 NON-INVASIVE DETECTION - STOP LINE: Main St and Waterville Commons Dr	LUMP SUM	LUMP	SUM	_____	_____
0780	643.21 NON-INVASIVE DETECTION - STOP LINE: Main St and Westview Dr	LUMP SUM	LUMP	SUM	_____	_____
0790	643.21 NON-INVASIVE DETECTION - STOP LINE: Pleasant St and Oak St	LUMP SUM	LUMP	SUM	_____	_____
0800	643.21 NON-INVASIVE DETECTION - STOP LINE: Route 1 and Route 52	LUMP SUM	LUMP	SUM	_____	_____
0810	643.21 NON-INVASIVE DETECTION - STOP LINE: Route 201 and Bridge St	LUMP SUM	LUMP	SUM	_____	_____
0820	643.21 NON-INVASIVE DETECTION - STOP LINE: Route 201 and China Rd	LUMP SUM	LUMP	SUM	_____	_____
0830	643.21 NON-INVASIVE DETECTION - STOP LINE: Route 201 and Clinton Ave	LUMP SUM	LUMP	SUM	_____	_____

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Proposal Line Number	Item ID Description	Approximate Quantity and Units	Unit Price		Bid Amount	
			Dollars	Cents	Dollars	Cents
0840	643.21 NON-INVASIVE DETECTION - STOP LINE: Route 201 and CMD	LUMP SUM	LUMP	SUM	_____	_____
0850	643.21 NON-INVASIVE DETECTION - STOP LINE: Route 201 and Halifax St	LUMP SUM	LUMP	SUM	_____	_____
0860	643.21 NON-INVASIVE DETECTION - STOP LINE: Route 201 and Johnny's Seeds/KVCOG	LUMP SUM	LUMP	SUM	_____	_____
0870	643.21 NON-INVASIVE DETECTION - STOP LINE: Route 202 and Route 32	LUMP SUM	LUMP	SUM	_____	_____
0880	643.21 NON-INVASIVE DETECTION - STOP LINE: Route 224 and River St	LUMP SUM	LUMP	SUM	_____	_____
0890	643.21 NON-INVASIVE DETECTION - STOP LINE: Route 27 and Route 3	LUMP SUM	LUMP	SUM	_____	_____
0900	643.21 NON-INVASIVE DETECTION - STOP LINE: Route 3 & N Belfast Ave	LUMP SUM	LUMP	SUM	_____	_____
0910	643.21 NON-INVASIVE DETECTION - STOP LINE: Route 3 (N Belfast Ave) & Church Hill	LUMP SUM	LUMP	SUM	_____	_____
0920	643.21 NON-INVASIVE DETECTION - STOP LINE: Route 3 and Henrys Way	LUMP SUM	LUMP	SUM	_____	_____
0930	643.21 NON-INVASIVE DETECTION - STOP LINE: Route 3 and Riverside Dr	LUMP SUM	LUMP	SUM	_____	_____

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			Dollars	Cents	Dollars	Cents
0940	643.21 NON-INVASIVE DETECTION - STOP LINE: Route 3 and Route 104 (W River Rd)	LUMP SUM	LUMP	SUM	_____	_____
0950	643.21 NON-INVASIVE DETECTION - STOP LINE: Route 3 and Starrett Dr	LUMP SUM	LUMP	SUM	_____	_____
0960	643.21 NON-INVASIVE DETECTION - STOP LINE: Route 4 and Bridge St	LUMP SUM	LUMP	SUM	_____	_____
0970	643.21 NON-INVASIVE DETECTION - STOP LINE: Route 4 and Broadway	LUMP SUM	LUMP	SUM	_____	_____
0980	643.21 NON-INVASIVE DETECTION - STOP LINE: Route 4 and Grammar Rd	LUMP SUM	LUMP	SUM	_____	_____
0990	643.21 NON-INVASIVE DETECTION - STOP LINE: Route 4 and Hannaford Dr	LUMP SUM	LUMP	SUM	_____	_____
1000	643.21 NON-INVASIVE DETECTION - STOP LINE: Route 4 and Hospital St	LUMP SUM	LUMP	SUM	_____	_____
1010	643.21 NON-INVASIVE DETECTION - STOP LINE: Route 4 and Route 2/27	LUMP SUM	LUMP	SUM	_____	_____
1020	643.21 NON-INVASIVE DETECTION - STOP LINE: Route 4 and Walmart Dr	LUMP SUM	LUMP	SUM	_____	_____
1030	643.21 NON-INVASIVE DETECTION - STOP LINE: Route 4A/202 and River St	LUMP SUM	LUMP	SUM	_____	_____

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			Dollars	Cents	Dollars	Cents
1040	643.21 NON-INVASIVE DETECTION - STOP LINE: Route 4A/202 and Route 224	LUMP SUM	LUMP	SUM	_____	_____
1050	643.21 NON-INVASIVE DETECTION - STOP LINE: S Belfast Ave and Cony Rd/Church Hill	LUMP SUM	LUMP	SUM	_____	_____
1060	643.21 NON-INVASIVE DETECTION - STOP LINE: Senator Way and Crossing Way	LUMP SUM	LUMP	SUM	_____	_____
1070	643.21 NON-INVASIVE DETECTION - STOP LINE: Silver St and Elm St	LUMP SUM	LUMP	SUM	_____	_____
1080	643.21 NON-INVASIVE DETECTION - STOP LINE: Spring St and Elm St	LUMP SUM	LUMP	SUM	_____	_____
1090	643.21 NON-INVASIVE DETECTION - STOP LINE: Spring St and Silver St	LUMP SUM	LUMP	SUM	_____	_____
1100	643.21 NON-INVASIVE DETECTION - STOP LINE: State St and Bridge St	LUMP SUM	LUMP	SUM	_____	_____
1110	643.21 NON-INVASIVE DETECTION - STOP LINE: State St and Capitol St	LUMP SUM	LUMP	SUM	_____	_____
1120	643.21 NON-INVASIVE DETECTION - STOP LINE: State St and Union St	LUMP SUM	LUMP	SUM	_____	_____
1130	643.21 NON-INVASIVE DETECTION - STOP LINE: State St and Winthrop St	LUMP SUM	LUMP	SUM	_____	_____

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			Dollars	Cents	Dollars	Cents
1140	643.21 NON-INVASIVE DETECTION - STOP LINE: Stone St and Hannaford Dr	LUMP SUM	LUMP	SUM	_____	_____
1150	643.21 NON-INVASIVE DETECTION - STOP LINE: Water St and Bridge St	LUMP SUM	LUMP	SUM	_____	_____
1160	643.21 NON-INVASIVE DETECTION - STOP LINE: Western Ave and Airport Rd	LUMP SUM	LUMP	SUM	_____	_____
1170	643.21 NON-INVASIVE DETECTION - STOP LINE: Western Ave and Armory St	LUMP SUM	LUMP	SUM	_____	_____
1180	643.21 NON-INVASIVE DETECTION - STOP LINE: Western Ave and Crossing Way	LUMP SUM	LUMP	SUM	_____	_____
1190	643.21 NON-INVASIVE DETECTION - STOP LINE: Western Ave and Edison Dr	LUMP SUM	LUMP	SUM	_____	_____
1200	643.21 NON-INVASIVE DETECTION - STOP LINE: Western Ave and Orchard St	LUMP SUM	LUMP	SUM	_____	_____
1210	643.21 NON-INVASIVE DETECTION - STOP LINE: Western Ave and Senator Way	LUMP SUM	LUMP	SUM	_____	_____
1220	643.21 NON-INVASIVE DETECTION - STOP LINE: Western Ave and Sewall St	LUMP SUM	LUMP	SUM	_____	_____
1230	643.21 NON-INVASIVE DETECTION - STOP LINE: Western Ave and Shuman Ave	LUMP SUM	LUMP	SUM	_____	_____

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Proposal Line Number	Item ID Description	Approximate Quantity and Units	Unit Price		Bid Amount	
			Dollars	Cents	Dollars	Cents
1240	643.21 NON-INVASIVE DETECTION - STOP LINE: Western Ave and U Haul Dr	LUMP SUM	LUMP	SUM	_____	_____
1250	643.21 NON-INVASIVE DETECTION - STOP LINE: Western Ave and Whitten Rd	LUMP SUM	LUMP	SUM	_____	_____
1260	643.21 NON-INVASIVE DETECTION - STOP LINE: Whitten Rd and Hannaford Dr	LUMP SUM	LUMP	SUM	_____	_____
1270	643.22 NON-INVASIVE DETECTION - ADVANCE: Bridge St and Maine Ave	LUMP SUM	LUMP	SUM	_____	_____
1280	643.22 NON-INVASIVE DETECTION - ADVANCE: Civic Center Dr and Darin Dr	LUMP SUM	LUMP	SUM	_____	_____
1290	643.22 NON-INVASIVE DETECTION - ADVANCE: Civic Center Dr and I-95 NB Ramps	LUMP SUM	LUMP	SUM	_____	_____
1300	643.22 NON-INVASIVE DETECTION - ADVANCE: Civic Center Dr and Leighton Rd	LUMP SUM	LUMP	SUM	_____	_____
1310	643.22 NON-INVASIVE DETECTION - ADVANCE: Civic Center Dr and Townsend Rd	LUMP SUM	LUMP	SUM	_____	_____
1320	643.22 NON-INVASIVE DETECTION - ADVANCE: Civic Center Dr and University Dr	LUMP SUM	LUMP	SUM	_____	_____

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Proposal Line Number	Item ID Description	Approximate Quantity and Units	Unit Price		Bid Amount	
			Dollars	Cents	Dollars	Cents
1330	643.22 NON-INVASIVE DETECTION - ADVANCE: CMD and Cushman Rd	LUMP SUM	LUMP	SUM	_____	_____
1340	643.22 NON-INVASIVE DETECTION - ADVANCE: College Ave and Hazelwood Ave	LUMP SUM	LUMP	SUM	_____	_____
1350	643.22 NON-INVASIVE DETECTION - ADVANCE: Eastern Ave and Cony Rd	LUMP SUM	LUMP	SUM	_____	_____
1360	643.22 NON-INVASIVE DETECTION - ADVANCE: Eastern Ave and Hospital St/Stone St	LUMP SUM	LUMP	SUM	_____	_____
1370	643.22 NON-INVASIVE DETECTION - ADVANCE: Eastern Ave and Spring St/Togus Rd	LUMP SUM	LUMP	SUM	_____	_____
1380	643.22 NON-INVASIVE DETECTION - ADVANCE: Hospital St and Piggery Rd/Tyson Dr	LUMP SUM	LUMP	SUM	_____	_____
1390	643.22 NON-INVASIVE DETECTION - ADVANCE: KMD and 1st Rangeway	LUMP SUM	LUMP	SUM	_____	_____
1400	643.22 NON-INVASIVE DETECTION - ADVANCE: KMD and Airport Rd	LUMP SUM	LUMP	SUM	_____	_____
1410	643.22 NON-INVASIVE DETECTION - ADVANCE: KMD and CMD	LUMP SUM	LUMP	SUM	_____	_____

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Proposal Line Number	Item ID Description	Approximate Quantity and Units	Unit Price		Bid Amount	
			Dollars	Cents	Dollars	Cents
1420	643.22 NON-INVASIVE DETECTION - ADVANCE: KMD and Cool St	LUMP SUM	LUMP	SUM	_____	_____
1430	643.22 NON-INVASIVE DETECTION - ADVANCE: KMD and First Park Dr	LUMP SUM	LUMP	SUM	_____	_____
1440	643.22 NON-INVASIVE DETECTION - ADVANCE: KMD and Hannaford Dr	LUMP SUM	LUMP	SUM	_____	_____
1450	643.22 NON-INVASIVE DETECTION - ADVANCE: KMD and I-95 NB	LUMP SUM	LUMP	SUM	_____	_____
1460	643.22 NON-INVASIVE DETECTION - ADVANCE: KMD and I-95 SB	LUMP SUM	LUMP	SUM	_____	_____
1470	643.22 NON-INVASIVE DETECTION - ADVANCE: KMD and Shaws Dr	LUMP SUM	LUMP	SUM	_____	_____
1480	643.22 NON-INVASIVE DETECTION - ADVANCE: KMD and Washington St	LUMP SUM	LUMP	SUM	_____	_____
1490	643.22 NON-INVASIVE DETECTION - ADVANCE: KMD and West River Rd	LUMP SUM	LUMP	SUM	_____	_____
1500	643.22 NON-INVASIVE DETECTION - ADVANCE: Main St and Alumni Dr/Old Mill Rd	LUMP SUM	LUMP	SUM	_____	_____
1510	643.22 NON-INVASIVE DETECTION - ADVANCE: Main St and Armory Rd	LUMP SUM	LUMP	SUM	_____	_____

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Proposal Line Number	Item ID Description	Approximate Quantity and Units	Unit Price		Bid Amount	
			Dollars	Cents	Dollars	Cents
1520	643.22 NON-INVASIVE DETECTION - ADVANCE: Main St and Fairfield St	LUMP SUM	LUMP	SUM	_____	_____
1530	643.22 NON-INVASIVE DETECTION - ADVANCE: Main St and I-95 NB	LUMP SUM	LUMP	SUM	_____	_____
1540	643.22 NON-INVASIVE DETECTION - ADVANCE: Main St and I-95 SB	LUMP SUM	LUMP	SUM	_____	_____
1550	643.22 NON-INVASIVE DETECTION - ADVANCE: Main St and Jagger Mill Rd	LUMP SUM	LUMP	SUM	_____	_____
1560	643.22 NON-INVASIVE DETECTION - ADVANCE: Main St and Shaw's Dr	LUMP SUM	LUMP	SUM	_____	_____
1570	643.22 NON-INVASIVE DETECTION - ADVANCE: Main St and Walmart Dr	LUMP SUM	LUMP	SUM	_____	_____
1580	643.22 NON-INVASIVE DETECTION - ADVANCE: Main St and Waterville Commons Rd	LUMP SUM	LUMP	SUM	_____	_____
1590	643.22 NON-INVASIVE DETECTION - ADVANCE: Main St and Westview Dr	LUMP SUM	LUMP	SUM	_____	_____
1600	643.22 NON-INVASIVE DETECTION - ADVANCE: Route 1 and Route 52	LUMP SUM	LUMP	SUM	_____	_____
1610	643.22 NON-INVASIVE DETECTION - ADVANCE: Route 201 and Clinton Ave	LUMP SUM	LUMP	SUM	_____	_____

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Proposal Line Number	Item ID Description	Approximate Quantity and Units	Unit Price		Bid Amount	
			Dollars	Cents	Dollars	Cents
1620	643.22 NON-INVASIVE DETECTION - ADVANCE: Route 201 and CMD	LUMP SUM	LUMP	SUM	_____	_____
1630	643.22 NON-INVASIVE DETECTION - ADVANCE: Route 201 and Johnny's Seeds/KVCOG	LUMP SUM	LUMP	SUM	_____	_____
1640	643.22 NON-INVASIVE DETECTION - ADVANCE: Route 202 and Route 32	LUMP SUM	LUMP	SUM	_____	_____
1650	643.22 NON-INVASIVE DETECTION - ADVANCE: Route 224 and River St	LUMP SUM	LUMP	SUM	_____	_____
1660	643.22 NON-INVASIVE DETECTION - ADVANCE: Route 3 (N Belfast Ave) and Church Hill	LUMP SUM	LUMP	SUM	_____	_____
1670	643.22 NON-INVASIVE DETECTION - ADVANCE: Route 3 and N Belfast Ave	LUMP SUM	LUMP	SUM	_____	_____
1680	643.22 NON-INVASIVE DETECTION - ADVANCE: Route 3 and Riverside Dr	LUMP SUM	LUMP	SUM	_____	_____
1690	643.22 NON-INVASIVE DETECTION - ADVANCE: Route 3 and Route 103 (W River Rd)	LUMP SUM	LUMP	SUM	_____	_____
1700	643.22 NON-INVASIVE DETECTION - ADVANCE: Route 3 and Starrett Dr	LUMP SUM	LUMP	SUM	_____	_____
1710	643.22 NON-INVASIVE DETECTION - ADVANCE: Route 4 and Grammar Rd	LUMP SUM	LUMP	SUM	_____	_____

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Proposal Line Number	Item ID Description	Approximate Quantity and Units	Unit Price		Bid Amount	
			Dollars	Cents	Dollars	Cents
1720	643.22 NON-INVASIVE DETECTION - ADVANCE: Route 4 and Hannaford Dr	LUMP SUM	LUMP	SUM	_____	_____
1730	643.22 NON-INVASIVE DETECTION - ADVANCE: Route 4 and Hospital St	LUMP SUM	LUMP	SUM	_____	_____
1740	643.22 NON-INVASIVE DETECTION - ADVANCE: Route 4 and Route 2/27	LUMP SUM	LUMP	SUM	_____	_____
1750	643.22 NON-INVASIVE DETECTION - ADVANCE: Route 4 and Walmart Dr	LUMP SUM	LUMP	SUM	_____	_____
1760	643.22 NON-INVASIVE DETECTION - ADVANCE: Route 4A/202 and Route 224	LUMP SUM	LUMP	SUM	_____	_____
1770	643.22 NON-INVASIVE DETECTION - ADVANCE: S Belfast Ave and Cony Rd/Church Hill	LUMP SUM	LUMP	SUM	_____	_____
1780	643.22 NON-INVASIVE DETECTION - ADVANCE: Water St and Bridge St	LUMP SUM	LUMP	SUM	_____	_____
1790	643.22 NON-INVASIVE DETECTION - ADVANCE: Western Ave and Armory St	LUMP SUM	LUMP	SUM	_____	_____
1800	643.22 NON-INVASIVE DETECTION - ADVANCE: Western Ave and Crossing Way	LUMP SUM	LUMP	SUM	_____	_____
1810	643.22 NON-INVASIVE DETECTION - ADVANCE: Western Ave and Edison Dr	LUMP SUM	LUMP	SUM	_____	_____

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			Dollars	Cents	Dollars	Cents
1820	643.22 NON-INVASIVE DETECTION - ADVANCE: Western Ave and Orchard St	LUMP SUM	LUMP	SUM	_____	_____
1830	643.22 NON-INVASIVE DETECTION - ADVANCE: Western Ave and Senator Way	LUMP SUM	LUMP	SUM	_____	_____
1840	643.22 NON-INVASIVE DETECTION - ADVANCE: Western Ave and Shuman Ave	LUMP SUM	LUMP	SUM	_____	_____
1850	643.22 NON-INVASIVE DETECTION - ADVANCE: Western Ave and Whitten Rd	LUMP SUM	LUMP	SUM	_____	_____
1860	643.22 NON-INVASIVE DETECTION - ADVANCE: Whitten Rd and Hannaford Dr	LUMP SUM	LUMP	SUM	_____	_____
1870	643.71 TRAFFIC SIGNAL MODIFICATION Bangor St and Linden St/Quimby St	LUMP SUM	LUMP	SUM	_____	_____
1880	643.71 TRAFFIC SIGNAL MODIFICATION Bangor St and N Belfast Ave/Locke St	LUMP SUM	LUMP	SUM	_____	_____
1890	643.71 TRAFFIC SIGNAL MODIFICATION Bridge St and Benton Ave/River Rd	LUMP SUM	LUMP	SUM	_____	_____
1900	643.71 TRAFFIC SIGNAL MODIFICATION Bridge St and Maine Ave	LUMP SUM	LUMP	SUM	_____	_____
1910	643.71 TRAFFIC SIGNAL MODIFICATION Bridge St and Water St	LUMP SUM	LUMP	SUM	_____	_____

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Proposal Line Number	Item ID Description	Approximate Quantity and Units	Unit Price		Bid Amount	
			Dollars	Cents	Dollars	Cents
1920	643.71 TRAFFIC SIGNAL MODIFICATION Capitol St and Sewall St	LUMP SUM	LUMP	SUM	_____	_____
1930	643.71 TRAFFIC SIGNAL MODIFICATION China Rd and Cushman Rd	LUMP SUM	LUMP	SUM	_____	_____
1940	643.71 TRAFFIC SIGNAL MODIFICATION Civic Center Dr and Commerce Dr	LUMP SUM	LUMP	SUM	_____	_____
1950	643.71 TRAFFIC SIGNAL MODIFICATION Civic Center Dr and Darin Dr	LUMP SUM	LUMP	SUM	_____	_____
1960	643.71 TRAFFIC SIGNAL MODIFICATION Civic Center Dr and I-95 NB Ramps	LUMP SUM	LUMP	SUM	_____	_____
1970	643.71 TRAFFIC SIGNAL MODIFICATION Civic Center Dr and I-95 SB Ramps	LUMP SUM	LUMP	SUM	_____	_____
1980	643.71 TRAFFIC SIGNAL MODIFICATION Civic Center Dr and Leighton Rd	LUMP SUM	LUMP	SUM	_____	_____
1990	643.71 TRAFFIC SIGNAL MODIFICATION Civic Center Dr and Townsend Rd	LUMP SUM	LUMP	SUM	_____	_____
2000	643.71 TRAFFIC SIGNAL MODIFICATION Civic Center Dr and University Dr/Market Place	LUMP SUM	LUMP	SUM	_____	_____
2010	643.71 TRAFFIC SIGNAL MODIFICATION CMD and Cushman Rd	LUMP SUM	LUMP	SUM	_____	_____

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Proposal Line Number	Item ID Description	Approximate Quantity and Units	Unit Price		Bid Amount	
			Dollars	Cents	Dollars	Cents
2020	643.71 TRAFFIC SIGNAL MODIFICATION College Ave and Hazelwood Ave	LUMP SUM	LUMP	SUM	_____	_____
2030	643.71 TRAFFIC SIGNAL MODIFICATION Cony St and Will St/City Center Dr	LUMP SUM	LUMP	SUM	_____	_____
2040	643.71 TRAFFIC SIGNAL MODIFICATION Eastern Ave and Cony Rd	LUMP SUM	LUMP	SUM	_____	_____
2050	643.71 TRAFFIC SIGNAL MODIFICATION Eastern Ave and Hospital St/Stone St	LUMP SUM	LUMP	SUM	_____	_____
2060	643.71 TRAFFIC SIGNAL MODIFICATION Eastern Ave and Spring St/Togus Rd	LUMP SUM	LUMP	SUM	_____	_____
2070	643.71 TRAFFIC SIGNAL MODIFICATION Elm St and Park St	LUMP SUM	LUMP	SUM	_____	_____
2080	643.71 TRAFFIC SIGNAL MODIFICATION Elm St and Western Ave	LUMP SUM	LUMP	SUM	_____	_____
2090	643.71 TRAFFIC SIGNAL MODIFICATION Hospital St and Piggery Rd/Tyson Dr	LUMP SUM	LUMP	SUM	_____	_____
2100	643.71 TRAFFIC SIGNAL MODIFICATION KMD and 1st Rangeway	LUMP SUM	LUMP	SUM	_____	_____
2110	643.71 TRAFFIC SIGNAL MODIFICATION KMD and Airport Rd	LUMP SUM	LUMP	SUM	_____	_____

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			Dollars	Cents	Dollars	Cents
2120	643.71 TRAFFIC SIGNAL MODIFICATION KMD and Cool St	LUMP SUM	LUMP	SUM	_____	_____
2130	643.71 TRAFFIC SIGNAL MODIFICATION KMD and First Park Dr	LUMP SUM	LUMP	SUM	_____	_____
2140	643.71 TRAFFIC SIGNAL MODIFICATION KMD and Hannaford Dr	LUMP SUM	LUMP	SUM	_____	_____
2150	643.71 TRAFFIC SIGNAL MODIFICATION KMD and I-95 NB	LUMP SUM	LUMP	SUM	_____	_____
2160	643.71 TRAFFIC SIGNAL MODIFICATION KMD and I-95 SB	LUMP SUM	LUMP	SUM	_____	_____
2170	643.71 TRAFFIC SIGNAL MODIFICATION KMD and Shaws Dr	LUMP SUM	LUMP	SUM	_____	_____
2180	643.71 TRAFFIC SIGNAL MODIFICATION KMD and Washington St	LUMP SUM	LUMP	SUM	_____	_____
2190	643.71 TRAFFIC SIGNAL MODIFICATION KMD and West River Rd	LUMP SUM	LUMP	SUM	_____	_____
2200	643.71 TRAFFIC SIGNAL MODIFICATION Main St and Alumni Dr/Old Mill Rd	LUMP SUM	LUMP	SUM	_____	_____
2210	643.71 TRAFFIC SIGNAL MODIFICATION Main St and Armory Rd	LUMP SUM	LUMP	SUM	_____	_____

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Proposal Line Number	Item ID Description	Approximate Quantity and Units	Unit Price		Bid Amount	
			Dollars	Cents	Dollars	Cents
2220	643.71 TRAFFIC SIGNAL MODIFICATION Main St and Elm St	LUMP SUM	LUMP	SUM	_____	_____
2230	643.71 TRAFFIC SIGNAL MODIFICATION Main St and Emery St	LUMP SUM	LUMP	SUM	_____	_____
2240	643.71 TRAFFIC SIGNAL MODIFICATION Main St and Eustis Pkwy	LUMP SUM	LUMP	SUM	_____	_____
2250	643.71 TRAFFIC SIGNAL MODIFICATION Main St and Fairfield St	LUMP SUM	LUMP	SUM	_____	_____
2260	643.71 TRAFFIC SIGNAL MODIFICATION Main St and Hannaford Dr	LUMP SUM	LUMP	SUM	_____	_____
2270	643.71 TRAFFIC SIGNAL MODIFICATION Main St and High St	LUMP SUM	LUMP	SUM	_____	_____
2280	643.71 TRAFFIC SIGNAL MODIFICATION Main St and I-95 NB	LUMP SUM	LUMP	SUM	_____	_____
2290	643.71 TRAFFIC SIGNAL MODIFICATION Main St and I-95 SB	LUMP SUM	LUMP	SUM	_____	_____
2300	643.71 TRAFFIC SIGNAL MODIFICATION Main St and Jagger Mill Rd	LUMP SUM	LUMP	SUM	_____	_____
2310	643.71 TRAFFIC SIGNAL MODIFICATION Main St and Perkins St	LUMP SUM	LUMP	SUM	_____	_____

Maine Department of Transportation

Proposal Schedule of Items

Proposal ID: 024301.00

Project(s): 024301.00

SECTION: 1 Project Items

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
2320	643.71 TRAFFIC SIGNAL MODIFICATION Main St and Route 202	LUMP SUM	LUMP	SUM	_____	_____
2330	643.71 TRAFFIC SIGNAL MODIFICATION Main St and Route 224	LUMP SUM	LUMP	SUM	_____	_____
2340	643.71 TRAFFIC SIGNAL MODIFICATION Main St and Shaw's Dr	LUMP SUM	LUMP	SUM	_____	_____
2350	643.71 TRAFFIC SIGNAL MODIFICATION Main St and Temple St	LUMP SUM	LUMP	SUM	_____	_____
2360	643.71 TRAFFIC SIGNAL MODIFICATION Main St and Walmart Dr	LUMP SUM	LUMP	SUM	_____	_____
2370	643.71 TRAFFIC SIGNAL MODIFICATION Main St and Washington St	LUMP SUM	LUMP	SUM	_____	_____
2380	643.71 TRAFFIC SIGNAL MODIFICATION Main St and Waterville Commons Dr	LUMP SUM	LUMP	SUM	_____	_____
2390	643.71 TRAFFIC SIGNAL MODIFICATION Main St and Westview Dr	LUMP SUM	LUMP	SUM	_____	_____
2400	643.71 TRAFFIC SIGNAL MODIFICATION Pleasant St and Oak St	LUMP SUM	LUMP	SUM	_____	_____
2410	643.71 TRAFFIC SIGNAL MODIFICATION Route 1 and Route 52	LUMP SUM	LUMP	SUM	_____	_____

Maine Department of Transportation

Proposal Schedule of Items

Proposal ID: 024301.00

Project(s): 024301.00

SECTION: 1 Project Items

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
2420	643.71 TRAFFIC SIGNAL MODIFICATION Route 201 and Bridge St	LUMP SUM	LUMP	SUM	_____	_____
2430	643.71 TRAFFIC SIGNAL MODIFICATION Route 201 and China Rd	LUMP SUM	LUMP	SUM	_____	_____
2440	643.71 TRAFFIC SIGNAL MODIFICATION Route 201 and Clinton Ave	LUMP SUM	LUMP	SUM	_____	_____
2450	643.71 TRAFFIC SIGNAL MODIFICATION Route 201 and CMD	LUMP SUM	LUMP	SUM	_____	_____
2460	643.71 TRAFFIC SIGNAL MODIFICATION Route 201 and Halifax St	LUMP SUM	LUMP	SUM	_____	_____
2470	643.71 TRAFFIC SIGNAL MODIFICATION Route 201 and Johnny's Seeds/KVCOG	LUMP SUM	LUMP	SUM	_____	_____
2480	643.71 TRAFFIC SIGNAL MODIFICATION Route 224 and River St	LUMP SUM	LUMP	SUM	_____	_____
2490	643.71 TRAFFIC SIGNAL MODIFICATION Route 27 and Route 3	LUMP SUM	LUMP	SUM	_____	_____
2500	643.71 TRAFFIC SIGNAL MODIFICATION Route 3 (N Belfast Ave) and Church Hill Rd	LUMP SUM	LUMP	SUM	_____	_____
2510	643.71 TRAFFIC SIGNAL MODIFICATION Route 3 and Hatley Rd	LUMP SUM	LUMP	SUM	_____	_____

Maine Department of Transportation

Proposal Schedule of Items

Proposal ID: 024301.00

Project(s): 024301.00

SECTION: 1 Project Items

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
2520	643.71 TRAFFIC SIGNAL MODIFICATION Route 3 and Henrys Way/Medical Center Pkwy	LUMP SUM	LUMP	SUM	_____	_____
2530	643.71 TRAFFIC SIGNAL MODIFICATION Route 3 and N Belfast Ave	LUMP SUM	LUMP	SUM	_____	_____
2540	643.71 TRAFFIC SIGNAL MODIFICATION Route 3 and Riverside Dr	LUMP SUM	LUMP	SUM	_____	_____
2550	643.71 TRAFFIC SIGNAL MODIFICATION Route 3 and Route 104 (W River Rd)	LUMP SUM	LUMP	SUM	_____	_____
2560	643.71 TRAFFIC SIGNAL MODIFICATION Route 3 and Route 32	LUMP SUM	LUMP	SUM	_____	_____
2570	643.71 TRAFFIC SIGNAL MODIFICATION Route 4 and Bridge St	LUMP SUM	LUMP	SUM	_____	_____
2580	643.71 TRAFFIC SIGNAL MODIFICATION Route 4 and Broadway	LUMP SUM	LUMP	SUM	_____	_____
2590	643.71 TRAFFIC SIGNAL MODIFICATION Route 4 and Grammar Rd/New Dam Rd	LUMP SUM	LUMP	SUM	_____	_____
2600	643.71 TRAFFIC SIGNAL MODIFICATION Route 4 and Hannaford Dr	LUMP SUM	LUMP	SUM	_____	_____
2610	643.71 TRAFFIC SIGNAL MODIFICATION Route 4 and Hospital St	LUMP SUM	LUMP	SUM	_____	_____

Maine Department of Transportation

Proposal Schedule of Items

Proposal ID: 024301.00

Project(s): 024301.00

SECTION: 1 Project Items

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
2620	643.71 TRAFFIC SIGNAL MODIFICATION Route 4 and Route 2/27 (Farmington Falls Rd)	LUMP SUM	LUMP	SUM	_____	_____
2630	643.71 TRAFFIC SIGNAL MODIFICATION Route 4 and Walmart Dr	LUMP SUM	LUMP	SUM	_____	_____
2640	643.71 TRAFFIC SIGNAL MODIFICATION Route 4A/202 and River St	LUMP SUM	LUMP	SUM	_____	_____
2650	643.71 TRAFFIC SIGNAL MODIFICATION Route 4A/202 and Route 224	LUMP SUM	LUMP	SUM	_____	_____
2660	643.71 TRAFFIC SIGNAL MODIFICATION S Belfast Ave and Cony Rd/Church Hill Rd	LUMP SUM	LUMP	SUM	_____	_____
2670	643.71 TRAFFIC SIGNAL MODIFICATION Senator Way and Crossing Way	LUMP SUM	LUMP	SUM	_____	_____
2680	643.71 TRAFFIC SIGNAL MODIFICATION Silver St and Elm St	LUMP SUM	LUMP	SUM	_____	_____
2690	643.71 TRAFFIC SIGNAL MODIFICATION Spring St and Elm St	LUMP SUM	LUMP	SUM	_____	_____
2700	643.71 TRAFFIC SIGNAL MODIFICATION Spring St and Main St	LUMP SUM	LUMP	SUM	_____	_____
2710	643.71 TRAFFIC SIGNAL MODIFICATION Spring St and Silver St	LUMP SUM	LUMP	SUM	_____	_____

Maine Department of Transportation

Proposal Schedule of Items

Proposal ID: 024301.00

Project(s): 024301.00

SECTION: 1 Project Items

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
2720	643.71 TRAFFIC SIGNAL MODIFICATION State St and Bridge St	LUMP SUM	LUMP	SUM	_____	_____
2730	643.71 TRAFFIC SIGNAL MODIFICATION State St and Capitol St	LUMP SUM	LUMP	SUM	_____	_____
2740	643.71 TRAFFIC SIGNAL MODIFICATION State St and Union St	LUMP SUM	LUMP	SUM	_____	_____
2750	643.71 TRAFFIC SIGNAL MODIFICATION State St and Winthrop St	LUMP SUM	LUMP	SUM	_____	_____
2760	643.71 TRAFFIC SIGNAL MODIFICATION Stone St and Hannaford Dr	LUMP SUM	LUMP	SUM	_____	_____
2770	643.71 TRAFFIC SIGNAL MODIFICATION Water St and Bridge St	LUMP SUM	LUMP	SUM	_____	_____
2780	643.71 TRAFFIC SIGNAL MODIFICATION Wester Ave and U Haul Dr	LUMP SUM	LUMP	SUM	_____	_____
2790	643.71 TRAFFIC SIGNAL MODIFICATION Western Ave and Airport Rd	LUMP SUM	LUMP	SUM	_____	_____
2800	643.71 TRAFFIC SIGNAL MODIFICATION Western Ave and Armory St	LUMP SUM	LUMP	SUM	_____	_____
2810	643.71 TRAFFIC SIGNAL MODIFICATION Western Ave and Crossing Way	LUMP SUM	LUMP	SUM	_____	_____

Maine Department of Transportation

Proposal Schedule of Items

Proposal ID: 024301.00

Project(s): 024301.00

SECTION: 1 Project Items

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
2820	643.71 TRAFFIC SIGNAL MODIFICATION Western Ave and Edison Dr	LUMP SUM	LUMP	SUM	_____	_____
2830	643.71 TRAFFIC SIGNAL MODIFICATION Western Ave and Orchard St/Meadow Rd	LUMP SUM	LUMP	SUM	_____	_____
2840	643.71 TRAFFIC SIGNAL MODIFICATION Western Ave and Senator Way	LUMP SUM	LUMP	SUM	_____	_____
2850	643.71 TRAFFIC SIGNAL MODIFICATION Western Ave and Sewall St	LUMP SUM	LUMP	SUM	_____	_____
2860	643.71 TRAFFIC SIGNAL MODIFICATION Western Ave and Shuman Ave	LUMP SUM	LUMP	SUM	_____	_____
2870	643.71 TRAFFIC SIGNAL MODIFICATION Western Ave and Whitten Rd	LUMP SUM	LUMP	SUM	_____	_____
2880	643.71 TRAFFIC SIGNAL MODIFICATION Whitten Rd and Hannaford Dr	LUMP SUM	LUMP	SUM	_____	_____
2890	643.72 TEMPORARY TRAFFIC SIGNAL Main St and High St	LUMP SUM	LUMP	SUM	_____	_____
2900	643.72 TEMPORARY TRAFFIC SIGNAL Main St and Route 223	LUMP SUM	LUMP	SUM	_____	_____
2910	643.72 TEMPORARY TRAFFIC SIGNAL Route 10 and Clinton Ave	LUMP SUM	LUMP	SUM	_____	_____

Maine Department of Transportation

Proposal Schedule of Items

Proposal ID: 024301.00

Project(s): 024301.00

SECTION: 1 Project Items

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
2920	643.72 TEMPORARY TRAFFIC SIGNAL Water St and Bridge St	LUMP SUM	LUMP	SUM	_____	_____
2930	643.81 TRAFFIC SIGNAL CONTROL SYSTEM	LUMP SUM	LUMP	SUM	_____	_____
2940	643.90 INTERCONNECT WIRE BETWEEN 12 Strand (7,000 LF)	LUMP SUM	LUMP	SUM	_____	_____
2950	643.90 INTERCONNECT WIRE BETWEEN Main St and Route 202	LUMP SUM	LUMP	SUM	_____	_____
2960	643.90 INTERCONNECT WIRE BETWEEN Main St and Route 224	LUMP SUM	LUMP	SUM	_____	_____
2970	643.90 INTERCONNECT WIRE BETWEEN Main St and Washington St	LUMP SUM	LUMP	SUM	_____	_____
2980	643.91 MAST ARM POLE 20' arm and w/30' arm	1.000 EA	_____	_____	_____	_____
2990	643.91 MAST ARM POLE 25' arm	2.000 EA	_____	_____	_____	_____
3000	643.91 MAST ARM POLE 30' arm	3.000 EA	_____	_____	_____	_____
3010	643.91 MAST ARM POLE 35' arm	2.000 EA	_____	_____	_____	_____
3020	643.91 MAST ARM POLE 35' arm and 30' arm	1.000 EA	_____	_____	_____	_____
3030	643.91 MAST ARM POLE 35' arm and 45' arm	1.000 EA	_____	_____	_____	_____

Maine Department of Transportation

Proposal Schedule of Items

Proposal ID: 024301.00

Project(s): 024301.00

SECTION: 1 Project Items

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
3040	643.91 MAST ARM POLE 40' arm	2.000 EA	_____	 _____	_____	 _____
3050	643.91 MAST ARM POLE 50' arm	1.000 EA	_____	 _____	_____	 _____
3060	643.91 MAST ARM POLE 55' arm	1.000 EA	_____	 _____	_____	 _____
3070	643.92 PEDESTAL POLE	121.000 EA	_____	 _____	_____	 _____
3080	643.93 STRAIN POLE	2.000 EA	_____	 _____	_____	 _____
3090	643.94 DUAL PURPOSE POLE 20' arm w/luminaire	1.000 EA	_____	 _____	_____	 _____
3100	643.94 DUAL PURPOSE POLE 25' arm w/luminaire	1.000 EA	_____	 _____	_____	 _____
3110	643.94 DUAL PURPOSE POLE 28' arm w/luminaire	1.000 EA	_____	 _____	_____	 _____
3120	643.94 DUAL PURPOSE POLE 35' arm w/ luminaire	3.000 EA	_____	 _____	_____	 _____
3130	643.94 DUAL PURPOSE POLE 40' arm w/luminaire	1.000 EA	_____	 _____	_____	 _____
3140	643.97 WOOD POLES WITH GUYS AND SPAN WIRE	1.000 EA	_____	 _____	_____	 _____
3150	652.312 TYPE III BARRICADE	15.000 EA	_____	 _____	_____	 _____

Maine Department of Transportation

Proposal Schedule of Items

Proposal ID: 024301.00

Project(s): 024301.00

SECTION: 1 Project Items

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
3160	652.33 DRUM	60.000 EA	_____	 _____	_____	 _____
3170	652.34 CONE	100.000 EA	_____	 _____	_____	 _____
3180	652.35 CONSTRUCTION SIGNS	2,400.000 SF	_____	 _____	_____	 _____
3190	652.36 MAINTENANCE OF TRAFFIC CONTROL DEVICES	1,000.000 CD	_____	 _____	_____	 _____
3200	652.38 FLAGGER	2,500.000 HR	_____	 _____	_____	 _____
3210	652.381 TRAFFIC OFFICER	3,000.000 HR	_____	 _____	_____	 _____
3220	652.41 PORTABLE CHANGEABLE MESSAGE SIGN	5.000 EA	_____	 _____	_____	 _____
3230	654.05 ADAPTIVE SIGNAL CONTROL SYSTEM Civic Center Drive	LUMP SUM		 LUMP SUM	_____	 _____
3240	654.05 ADAPTIVE SIGNAL CONTROL SYSTEM Kennedy Memorial Drive	LUMP SUM		 LUMP SUM	_____	 _____
3250	654.05 ADAPTIVE SIGNAL CONTROL SYSTEM Main Street	LUMP SUM		 LUMP SUM	_____	 _____
3260	654.05 ADAPTIVE SIGNAL CONTROL SYSTEM Western Ave	LUMP SUM		 LUMP SUM	_____	 _____
3270	654.351 CONNECTED ROADSIDE UNIT (RSU)	104.000 EA	_____	 _____	_____	 _____

Maine Department of Transportation

Proposal Schedule of Items

Proposal ID: 024301.00

Project(s): 024301.00

SECTION: 1 Project Items

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
3280	654.352 ON-BOARD UNIT (OBU) VEHICLE EQUIPMENT	5.000 EA	_____	 _____	_____	 _____
3290	656.75 TEMPORARY SOIL EROSION AND WATER POLLUTION CONTROL	LUMP SUM	LUMP SUM	 _____	_____	 _____
3300	659.10 MOBILIZATION	LUMP SUM	LUMP SUM	 _____	_____	 _____
Section: 1			Total:	 _____	_____	 _____
			Total Bid:	 _____	_____	 _____

CONTRACT AGREEMENT, OFFER & AWARD

AGREEMENT made on the date last signed below, by and between the State of Maine, acting through and by its Department of Transportation (Department), an agency of state government with its principal administrative offices located at Child Street, Augusta, Maine, with a mailing address at 16 State House Station, Augusta, Maine 04333-0016, and

_____ a corporation or other legal entity organized under the laws of the State of _____, with its principal place of business located at _____

The Department and the Contractor, in consideration of the mutual promises set forth in this Agreement (the “Contract”), hereby agree as follows:

A. **The Work.**

The Contractor agrees to complete all Work as specified or indicated in the Contract including Extra Work in conformity with the Contract, **WIN. 024301.00** for **Statewide Traffic Signal Updates** in various locations, Counties of **Franklin, Kennebec, Somerset, Waldo , and York** Maine. The Work includes construction, maintenance during construction, warranty as provided in the Contract, and other incidental work.

The Contractor shall be responsible for furnishing all supervision, labor, equipment, tools supplies, permanent materials and temporary materials required to perform the Work including construction quality control including inspection, testing and documentation, all required documentation at the conclusion of the project, warranting its work and performing all other work indicated in the Contract.

The Department shall have the right to alter the nature and extent of the Work as provided in the Contract; payment to be made as provided in the same.

B. **Time.**

The Contractor agrees to complete all Work, except warranty work, on or before **April 30, 2024**. Further, the Department may deduct from moneys otherwise due the Contractor, not as a penalty, but as Liquidated Damages in accordance with Sections 107.7 and 107.8 of the *State of Maine Department of Transportation Standard Specifications, March 2020 Edition* and related Special Provisions.

C. Price.

The quantities given in the Schedule of Items of the Bid Package will be used as the basis for determining the original Contract amount and for determining the amounts of the required Performance Surety Bond and Payment Surety Bond, and that the amount of this offer is _____

\$ _____ Performance Bond and Payment Bond each being 100% of the amount of this Contract.

D. Contract.

This Contract, which may be amended, modified, or supplemented in writing only, consists of the Contract documents as defined in the Plans, *Standard Specifications, March 2020 Edition, Standard Details March 2020 Edition* as updated through advertisement, Supplemental Specifications, Special Provisions, Contract Agreement; and Contract Bonds. It is agreed and understood that this Contract will be governed by the documents listed above.

E. Certifications.

By signing below, the Contractor hereby certifies that to the best of the Contractor's knowledge and belief:

1. All of the statements, representations, covenants, and/or certifications required or set forth in the Bid and the Bid Documents, including those in the Federal Contract Provisions Supplement, and the Contract are still complete and accurate as of the date of this Agreement.
2. The Contractor knows of no legal, contractual, or financial impediment to entering into this Contract.
3. The person signing below is legally authorized by the Contractor to sign this Contract on behalf of the Contractor and to legally bind the Contractor to the terms of the Contract.

F. Offer.

The undersigned, having carefully examined the site of work, the Plans, *Standard Specifications March 2020 Edition*, *Standard Details March 2020 Edition* as updated through advertisement, Supplemental Specifications, Special Provisions, Contract Agreement; and Contract Bonds contained herein for construction of:

WIN. 024301.00 - Statewide Traffic Signal Updates - in various locations in the,

State of Maine, on which bids will be received until the time specified in the “Notice to Contractors” do(es) hereby bid and offer to enter into this contract to supply all the materials, tools, equipment and labor to construct the whole of the Work in strict accordance with the terms and conditions of this Contract at the unit prices in the attached “Schedule of Items.”

The Offeror agrees to perform the work required at the price specified above and in accordance with the bids provided in the attached “Schedule of Items” in strict accordance with the terms of this solicitation, and to provide the appropriate insurance and bonds if this offer is accepted by the Government in writing.

As Offeror also agrees:

First: To do any extra work, not covered by the attached “Schedule of Items,” which may be ordered by the Resident, and to accept as full compensation the amount determined upon a “Force Account” basis as provided in the *Standard Specifications, March 2020 Edition*, and as addressed in the contract documents.

Second: That the bid bond at 5% of the bid amount or the official bank check, cashier’s check, certificate of deposit or U. S. Postal Money Order in the amount given in the “Notice to Contractors”, payable to the Treasurer of the State of Maine and accompanying this bid, shall be forfeited, as liquidated damages, if in case this bid is accepted, and the undersigned shall fail to abide by the terms and conditions of the offer and fail to furnish satisfactory insurance and Contract bonds under the conditions stipulated in the Specifications within 15 days of notice of intent to award the contract.

Third: To begin the Work as stated in Section 107.2 of the *Standard Specifications March 2020 Edition* and complete the Work within the time limits given in the Special Provisions of this Contract.

Fourth: The Contractor will be bound to the Disadvantaged Business Enterprise (DBE) Requirements contained in the attached Notice (Additional Instructions to Bidders) and submit a completed Contractor’s Disadvantaged Business Enterprise Utilization Plan with their bid.

Fifth: That this offer shall remain open for 30 calendar days after the date of opening of bids.

Sixth: The Bidder hereby certifies, to the best of its knowledge and belief that: the Bidder has not, either directly or indirectly, entered into any agreement, participated in any collusion, or otherwise taken any action in restraint of competitive bidding in connection with its bid, and its subsequent contract with the Department.

IN WITNESS WHEREOF, the Contractor, for itself, its successors and assigns, hereby execute two duplicate originals of this Agreement and thereby binds itself to all covenants, terms, and obligations contained in the Contract Documents.

CONTRACTOR

Date

(Signature of Legally Authorized Representative
of the Contractor)

Witness

(Name and Title Printed)

G. Award.

Your offer is hereby accepted.
documents referenced herein.

This award consummates the Contract, and the

MAINE DEPARTMENT OF TRANSPORTATION

Date

By: Bruce A. Van Note, Commissioner

Witness

CONTRACT AGREEMENT, OFFER & AWARD

AGREEMENT made on the date last signed below, by and between the State of Maine, acting through and by its Department of Transportation (Department), an agency of state government with its principal administrative offices located at Child Street, Augusta, Maine, with a mailing address at 16 State House Station, Augusta, Maine 04333-0016, and

_____ a corporation or other legal entity organized under the laws of the State of _____, with its principal place of business located at _____

The Department and the Contractor, in consideration of the mutual promises set forth in this Agreement (the "Contract"), hereby agree as follows:

A. The Work.

The Contractor agrees to complete all Work as specified or indicated in the Contract including Extra Work in conformity with the Contract, **WIN. 024301.00** for **Statewide Traffic Signal Updates** in various locations, Counties of **Franklin, Kennebec, Somerset, Waldo, and York** Maine. The Work includes construction, maintenance during construction, warranty as provided in the Contract, and other incidental work.

The Contractor shall be responsible for furnishing all supervision, labor, equipment, tools supplies, permanent materials and temporary materials required to perform the Work including construction quality control including inspection, testing and documentation, all required documentation at the conclusion of the project, warranting its work and performing all other work indicated in the Contract.

The Department shall have the right to alter the nature and extent of the Work as provided in the Contract; payment to be made as provided in the same.

B. Time.

The Contractor agrees to complete all Work, except warranty work, on or before **April 30, 2024**. Further, the Department may deduct from moneys otherwise due the Contractor, not as a penalty, but as Liquidated Damages in accordance with Sections 107.7 and 107.8 of the *State of Maine Department of Transportation Standard Specifications, March 2020 Edition* and related Special Provisions.

C. Price.

The quantities given in the Schedule of Items of the Bid Package will be used as the basis for determining the original Contract amount and for determining the amounts of the required Performance Surety Bond and Payment Surety Bond, and that the amount of this offer is _____

\$ _____ Performance Bond and Payment Bond each being 100% of the amount of this Contract.

D. Contract.

This Contract, which may be amended, modified, or supplemented in writing only, consists of the Contract documents as defined in the Plans, *Standard Specifications, March 2020 Edition, Standard Details March 2020 Edition* as updated through advertisement, Supplemental Specifications, Special Provisions, Contract Agreement; and Contract Bonds. It is agreed and understood that this Contract will be governed by the documents listed above.

E. Certifications.

By signing below, the Contractor hereby certifies that to the best of the Contractor's knowledge and belief:

1. All of the statements, representations, covenants, and/or certifications required or set forth in the Bid and the Bid Documents, including those in the Federal Contract Provisions Supplement, and the Contract are still complete and accurate as of the date of this Agreement.
2. The Contractor knows of no legal, contractual, or financial impediment to entering into this Contract.
3. The person signing below is legally authorized by the Contractor to sign this Contract on behalf of the Contractor and to legally bind the Contractor to the terms of the Contract.

F. Offer.

The undersigned, having carefully examined the site of work, the Plans, *Standard Specifications March 2020 Edition*, *Standard Details March 2020 Edition* as updated through advertisement, Supplemental Specifications, Special Provisions, Contract Agreement; and Contract Bonds contained herein for construction of:

WIN. 024301.00 - Statewide Traffic Signal Updates - in various locations in the,

State of Maine, on which bids will be received until the time specified in the “Notice to Contractors” do(es) hereby bid and offer to enter into this contract to supply all the materials, tools, equipment and labor to construct the whole of the Work in strict accordance with the terms and conditions of this Contract at the unit prices in the attached “Schedule of Items.”

The Offeror agrees to perform the work required at the price specified above and in accordance with the bids provided in the attached “Schedule of Items” in strict accordance with the terms of this solicitation, and to provide the appropriate insurance and bonds if this offer is accepted by the Government in writing.

As Offeror also agrees:

First: To do any extra work, not covered by the attached “Schedule of Items,” which may be ordered by the Resident, and to accept as full compensation the amount determined upon a “Force Account” basis as provided in the *Standard Specifications, March 2020 Edition*, and as addressed in the contract documents.

Second: That the bid bond at 5% of the bid amount or the official bank check, cashier’s check, certificate of deposit or U. S. Postal Money Order in the amount given in the “Notice to Contractors”, payable to the Treasurer of the State of Maine and accompanying this bid, shall be forfeited, as liquidated damages, if in case this bid is accepted, and the undersigned shall fail to abide by the terms and conditions of the offer and fail to furnish satisfactory insurance and Contract bonds under the conditions stipulated in the Specifications within 15 days of notice of intent to award the contract.

Third: To begin the Work as stated in Section 107.2 of the *Standard Specifications March 2020 Edition* and complete the Work within the time limits given in the Special Provisions of this Contract.

Fourth: The Contractor will be bound to the Disadvantaged Business Enterprise (DBE) Requirements contained in the attached Notice (Additional Instructions to Bidders) and submit a completed Contractor’s Disadvantaged Business Enterprise Utilization Plan with their bid.

Fifth: That this offer shall remain open for 30 calendar days after the date of opening of bids.

Sixth: The Bidder hereby certifies, to the best of its knowledge and belief that: the Bidder has not, either directly or indirectly, entered into any agreement, participated in any collusion, or otherwise taken any action in restraint of competitive bidding in connection with its bid, and its subsequent contract with the Department.

IN WITNESS WHEREOF, the Contractor, for itself, its successors and assigns, hereby execute two duplicate originals of this Agreement and thereby binds itself to all covenants, terms, and obligations contained in the Contract Documents.

CONTRACTOR

Date

(Signature of Legally Authorized Representative
of the Contractor)

Witness

(Name and Title Printed)

G. Award.

Your offer is hereby accepted.
documents referenced herein.

This award consummates the Contract, and the

MAINE DEPARTMENT OF TRANSPORTATION

Date

By: Bruce A. Van Note, Commissioner

Witness

CONTRACT AGREEMENT, OFFER & AWARD

AGREEMENT made on the date last signed below, by and between the State of Maine, acting through and by its Department of Transportation (Department), an agency of state government with its principal administrative offices located at Child Street Augusta, Maine, with a mailing address at 16 State House Station, Augusta, Maine 04333-0016, and (Name of the firm bidding the job) a corporation or other legal entity organized under the laws of the State of Maine, with its principal place of business located at (address of the firm bidding the job)

The Department and the Contractor, in consideration of the mutual promises set forth in this Agreement (the "Contract"), hereby agree as follows:

A. The Work.

The Contractor agrees to complete all Work as specified or indicated in the Contract including Extra Work in conformity with the Contract, PIN No.0112345.00, for the **Hot Mix Asphalt Overlay** in the town/city of **South Nowhere**, County of **Washington**, Maine. The Work includes construction, maintenance during construction, warranty as provided in the Contract, and other incidental work.

The Contractor shall be responsible for furnishing all supervision, labor, equipment, tools supplies, permanent materials and temporary materials required to perform the Work including construction quality control including inspection, testing and documentation, all required documentation at the conclusion of the project, warranting its work and performing all other work indicated in the Contract.

The Department shall have the right to alter the nature and extent of the Work as provided in the Contract; payment to be made as provided in the same.

B. Time.

The Contractor agrees to complete all Work, except warranty work, on or before **November 15, 2006**. Further, the Department may deduct from moneys otherwise due the Contractor, not as a penalty, but as Liquidated Damages in accordance with Sections 107.7 and 107.8 of the *State of Maine Department of Transportation Standard Specifications, March 2020 Edition* and related Special Provisions.

C. Price.

The quantities given in the Schedule of Items of the Bid Package will be used as the basis for determining the original Contract amount and for determining the amounts of the required Performance Surety Bond and Payment Surety Bond, and that the amount of this offer is (Place bid here in alphabetical form such as One Hundred and Two dollars and 10 cents)
\$ (repeat bid here in numerical terms, such as \$102.10) Performance Bond and Payment Bond each being 100% of the amount of this Contract.

D. Contract.

This Contract, which may be amended, modified, or supplemented in writing only, consists of the Contract documents as defined in the Plans, *Standard Specifications, March 2020 Edition, Standard Details March 2020 Edition*, Supplemental Specifications, Special Provisions, Contract Agreement; and Contract Bonds. It is agreed and understood that this Contract will be governed by the documents listed above.

E. Certifications.

By signing below, the Contractor hereby certifies that to the best of the Contractor's knowledge and belief:

1. All of the statements, representations, covenants, and/or certifications required or set forth in the Bid and the Bid Documents, including those in Appendix A to Division 100 of the *Standard Specifications March 2020 Edition* (Federal Contract Provisions Supplement), and the Contract are still complete and accurate as of the date of this Agreement.
2. The Contractor knows of no legal, contractual, or financial impediment to entering into this Contract.
3. The person signing below is legally authorized by the Contractor to sign this Contract on behalf of the Contractor and to legally bind the Contractor to the terms of the Contract.

F. Offer.

The undersigned, having carefully examined the site of work, the Plans, *Standard Specifications, March 2020 Edition, Standard Details March 2020 Edition*, Supplemental Specifications, Special Provisions, Contract Agreement; and Contract Bonds contained herein for construction of:

PIN 012345.00 South Nowhere, Hot Mix Asphalt Overlay

State of Maine, on which bids will be received until the time specified in the "Notice to Contractors" do(es) hereby bid and offer to enter into this contract to supply all the materials, tools, equipment and labor to construct the whole of the Work in strict accordance with the terms and conditions of this Contract at the unit prices in the attached "Schedule of Items."

The Offeror agrees to perform the work required at the price specified above and in accordance with the bids provided in the attached "Schedule of Items" in strict accordance with the terms of this solicitation, and to provide the appropriate insurance and bonds if this offer is accepted by the Government in writing.

As Offeror also agrees:

First: To do any extra work, not covered by the attached "Schedule of Items," which may be ordered by the Resident, and to accept as full compensation the amount determined upon a "Force Account" basis as provided in the *Standard Specifications, March 2020 Edition*, and as addressed in the contract documents.

Second: That the bid bond at 5% of the bid amount or the official bank check, cashier's check, certificate of deposit or U. S. Postal Money Order in the amount given in the "Notice to Contractors", payable to the Treasurer of the State of Maine and accompanying this bid, shall be forfeited, as liquidated damages, if in case this bid is accepted, and the undersigned shall fail to abide by the terms and conditions of the offer and fail to furnish satisfactory insurance and Contract bonds under the conditions stipulated in the Specifications within 15 days of notice of intent to award the contract.

Third: To begin the Work as stated in Section 107.2 of the *Standard Specifications March 2020 Edition* and complete the Work within the time limits given in the Special Provisions of this Contract.

Fourth: The Contractor will be bound to the Disadvantaged Business Enterprise (DBE) Requirements contained in the attached Notice (Additional Instructions to Bidders) and submit a completed Contractor's Disadvantaged Business Enterprise Utilization Plan with their bid.

Fifth: That this offer shall remain open for 30 calendar days after the date of opening of bids.

Sixth: The Bidder hereby certifies, to the best of its knowledge and belief that: the Bidder has not, either directly or indirectly, entered into any agreement, participated in any collusion, or otherwise taken any action in restraint of competitive bidding in connection with its bid, and its subsequent contract with the Department.

IN WITNESS WHEREOF, the Contractor, for itself, its successors and assigns, hereby execute two duplicate originals of this Agreement and thereby binds itself to all covenants, terms, and obligations contained in the Contract Documents.

Date

(Witness Sign Here)
Witness

(Sign Here)
(Signature of Legally Authorized Representative of the Contractor)

(Print Name Here)
(Name and Title Printed)

CONTRACTOR

G. Award.

Your offer is hereby accepted. documents referenced herein.

This award consummates the Contract, and the

MAINE DEPARTMENT OF TRANSPORTATION

Date

By: Bruce A. Van Note, Commissioner

(Witness)

BOND # _____

CONTRACT PERFORMANCE BOND
(Surety Company Form)

KNOW ALL MEN BY THESE PRESENTS: That _____
_____ in the State of _____, as principal,
and.....
a corporation duly organized under the laws of the State of and having a
usual place of business
as Surety, are held and firmly bound unto the Treasurer of the State of Maine in the sum
of _____ and 00/100 Dollars (\$ _____),
to be paid said Treasurer of the State of Maine or his successors in office, for which
payment well and truly to be made, Principal and Surety bind themselves, their heirs,
executors and administrators, successors and assigns, jointly and severally by these
presents.

The condition of this obligation is such that if the Principal designated as Contractor in
the Contract to construct Project Number _____ in the Municipality of
_____ promptly and faithfully performs the Contract, then this
obligation shall be null and void; otherwise it shall remain in full force and effect.

The Surety hereby waives notice of any alteration or extension of time made by the State
of Maine.

Signed and sealed this day of, 20.....

WITNESSES:

SIGNATURES:

CONTRACTOR:

Signature.....

.....

Print Name Legibly

Print Name Legibly

SURETY:

Signature

.....

Print Name Legibly

Print Name Legibly

SURETY ADDRESS:

NAME OF LOCAL AGENCY:

.....
.....
.....

ADDRESS
.....
.....

TELEPHONE.....

.....

BOND # _____

CONTRACT PAYMENT BOND
(Surety Company Form)

KNOW ALL MEN BY THESE PRESENTS: That _____
_____ **in the State of** _____, as principal,
and.....
a corporation duly organized under the laws of the State of and having a
usual place of business in
as Surety, are held and firmly bound unto the Treasurer of the State of Maine for the use
and benefit of claimants as herein below defined, in the sum of
_____ **and 00/100 Dollars (\$** _____ **)**
for the payment whereof Principal and Surety bind themselves, their heirs, executors and
administrators, successors and assigns, jointly and severally by these presents.

The condition of this obligation is such that if the Principal designated as Contractor in
the Contract to construct Project Number _____ in the Municipality of
_____ promptly satisfies all claims and demands incurred for all
labor and material, used or required by him in connection with the work contemplated by
said Contract, and fully reimburses the obligee for all outlay and expense which the
obligee may incur in making good any default of said Principal, then this obligation shall
be null and void; otherwise it shall remain in full force and effect.

A claimant is defined as one having a direct contract with the Principal or with a
Subcontractor of the Principal for labor, material or both, used or reasonably required for
use in the performance of the contract.

Signed and sealed this day of, 20

WITNESS:

SIGNATURES:

CONTRACTOR:

Signature.....

.....

Print Name Legibly

Print Name Legibly

SURETY:

Signature.....

.....

Print Name Legibly

Print Name Legibly

SURETY ADDRESS:

NAME OF LOCAL AGENCY:

.....

ADDRESS

.....

.....

TELEPHONE

.....

"General Decision Number: ME20200035 05/08/2020

Superseded General Decision Number: ME20190035

State: Maine

Construction Type: Highway

County: Franklin County in Maine.

HIGHWAY CONSTRUCTION PROJECTS

Note: Under Executive Order (EO) 13658, an hourly minimum wage of \$10.80 for calendar year 2020 applies to all contracts subject to the Davis-Bacon Act for which the contract is awarded (and any solicitation was issued) on or after January 1, 2015. If this contract is covered by the EO, the contractor must pay all workers in any classification listed on this wage determination at least \$10.80 per hour (or the applicable wage rate listed on this wage determination, if it is higher) for all hours spent performing on the contract in calendar year 2020. If this contract is covered by the EO and a classification considered necessary for performance of work on the contract does not appear on this wage determination, the contractor must pay workers in that classification at least the wage rate determined through the conformance process set forth in 29 CFR 5.5(a)(1)(ii) (or the EO minimum wage rate, if it is higher than the conformed wage rate). The EO minimum wage rate will be adjusted annually. Please note that this EO applies to the above-mentioned types of contracts entered into by the federal government that are subject to the Davis-Bacon Act itself, but it does not apply to contracts subject only to the Davis-Bacon Related Acts, including those set forth at 29 CFR 5.1(a)(2)-(60). Additional information on contractor requirements and worker protections under the EO is available at www.dol.gov/whd/govcontracts.

Modification Number	Publication Date
0	01/03/2020
1	04/17/2020
2	05/08/2020

* ENGI0004-022 04/01/2018

	Rates	Fringes
POWER EQUIPMENT OPERATOR: Grader/Blade, Milling Machine.....	\$ 22.61	12.50

SUME2014-030 06/23/2017		

	Rates	Fringes
CARPENTER, Includes Form Work....	\$ 18.34	2.84
HIGHWAY/PARKING LOT STRIPING: Laborer.....	\$ 14.80	1.27
IRONWORKER, REINFORCING.....	\$ 16.27	0.00
LABORER: Asphalt, Includes Raker, Shoveler, Spreader and		

Distributor.....	\$ 15.40	2.69
LABORER: Common or General.....	\$ 14.45	2.16
LABORER: Landscape.....	\$ 18.69	2.70
LABORER: Wheelman.....	\$ 15.64	4.29
OPERATOR: Backhoe/Excavator/Trackhoe.....	\$ 18.80	4.16
OPERATOR: Bobcat/Skid Steer/Skid Loader.....	\$ 21.66	4.91
OPERATOR: Broom/Sweeper.....	\$ 19.09	5.20
OPERATOR: Bulldozer.....	\$ 17.30	3.50
OPERATOR: Loader.....	\$ 18.59	5.53
OPERATOR: Mechanic.....	\$ 22.07	8.73
OPERATOR: Paver (Asphalt, Aggregate, and Concrete).....	\$ 21.46	8.78
OPERATOR: Screed.....	\$ 19.02	4.82
OPERATOR: Roller (Earth).....	\$ 16.43	3.40
OPERATOR: Roller Asphalt.....	\$ 21.97	7.81
TRAFFIC CONTROL: Flagger.....	\$ 9.38	0.00
TRAFFIC CONTROL: Laborer-Cones/ Barricades/Barrels - Setter/Mover/Sweeper.....	\$ 17.47	4.80
TRUCK DRIVER: Dump Truck.....	\$ 15.07	5.15
TRUCK DRIVER: TackTruck.....	\$ 20.18	7.75

WELDERS - Receive rate prescribed for craft performing operation to which welding is incidental.

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Note: Executive Order (EO) 13706, Establishing Paid Sick Leave for Federal Contractors applies to all contracts subject to the Davis-Bacon Act for which the contract is awarded (and any solicitation was issued) on or after January 1, 2017. If this contract is covered by the EO, the contractor must provide employees with 1 hour of paid sick leave for every 30 hours they work, up to 56 hours of paid sick leave each year. Employees must be permitted to use paid sick leave for their own illness, injury or other health-related needs, including preventive care; to assist a family member (or person who is like family to the employee) who is ill, injured, or has other health-related needs, including preventive care; or for reasons resulting from, or to assist a family member (or person who is like family to the employee) who is a victim of, domestic violence, sexual assault, or stalking. Additional information on contractor requirements and worker protections under the EO is available at www.dol.gov/whd/govcontracts.

Unlisted classifications needed for work not included within the scope of the classifications listed may be added after award only as provided in the labor standards contract clauses (29CFR 5.5 (a) (1) (ii)).

The body of each wage determination lists the classification and wage rates that have been found to be prevailing for the cited type(s) of construction in the area covered by the wage determination. The classifications are listed in alphabetical order of ""identifiers"" that indicate whether the particular rate is a union rate (current union negotiated rate for local), a survey rate (weighted average rate) or a union average rate (weighted union average rate).

Union Rate Identifiers

A four letter classification abbreviation identifier enclosed in dotted lines beginning with characters other than ""SU"" or ""UAVG"" denotes that the union classification and rate were prevailing for that classification in the survey. Example: PLUM0198-005 07/01/2014. PLUM is an abbreviation identifier of the union which prevailed in the survey for this classification, which in this example would be Plumbers. 0198 indicates the local union number or district council number where applicable, i.e., Plumbers Local 0198. The next number, 005 in the example, is an internal number used in processing the wage determination. 07/01/2014 is the effective date of the most current negotiated rate, which in this example is July 1, 2014.

Union prevailing wage rates are updated to reflect all rate changes in the collective bargaining agreement (CBA) governing this classification and rate.

Survey Rate Identifiers

Classifications listed under the ""SU"" identifier indicate that no one rate prevailed for this classification in the survey and the published rate is derived by computing a weighted average rate based on all the rates reported in the survey for that classification. As this weighted average rate includes all rates reported in the survey, it may include both union and non-union rates. Example: SULA2012-007 5/13/2014. SU indicates the rates are survey rates based on a weighted average calculation of rates and are not majority rates. LA indicates the State of Louisiana. 2012 is the year of survey on which these classifications and rates are based. The next number, 007 in the example, is an internal number used in producing the wage determination. 5/13/2014 indicates the survey completion date for the classifications and rates under that identifier.

Survey wage rates are not updated and remain in effect until a new survey is conducted.

Union Average Rate Identifiers

Classification(s) listed under the UAVG identifier indicate that no single majority rate prevailed for those classifications; however, 100% of the data reported for the classifications was union data. EXAMPLE: UAVG-OH-0010

08/29/2014. UAVG indicates that the rate is a weighted union average rate. OH indicates the state. The next number, 0010 in the example, is an internal number used in producing the wage determination. 08/29/2014 indicates the survey completion date for the classifications and rates under that identifier.

A UAVG rate will be updated once a year, usually in January of each year, to reflect a weighted average of the current negotiated/CBA rate of the union locals from which the rate is based.

WAGE DETERMINATION APPEALS PROCESS

1.) Has there been an initial decision in the matter? This can be:

- * an existing published wage determination
- * a survey underlying a wage determination
- * a Wage and Hour Division letter setting forth a position on a wage determination matter
- * a conformance (additional classification and rate) ruling

On survey related matters, initial contact, including requests for summaries of surveys, should be with the Wage and Hour Regional Office for the area in which the survey was conducted because those Regional Offices have responsibility for the Davis-Bacon survey program. If the response from this initial contact is not satisfactory, then the process described in 2.) and 3.) should be followed.

With regard to any other matter not yet ripe for the formal process described here, initial contact should be with the Branch of Construction Wage Determinations. Write to:

Branch of Construction Wage Determinations
Wage and Hour Division
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

2.) If the answer to the question in 1.) is yes, then an interested party (those affected by the action) can request review and reconsideration from the Wage and Hour Administrator (See 29 CFR Part 1.8 and 29 CFR Part 7). Write to:

Wage and Hour Administrator
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

The request should be accompanied by a full statement of the interested party's position and by any information (wage payment data, project description, area practice material, etc.) that the requestor considers relevant to the issue.

3.) If the decision of the Administrator is not favorable, an interested party may appeal directly to the Administrative Review Board (formerly the Wage Appeals Board). Write to:

Administrative Review Board
U.S. Department of Labor

200 Constitution Avenue, N.W.
Washington, DC 20210

4.) All decisions by the Administrative Review Board are final.

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END OF GENERAL DECISION"

"General Decision Number: ME20200037 05/08/2020

Superseded General Decision Number: ME20190037

State: Maine

Construction Type: Highway

County: Kennebec County in Maine.

HIGHWAY CONSTRUCTION PROJECTS

Note: Under Executive Order (EO) 13658, an hourly minimum wage of \$10.80 for calendar year 2020 applies to all contracts subject to the Davis-Bacon Act for which the contract is awarded (and any solicitation was issued) on or after January 1, 2015. If this contract is covered by the EO, the contractor must pay all workers in any classification listed on this wage determination at least \$10.80 per hour (or the applicable wage rate listed on this wage determination, if it is higher) for all hours spent performing on the contract in calendar year 2020. If this contract is covered by the EO and a classification considered necessary for performance of work on the contract does not appear on this wage determination, the contractor must pay workers in that classification at least the wage rate determined through the conformance process set forth in 29 CFR 5.5(a)(1)(ii) (or the EO minimum wage rate, if it is higher than the conformed wage rate). The EO minimum wage rate will be adjusted annually. Please note that this EO applies to the above-mentioned types of contracts entered into by the federal government that are subject to the Davis-Bacon Act itself, but it does not apply to contracts subject only to the Davis-Bacon Related Acts, including those set forth at 29 CFR 5.1(a)(2)-(60). Additional information on contractor requirements and worker protections under the EO is available at www.dol.gov/whd/govcontracts.

Modification Number	Publication Date
0	01/03/2020
1	04/17/2020
2	05/08/2020

* ENGI0004-005 04/01/2018

	Rates	Fringes
POWER EQUIPMENT OPERATOR: Grader/Blade, Milling Machine, Paver (Asphalt, Aggregate, and Concrete), Roller Asphalt.....	\$ 22.61	12.50

SUME2014-032 06/23/2017

	Rates	Fringes
CARPENTER, Includes Form Work....	\$ 18.34	2.84
HIGHWAY/PARKING LOT STRIPING: Laborer.....	\$ 14.80	1.27
IRONWORKER, REINFORCING.....	\$ 16.27	0.00

LABORER: Asphalt, Includes Raker, Shoveler, Spreader and Distributor.....	\$ 15.06	2.72
LABORER: Common or General.....	\$ 14.02	2.16
LABORER: Landscape.....	\$ 18.69	2.70
LABORER: Wheelman.....	\$ 15.64	4.29
OPERATOR: Backhoe/Excavator/Trackhoe.....	\$ 19.52	5.15
OPERATOR: Bobcat/Skid Steer/Skid Loader.....	\$ 21.98	4.85
OPERATOR: Broom/Sweeper.....	\$ 19.09	5.20
OPERATOR: Bulldozer.....	\$ 17.30	3.50
OPERATOR: Loader.....	\$ 18.59	5.53
OPERATOR: Mechanic.....	\$ 21.91	8.55
OPERATOR: Screed.....	\$ 19.43	4.90
OPERATOR: Roller (Earth).....	\$ 16.43	3.40
TRAFFIC CONTROL: Flagger.....	\$ 9.38	0.00
TRAFFIC CONTROL: Laborer-Cones/ Barricades/Barrels - Setter/Mover/Sweeper.....	\$ 17.47	4.80
TRUCK DRIVER: Dump Truck.....	\$ 14.32	5.81
TRUCK DRIVER: TackTruck.....	\$ 20.18	7.75

WELDERS - Receive rate prescribed for craft performing operation to which welding is incidental.

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Note: Executive Order (EO) 13706, Establishing Paid Sick Leave for Federal Contractors applies to all contracts subject to the Davis-Bacon Act for which the contract is awarded (and any solicitation was issued) on or after January 1, 2017. If this contract is covered by the EO, the contractor must provide employees with 1 hour of paid sick leave for every 30 hours they work, up to 56 hours of paid sick leave each year. Employees must be permitted to use paid sick leave for their own illness, injury or other health-related needs, including preventive care; to assist a family member (or person who is like family to the employee) who is ill, injured, or has other health-related needs, including preventive care; or for reasons resulting from, or to assist a family member (or person who is like family to the employee) who is a victim of, domestic violence, sexual assault, or stalking. Additional information on contractor requirements and worker protections under the EO is available at www.dol.gov/whd/govcontracts.

Unlisted classifications needed for work not included within the scope of the classifications listed may be added after

award only as provided in the labor standards contract clauses (29CFR 5.5 (a) (1) (ii)).

The body of each wage determination lists the classification and wage rates that have been found to be prevailing for the cited type(s) of construction in the area covered by the wage determination. The classifications are listed in alphabetical order of ""identifiers"" that indicate whether the particular rate is a union rate (current union negotiated rate for local), a survey rate (weighted average rate) or a union average rate (weighted union average rate).

Union Rate Identifiers

A four letter classification abbreviation identifier enclosed in dotted lines beginning with characters other than ""SU"" or ""UAVG"" denotes that the union classification and rate were prevailing for that classification in the survey. Example: PLUM0198-005 07/01/2014. PLUM is an abbreviation identifier of the union which prevailed in the survey for this classification, which in this example would be Plumbers. 0198 indicates the local union number or district council number where applicable, i.e., Plumbers Local 0198. The next number, 005 in the example, is an internal number used in processing the wage determination. 07/01/2014 is the effective date of the most current negotiated rate, which in this example is July 1, 2014.

Union prevailing wage rates are updated to reflect all rate changes in the collective bargaining agreement (CBA) governing this classification and rate.

Survey Rate Identifiers

Classifications listed under the ""SU"" identifier indicate that no one rate prevailed for this classification in the survey and the published rate is derived by computing a weighted average rate based on all the rates reported in the survey for that classification. As this weighted average rate includes all rates reported in the survey, it may include both union and non-union rates. Example: SULA2012-007 5/13/2014. SU indicates the rates are survey rates based on a weighted average calculation of rates and are not majority rates. LA indicates the State of Louisiana. 2012 is the year of survey on which these classifications and rates are based. The next number, 007 in the example, is an internal number used in producing the wage determination. 5/13/2014 indicates the survey completion date for the classifications and rates under that identifier.

Survey wage rates are not updated and remain in effect until a new survey is conducted.

Union Average Rate Identifiers

Classification(s) listed under the UAVG identifier indicate that no single majority rate prevailed for those classifications; however, 100% of the data reported for the classifications was union data. EXAMPLE: UAVG-OH-0010 08/29/2014. UAVG indicates that the rate is a weighted union average rate. OH indicates the state. The next number, 0010 in the example, is an internal number used in producing the wage

determination. 08/29/2014 indicates the survey completion date for the classifications and rates under that identifier.

A UAVG rate will be updated once a year, usually in January of each year, to reflect a weighted average of the current negotiated/CBA rate of the union locals from which the rate is based.

 WAGE DETERMINATION APPEALS PROCESS

1.) Has there been an initial decision in the matter? This can be:

- * an existing published wage determination
- * a survey underlying a wage determination
- * a Wage and Hour Division letter setting forth a position on a wage determination matter
- * a conformance (additional classification and rate) ruling

On survey related matters, initial contact, including requests for summaries of surveys, should be with the Wage and Hour Regional Office for the area in which the survey was conducted because those Regional Offices have responsibility for the Davis-Bacon survey program. If the response from this initial contact is not satisfactory, then the process described in 2.) and 3.) should be followed.

With regard to any other matter not yet ripe for the formal process described here, initial contact should be with the Branch of Construction Wage Determinations. Write to:

Branch of Construction Wage Determinations
 Wage and Hour Division
 U.S. Department of Labor
 200 Constitution Avenue, N.W.
 Washington, DC 20210

2.) If the answer to the question in 1.) is yes, then an interested party (those affected by the action) can request review and reconsideration from the Wage and Hour Administrator (See 29 CFR Part 1.8 and 29 CFR Part 7). Write to:

Wage and Hour Administrator
 U.S. Department of Labor
 200 Constitution Avenue, N.W.
 Washington, DC 20210

The request should be accompanied by a full statement of the interested party's position and by any information (wage payment data, project description, area practice material, etc.) that the requestor considers relevant to the issue.

3.) If the decision of the Administrator is not favorable, an interested party may appeal directly to the Administrative Review Board (formerly the Wage Appeals Board). Write to:

Administrative Review Board
 U.S. Department of Labor
 200 Constitution Avenue, N.W.
 Washington, DC 20210

4.) All decisions by the Administrative Review Board are final.

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END OF GENERAL DECISION"

"General Decision Number: ME20200042 05/08/2020

Superseded General Decision Number: ME20190042

State: Maine

Construction Type: Highway

County: Somerset County in Maine.

HIGHWAY CONSTRUCTION PROJECTS

Note: Under Executive Order (EO) 13658, an hourly minimum wage of \$10.80 for calendar year 2020 applies to all contracts subject to the Davis-Bacon Act for which the contract is awarded (and any solicitation was issued) on or after January 1, 2015. If this contract is covered by the EO, the contractor must pay all workers in any classification listed on this wage determination at least \$10.80 per hour (or the applicable wage rate listed on this wage determination, if it is higher) for all hours spent performing on the contract in calendar year 2020. If this contract is covered by the EO and a classification considered necessary for performance of work on the contract does not appear on this wage determination, the contractor must pay workers in that classification at least the wage rate determined through the conformance process set forth in 29 CFR 5.5(a)(1)(ii) (or the EO minimum wage rate, if it is higher than the conformed wage rate). The EO minimum wage rate will be adjusted annually. Please note that this EO applies to the above-mentioned types of contracts entered into by the federal government that are subject to the Davis-Bacon Act itself, but it does not apply to contracts subject only to the Davis-Bacon Related Acts, including those set forth at 29 CFR 5.1(a)(2)-(60). Additional information on contractor requirements and worker protections under the EO is available at www.dol.gov/whd/govcontracts.

Modification Number	Publication Date
0	01/03/2020
1	04/17/2020
2	05/08/2020

* ENGI0004-022 04/01/2018

	Rates	Fringes
POWER EQUIPMENT OPERATOR: Grader/Blade, Milling Machine.....	\$ 22.61	12.50

SUME2014-037 06/23/2017		

	Rates	Fringes
CARPENTER, Includes Form Work....	\$ 18.34	2.84
HIGHWAY/PARKING LOT STRIPING: Laborer.....	\$ 14.80	1.27
IRONWORKER, REINFORCING.....	\$ 16.27	0.00
LABORER: Asphalt, Includes Raker, Shoveler, Spreader and		

Distributor.....	\$ 15.40	2.69
LABORER: Common or General.....	\$ 14.42	2.68
LABORER: Landscape.....	\$ 18.69	2.70
LABORER: Wheelman.....	\$ 15.64	4.29
OPERATOR: Backhoe/Excavator/Trackhoe.....	\$ 18.80	4.16
OPERATOR: Bobcat/Skid Steer/Skid Loader.....	\$ 21.66	4.91
OPERATOR: Broom/Sweeper.....	\$ 19.09	5.20
OPERATOR: Bulldozer.....	\$ 17.30	3.50
OPERATOR: Loader.....	\$ 18.59	5.53
OPERATOR: Mechanic.....	\$ 22.07	8.73
OPERATOR: Paver (Asphalt, Aggregate, and Concrete).....	\$ 20.92	6.19
OPERATOR: Screed.....	\$ 19.02	4.82
OPERATOR: Roller (Earth).....	\$ 16.43	3.40
OPERATOR: Roller Asphalt.....	\$ 21.56	5.42
TRAFFIC CONTROL: Flagger.....	\$ 9.38	0.00
TRAFFIC CONTROL: Laborer-Cones/ Barricades/Barrels - Setter/Mover/Sweeper.....	\$ 17.47	4.80
TRUCK DRIVER: Dump Truck.....	\$ 15.07	5.15
TRUCK DRIVER: TackTruck.....	\$ 20.18	7.75

WELDERS - Receive rate prescribed for craft performing operation to which welding is incidental.

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Note: Executive Order (EO) 13706, Establishing Paid Sick Leave for Federal Contractors applies to all contracts subject to the Davis-Bacon Act for which the contract is awarded (and any solicitation was issued) on or after January 1, 2017. If this contract is covered by the EO, the contractor must provide employees with 1 hour of paid sick leave for every 30 hours they work, up to 56 hours of paid sick leave each year. Employees must be permitted to use paid sick leave for their own illness, injury or other health-related needs, including preventive care; to assist a family member (or person who is like family to the employee) who is ill, injured, or has other health-related needs, including preventive care; or for reasons resulting from, or to assist a family member (or person who is like family to the employee) who is a victim of, domestic violence, sexual assault, or stalking. Additional information on contractor requirements and worker protections under the EO is available at www.dol.gov/whd/govcontracts.

Unlisted classifications needed for work not included within the scope of the classifications listed may be added after award only as provided in the labor standards contract clauses (29CFR 5.5 (a) (1) (ii)).

The body of each wage determination lists the classification and wage rates that have been found to be prevailing for the cited type(s) of construction in the area covered by the wage determination. The classifications are listed in alphabetical order of ""identifiers"" that indicate whether the particular rate is a union rate (current union negotiated rate for local), a survey rate (weighted average rate) or a union average rate (weighted union average rate).

Union Rate Identifiers

A four letter classification abbreviation identifier enclosed in dotted lines beginning with characters other than ""SU"" or ""UAVG"" denotes that the union classification and rate were prevailing for that classification in the survey. Example: PLUM0198-005 07/01/2014. PLUM is an abbreviation identifier of the union which prevailed in the survey for this classification, which in this example would be Plumbers. 0198 indicates the local union number or district council number where applicable, i.e., Plumbers Local 0198. The next number, 005 in the example, is an internal number used in processing the wage determination. 07/01/2014 is the effective date of the most current negotiated rate, which in this example is July 1, 2014.

Union prevailing wage rates are updated to reflect all rate changes in the collective bargaining agreement (CBA) governing this classification and rate.

Survey Rate Identifiers

Classifications listed under the ""SU"" identifier indicate that no one rate prevailed for this classification in the survey and the published rate is derived by computing a weighted average rate based on all the rates reported in the survey for that classification. As this weighted average rate includes all rates reported in the survey, it may include both union and non-union rates. Example: SULA2012-007 5/13/2014. SU indicates the rates are survey rates based on a weighted average calculation of rates and are not majority rates. LA indicates the State of Louisiana. 2012 is the year of survey on which these classifications and rates are based. The next number, 007 in the example, is an internal number used in producing the wage determination. 5/13/2014 indicates the survey completion date for the classifications and rates under that identifier.

Survey wage rates are not updated and remain in effect until a new survey is conducted.

Union Average Rate Identifiers

Classification(s) listed under the UAVG identifier indicate that no single majority rate prevailed for those classifications; however, 100% of the data reported for the classifications was union data. EXAMPLE: UAVG-OH-0010

08/29/2014. UAVG indicates that the rate is a weighted union average rate. OH indicates the state. The next number, 0010 in the example, is an internal number used in producing the wage determination. 08/29/2014 indicates the survey completion date for the classifications and rates under that identifier.

A UAVG rate will be updated once a year, usually in January of each year, to reflect a weighted average of the current negotiated/CBA rate of the union locals from which the rate is based.

WAGE DETERMINATION APPEALS PROCESS

1.) Has there been an initial decision in the matter? This can be:

- * an existing published wage determination
- * a survey underlying a wage determination
- * a Wage and Hour Division letter setting forth a position on a wage determination matter
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On survey related matters, initial contact, including requests for summaries of surveys, should be with the Wage and Hour Regional Office for the area in which the survey was conducted because those Regional Offices have responsibility for the Davis-Bacon survey program. If the response from this initial contact is not satisfactory, then the process described in 2.) and 3.) should be followed.

With regard to any other matter not yet ripe for the formal process described here, initial contact should be with the Branch of Construction Wage Determinations. Write to:

Branch of Construction Wage Determinations
Wage and Hour Division
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

2.) If the answer to the question in 1.) is yes, then an interested party (those affected by the action) can request review and reconsideration from the Wage and Hour Administrator (See 29 CFR Part 1.8 and 29 CFR Part 7). Write to:

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200 Constitution Avenue, N.W.
Washington, DC 20210

The request should be accompanied by a full statement of the interested party's position and by any information (wage payment data, project description, area practice material, etc.) that the requestor considers relevant to the issue.

3.) If the decision of the Administrator is not favorable, an interested party may appeal directly to the Administrative Review Board (formerly the Wage Appeals Board). Write to:

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200 Constitution Avenue, N.W.
Washington, DC 20210

4.) All decisions by the Administrative Review Board are final.

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END OF GENERAL DECISION"

"General Decision Number: ME20200043 05/08/2020

Superseded General Decision Number: ME20190043

State: Maine

Construction Type: Highway

County: Waldo County in Maine.

HIGHWAY CONSTRUCTION PROJECTS

Note: Under Executive Order (EO) 13658, an hourly minimum wage of \$10.80 for calendar year 2020 applies to all contracts subject to the Davis-Bacon Act for which the contract is awarded (and any solicitation was issued) on or after January 1, 2015. If this contract is covered by the EO, the contractor must pay all workers in any classification listed on this wage determination at least \$10.80 per hour (or the applicable wage rate listed on this wage determination, if it is higher) for all hours spent performing on the contract in calendar year 2020. If this contract is covered by the EO and a classification considered necessary for performance of work on the contract does not appear on this wage determination, the contractor must pay workers in that classification at least the wage rate determined through the conformance process set forth in 29 CFR 5.5(a)(1)(ii) (or the EO minimum wage rate, if it is higher than the conformed wage rate). The EO minimum wage rate will be adjusted annually. Please note that this EO applies to the above-mentioned types of contracts entered into by the federal government that are subject to the Davis-Bacon Act itself, but it does not apply to contracts subject only to the Davis-Bacon Related Acts, including those set forth at 29 CFR 5.1(a)(2)-(60). Additional information on contractor requirements and worker protections under the EO is available at www.dol.gov/whd/govcontracts.

Modification Number	Publication Date
0	01/03/2020
1	04/17/2020
2	05/08/2020

* ENGI0004-005 04/01/2018

	Rates	Fringes
POWER EQUIPMENT OPERATOR: Grader/Blade, Milling Machine, Paver (Asphalt, Aggregate, and Concrete), Roller Asphalt.....	\$ 22.61	12.50

SUME2014-038 06/23/2017

	Rates	Fringes
CARPENTER, Includes Form Work....	\$ 18.34	2.84
HIGHWAY/PARKING LOT STRIPING: Laborer.....	\$ 14.80	1.27
IRONWORKER, REINFORCING.....	\$ 16.27	0.00

LABORER: Asphalt, Includes Raker, Shoveler, Spreader and Distributor.....	\$ 15.40	2.69
LABORER: Common or General.....	\$ 13.27	1.43
LABORER: Landscape.....	\$ 18.69	2.70
LABORER: Wheelman.....	\$ 15.64	4.29
OPERATOR:		
Backhoe/Excavator/Trackhoe.....	\$ 18.80	4.16
OPERATOR: Bobcat/Skid		
Steer/Skid Loader.....	\$ 21.66	4.91
OPERATOR: Broom/Sweeper.....	\$ 19.09	5.20
OPERATOR: Bulldozer.....	\$ 17.30	3.50
OPERATOR: Loader.....	\$ 18.59	5.53
OPERATOR: Mechanic.....	\$ 22.07	8.73
OPERATOR: Screed.....	\$ 19.02	4.82
OPERATOR: Roller (Earth).....	\$ 16.43	3.40
TRAFFIC CONTROL: Flagger.....	\$ 9.38	0.00
TRAFFIC CONTROL:		
Laborer-Cones/ Barricades/Barrels -		
Setter/Mover/Sweeper.....	\$ 17.47	4.80
TRUCK DRIVER: Dump Truck.....	\$ 13.98	7.90
TRUCK DRIVER: TackTruck.....	\$ 20.18	7.75

WELDERS - Receive rate prescribed for craft performing operation to which welding is incidental.

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Note: Executive Order (EO) 13706, Establishing Paid Sick Leave for Federal Contractors applies to all contracts subject to the Davis-Bacon Act for which the contract is awarded (and any solicitation was issued) on or after January 1, 2017. If this contract is covered by the EO, the contractor must provide employees with 1 hour of paid sick leave for every 30 hours they work, up to 56 hours of paid sick leave each year. Employees must be permitted to use paid sick leave for their own illness, injury or other health-related needs, including preventive care; to assist a family member (or person who is like family to the employee) who is ill, injured, or has other health-related needs, including preventive care; or for reasons resulting from, or to assist a family member (or person who is like family to the employee) who is a victim of, domestic violence, sexual assault, or stalking. Additional information on contractor requirements and worker protections under the EO is available at www.dol.gov/whd/govcontracts.

Unlisted classifications needed for work not included within the scope of the classifications listed may be added after

award only as provided in the labor standards contract clauses (29CFR 5.5 (a) (1) (ii)).

The body of each wage determination lists the classification and wage rates that have been found to be prevailing for the cited type(s) of construction in the area covered by the wage determination. The classifications are listed in alphabetical order of ""identifiers"" that indicate whether the particular rate is a union rate (current union negotiated rate for local), a survey rate (weighted average rate) or a union average rate (weighted union average rate).

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Union prevailing wage rates are updated to reflect all rate changes in the collective bargaining agreement (CBA) governing this classification and rate.

Survey Rate Identifiers

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A UAVG rate will be updated once a year, usually in January of each year, to reflect a weighted average of the current negotiated/CBA rate of the union locals from which the rate is based.

 WAGE DETERMINATION APPEALS PROCESS

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2.) If the answer to the question in 1.) is yes, then an interested party (those affected by the action) can request review and reconsideration from the Wage and Hour Administrator (See 29 CFR Part 1.8 and 29 CFR Part 7). Write to:

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END OF GENERAL DECISION"

LABORER: Asphalt, Includes Raker, Shoveler, Spreader and Distributor.....	\$ 17.53	2.13
LABORER: Common or General.....	\$ 15.11	2.46
LABORER: Epoxy Injector (Concrete).....	\$ 13.43	1.15
LABORER: Wheelman.....	\$ 20.97	5.13
OPERATOR: Backhoe/Excavator/Trackhoe.....	\$ 20.58	3.81
OPERATOR: Bobcat/Skid Steer/Skid Loader.....	\$ 23.66	0.97
OPERATOR: Broom/Sweeper.....	\$ 19.49	0.00
OPERATOR: Bulldozer.....	\$ 21.71	5.67
OPERATOR: Grader/Blade.....	\$ 27.40	8.13
OPERATOR: Loader.....	\$ 18.91	3.27
OPERATOR: Mechanic.....	\$ 24.71	7.83
OPERATOR: Milling Machine.....	\$ 27.44	6.37
OPERATOR: Paver (Asphalt, Aggregate, and Concrete).....	\$ 20.17	4.83
OPERATOR: Roller (Earth).....	\$ 16.52	1.66
OPERATOR: Roller Asphalt.....	\$ 19.64	6.09
TRAFFIC CONTROL: Flagger.....	\$ 10.33	0.00
TRAFFIC CONTROL: Laborer-Cones/ Barricades/Barrels - Setter/Mover/Sweeper.....	\$ 17.84	5.91
TRUCK DRIVER: Dump Truck.....	\$ 19.99	4.00

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END OF GENERAL DECISION

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State of Maine
 Department of Labor
 Bureau of Labor Standards
 Augusta, Maine 04333-0045
 Telephone (207) 623-7906

Wage Determination - In accordance with 26 MRS §1301 et. seq., this is a determination by the Bureau of Labor Standards, of the fair minimum wage rate to be paid to laborers and workers employed on the below titled project.

**2020 Fair Minimum Wage Rates
 Highway & Earth Statewide**

<u>Occupation Title</u>	<u>Minimum</u>	<u>Minimum</u>	<u>Total</u>	<u>Occupation Title</u>	<u>Minimum</u>	<u>Minimum</u>	<u>Total</u>
	<u>Wage</u>	<u>Benefit</u>			<u>Wage</u>	<u>Benefit</u>	
Asphalt Raker	\$16.00	\$0.00	\$16.00	Laborers (Helpers & Tenders)	\$15.59	\$0.56	\$16.15
Backhoe Loader Operator	\$20.00	\$2.60	\$22.60	Laborer - Skilled	\$18.00	\$1.20	\$19.20
Boom Truck (Truck Crane) Operator	\$25.00	\$4.94	\$29.94	Loader Operator - Front-End	\$19.47	\$3.00	\$22.47
Bulldozer Operator	\$21.50	\$4.52	\$26.02	Mechanic- Maintenance	\$22.00	\$3.09	\$25.09
Carpenter	\$22.46	\$2.19	\$24.65	Millwright	\$29.82	\$7.73	\$37.55
Cement Mason/Finisher	\$16.00	\$4.04	\$20.04	Painter	\$18.00	\$0.45	\$18.45
Crane Operator =>15 Tons)	\$30.00	\$7.76	\$37.76	Paver Operator	\$20.50	\$0.44	\$20.94
Crusher Plant Operator	\$20.50	\$5.33	\$25.83	Pipelayer	\$23.78	\$1.60	\$25.38
Driller - Rock	\$12.00	\$8.82	\$20.82	Plumber (Licensed)	\$26.00	\$4.50	\$30.50
Electrician - Licensed	\$28.00	\$6.27	\$34.27	Reclaimer Operator	\$22.91	\$13.25	\$36.16
Electrician Helper/Cable Puller	\$18.00	\$1.84	\$19.84	Roller Operator - Earth	\$16.00	\$0.24	\$16.24
Elevator Constructor/Installer	\$20.00	\$1.78	\$21.78	Roller Operator - Pavement	\$19.50	\$3.70	\$23.20
Excavator Operator	\$21.50	\$3.08	\$24.58	Screed/Wheelman	\$18.43	\$1.24	\$19.67
Fence Setter	\$18.00	\$1.30	\$19.30	Stone Mason	\$20.00	\$0.42	\$20.42
Flagger	\$13.00	\$0.00	\$13.00	Truck Driver - Light	\$16.00	\$0.44	\$16.44
Grader/Scraper Operator	\$20.00	\$0.65	\$20.65	Truck Driver - Medium	\$19.00	\$1.97	\$20.97
Highway Worker/Guardrail Installer	\$18.25	\$1.66	\$19.91	Truck Driver - Heavy	\$17.19	\$0.85	\$18.04
Hot Top Plant Operator	\$22.91	\$13.25	\$36.16	Truck Driver - Tractor Trailer	\$17.00	\$0.00	\$17.00
Ironworker - Reinforcing	\$29.23	\$7.18	\$36.41	Truck Driver - Mixer (Cement)	\$17.25	\$2.26	\$19.51
Ironworker - Structural	\$26.01	\$22.27	\$48.28				

The Laborer classifications include a wide range of work duties. Therefore, if any specific occupation to be employed on this project is not listed in this determination, call the Bureau of Labor Standards at the above number for further clarification.

Welders are classified in the trade to which the welding is incidental.

Apprentices – The minimum wage rate for registered apprentices are those set forth in the standards and policies of the Maine State Apprenticeship and Training Council for approved apprenticeship programs.

Title 26 §1310 requires that a clearly legible statement of all fair minimum wage and benefits rates to be paid the several classes of laborers, workers and mechanics employed on the construction on the public work must be kept posted in a prominent and easily accessible place at the site by each contractor and subcontractor subject to sections 1304 to 1313.

Appeal – Any person affected by the determination of these rates may appeal to the Commissioner of Labor by filing a written notice with the Commissioner stating the specific grounds of the objection within ten (10) days from the filing of these rates.

A true copy

Attest: Scott R. Cotnoir
 Scott R. Cotnoir
 Wage & Hour Director
 Bureau of Labor Standards

Expiration Date: 12-31-2020

SPECIAL PROVISION
SECTION 103
AWARD AND CONTRACTING
(Post-Bid, Pre-Award Qualifications)

Amend Section 103 of the Standard Specifications by adding the following:

After the Bid Opening, and as a condition for Award of the Contract, the lowest responsive bidder must complete a Maine Department of Transportation Project Specific Prequal which consists of a Highway and/or Traffic Signals/Lighting Prequalification Category, AND include an employee or subcontractor that can demonstrate the requisite experience (to the Department's satisfaction) to provide system integration services as described in Special Provision 643, 654, and 718 and as described in the Post-bid Qualification Submittal Contractor Requirements below. The Contractor's Safety Plan shall have a section on working with COVID-19. The Department may provide the Bidder with written Notice of Post-Bid Qualifications requiring the Bidder to provide written documentation presenting evidence of qualifications beyond these specifications.

Contractor Requirements

In order to be considered for the award of this contract, the Bidder and/or key local employees/subcontractors that will be assigned to the Work in this Contract shall demonstrate to the Department's satisfaction that they have satisfactorily completed at least four of the critical components of this Work as listed below in the previous five years

- Installation of ATC, ATCC, CMS, ASCT, and SPM system equipment and hardware.
- Installation, configuration and integration of CV on board units (OBU) and roadside units (RSU) that provide dual wireless technologies (cellular vehicle-to-everything [C-V2X] and dedicated short-range communications [DSRC]).
- Development and execution of transportation technology systems training materials and testing plans.
- Configuration and integration of ATC, ATCC, CMS, ASCT, CV and SPM system equipment and system data into a single integrated cloud-based system.
- Integration of different manufacturers ATC controllers into the Contractor-supplied CMS and SPM system. This is to include all applicable NTCIP MIB's to allow for full operation and adjustment of local controller from the CMS.
- Installation/Modification of sidewalk curb ramps that are fully compliant with Americans with Disabilities (ADA) requirements for public rights-of-way in the State of Maine.

The Contractor shall maintain all applicable and current licenses, authorizations, ratings and registrations for the duration of the contract.

The Contractor shall submit two copies or an electronic copy of all required submittals to the Department.

103.5 Award Conditions

In addition to the requirements of Standard Specification 103.5, the Apparent Low Bidder will be required to submit a completed matrix of “Compliance with Functional Requirements Manufacturer List” found in Special Provision 718 (or wherever it is located) within 14 days of notification of intent to award letter from the Department.

SPECIAL PROVISION
SECTION 104
(WAGE RATES)

When two or more wage rate schedules appear in the bid Book, the highest rate shall prevail for each classification.

SPECIAL PROVISIONS
SECTION 104
Utilities

UTILITY COORDINATION

The contractor has primary responsibility for coordinating their work with utilities after contract award. The contractor shall communicate directly with the utilities regarding any utility work necessary to maintain the contractor's schedule and prevent project construction delays. The contractor shall notify the resident of any issues.

THE CONTRACTOR SHALL PLAN AND CONDUCT WORK ACCORDINGLY.

MEETING

A Pre-Utility Conference, as defined in Subsection 104.4.6 of the Standard Specifications **is** required. The intent shall be to coordinate a Pre-Utility Conference prior to performing the MaineDOT contract work activities in each municipality. A Pre-Utility Conference can be combined whenever the municipality geographic location deems appropriate.

GENERAL INFORMATION

These Special Provisions outline the arrangements that have been made by the Department for utility work to be undertaken in conjunction with this project. The below table identifies all known utilities and railroads having facilities presently located or intending to install facilities within the limits of each specified intersection.

Unless otherwise specified, any subsurface utility facilities shown on the project plans represent approximate locations gathered from available information. The Department cannot certify the level of accuracy of this data. Subsurface facilities indicated on the topographic sheets (plan views) have been collected from historical records and/or on-site designations provided by the respective utility companies. Subsurface facilities indicated on the cross-sections have been carried over from the plan view data and may also include further approximations of the elevations (depths) based upon straight-line interpolation from the nearest manholes, gate valves, or test pits.

Utilities have been notified and shall be furnished a project booklet and plan set electronically.

Utility Overview Information

Cities: Augusta/Belfast/Gardiner/Sanford/Waterville/Winslow
Towns: Benton/China/Fairfield/Farmington/
Norridgewock/Oakland/Randolph
Project: #24301_Build Grant Traffic Signal Modernization
Date: 09/11/20

Utility	Aerial	Subsurface	Rail	City/Town
Consolidated Communications of Northern New England Company	X	X		Augusta/Belfast/Benton/Fairfield/Farmington/Gardiner/Randolph/Oakland/Sanford/Waterville/Winslow
Consolidated Communications of Maine Company	X	X		China
Central Maine Power (CMP)	X			Augusta/Belfast/Benton/China/Fairfield/Farmington/Gardiner/Randolph/Norridgewock/Oakland/Sanford/Waterville/Winslow
Spectrum_Charter Communications	X	X		Augusta/Belfast/Benton/China/Fairfield/Gardiner/Randolph/Norridgewock/Oakland/Waterville/Winslow
Otelco	X	X		Augusta/Waterville
MaineCom	X			Augusta
FirstLight Fiber	X	X		Augusta/Belfast/Fairfield/Gardiner/Randolph/Sanford
GWI_Greater Works Internet	X			Augusta
Lincolntonville Communications	X			Belfast
UniTel/UniCap	X			Belfast
TDS Telecom	X	X		Norridgewock
Greater Augusta Utility District		X		Augusta
Belfast Water District		X		Belfast
City of Belfast_wastewater		X		Belfast
Kennebec Water District		X		Benton/Fairfield/Waterville/Winslow
Fairfield Sewer District		X		Fairfield
Kennebec Sanitary Treatment District		X		Fairfield
Farmington Village Corp_water		X		Farmington
Town of Farmington_wastewater		X		Farmington
Gardiner Water District		X		Gardiner/Randolph
City of Gardiner_wastewater		X		Gardiner
Town of Randolph wasterwater		X		Randolph
Norridgewock Water District		X		Norridgewock
Town of Norridgewock_wastewater		X		Norridgewock
Town of Oakland_Maine Water Co.		X		Oakland
Town of Oakland_wastewater		X		Oakland
Sanford Water District		X		Sanford
Sanford Sewage District		X		Sanford
SanfordNet Fiber	X			Sanford
Waterville Sewage District		X		Waterville
City of Winslow_wastewater		X		Winslow
Maine Natural Gas (MNG)		X		Augusta
Summit Natural Gas (SNG)		X		Augusta/Fairfield/Gardiner/Randolph/Norridgewock/Oakland/Waterville/Winslow
Unitil Corp.		X		Sanford
MaineDOT Rail			X	Augusta/Gardiner
Springfield Terminal Railway			X	Waterville/Winslow

Cities: Augusta/Belfast/Gardiner/Sanford/Waterville/Winslow
 Towns: Benton/China/Fairfield/Farmington/
 Norridgewock/Oakland/Randolph
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Utility Contact Information			
Utility	Contact Person	Contact Phone (office)	City/Town
Consolidated Communications of Northern New England Company	Marty Pease	535-4208	Augusta/Belfast/Benton/Fairfield/Farmington/Gardiner/Randolph/Oakland/Sanford/Waterville/Winslow
Consolidated Communications of Maine Company	Marty Pease	535-4208	China
Central Maine Power (CMP)	Aaron Grenier	629-9517	Augusta/China/Gardiner/Randolph
Central Maine Power (CMP)	Steve Cookson	629-1705	Belfast
Central Maine Power (CMP)	Kristian Suttie	453-5612	Benton/Fairfield/Oakland/Waterville/Winslow
Central Maine Power (CMP)	Scott Raymond	629-6701	Farmington/Norridgewock
Central Maine Power (CMP)	Wayne Brown	629-2531	Sanford
Spectrum_Charter Communications	Dave Bouchard	620-3411	Augusta/Gardiner/Randolph
Spectrum_Charter Communications	Chris Verzoni	320-3416	Belfast/China/Norridgewock/Oakland/Waterville/Winslow
Otelco	Jim Knight	688-8284	Augusta/Waterville
MaineCom	Mike Atwater	557-1591	Augusta
FirstLight Fiber	Jonathan Rovillard	520-8238	Augusta/Fairfield/Sanford
FirstLight Fiber	Tim LaBreck	956-6657	Belfast/Farmington
GWI_Greater Works Internet	Keith Ellis	877-214-2009	Augusta
Lincolntonville Communications	Louis Rector	563-3339	Belfast
UniTel/UniCap	John Smith	948-3903	Belfast
TDS Telecom	Ron Troyer	603-746-2090	Norridgewock
Greater Augusta Utility District	Michael Morey	622-3701	Augusta
Belfast Water District	Keith Pooler	338-1200	Belfast
City of Belfast_wastewater	Bob Richards	338-2375	Belfast
Kennebec Water District	Jeff Longfellow Jared Bragdon	872-2763	Benton/Fairfield/Waterville/Winslow
Fairfield Sewer District	Bruce Williams	453-6551	Fairfield
Kennebec Sanitary Treatment District	Lynn Woodard	873-0611	Fairfield
Farmington Village Corp_water	Thomas Holt	778-4777	Farmington
Town of Farmington_wastewater	Stephen Millett	778-4712	Farmington
Gardiner Water District	Paul Gray	582-5500	Gardiner/Randolph
City of Gardiner_wastewater	Douglas Clark	582-1351	Gardiner
Town of Randolph_wastewater	Art Forland	582-5808	Randolph
Norridgewock Water District	Dave Jones Andy Gilson	634-3330	Norridgewock
Town of Norridgewock_wastewater	Tim Lyman	634-4738	Norridgewock
Town of Oakland_Maine Water Co.	Travis Bickford	474-3521	Oakland
Town of Oakland_wastewater	Daniel Bolduc	465-7198	Oakland
Sanford Water District	Keith Lavoisier	324-2312	Sanford
Sanford Sewage District	Andre Brousseau	324-5313	Sanford
table continues to the next sheet			
Sanford Sewage District	Dan Davis	324-5313	Sanford
City of Sanford_public works director	Mathew Hill	324-9135	Sanford
City of Sanford_fire chief	Chief Steven	324-9160	Sanford

Cities: Augusta/Belfast/Gardiner/Sanford/Waterville/Winslow
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	Benotti		
SanfordNet Fiber	Keith Ellis_GWI	214-2009	Sanford
City of Waterville_ assistant engineer	John Lombardi	680-4743	Waterville
Waterville Sewerage District	Tyler Mitchell Steve Bard	873-5191	Waterville
City of Winslow_ wastewater	Paul Fongemie	872-1972	Winslow
Maine Natural Gas	Joe Gauthier	729-0420	Augusta
Summit Natural Gas	Bryan Foster Bryan Haberman	621-8000	Augusta/Fairfield/Gardiner/ Randolph/Norridgewock/ Oakland/Waterville/Winslow
Unitil Corp.	Derick Giroux	536-5663	Sanford
MaineDOT Rail	Greg Gay	592-1766	Augusta/Gardiner
Springfield Terminal Railway	Shawn Higgins	978-663-1127	Waterville/Winslow
MaineDOT Electrical	Ron Cote	446-2305	All Municipalities

Temporary utility adjustments **are not** anticipated as part of this project. If any unexpected utility relocations become necessary, they shall be scheduled in compliance with Section 104 of the Standard Specifications and shall be performed by the appropriate utility company in conjunction with the work by the Contractor. Should the contractor choose to have any poles temporarily relocated, all work shall be done at the Contractor's request and expense, with no additional cost or schedule impacts to the Department.

All adjustments are to be made by the respective utility unless otherwise specified herein.

Utility working days are Monday through Friday. Times are estimated on the basis of a single crew for each utility. Any times and dates mentioned are **estimates only** and dependent upon favorable weather, working conditions, and freedom from emergencies. The Contractor shall have no claim against the Department if they are exceeded.

The contractor shall give notification of **ten (10) working days** to all existing utility companies prior to beginning any work in each individual municipality.

**** Specific information regarding the line voltage can be requested from Central Maine Power****

AERIAL

Aerial utility adjustments **are not** anticipated as part of this project. If any unexpected utility relocations become necessary, they shall be scheduled in compliance with Section 104 of the Standard Specifications and shall be done by the utilities in conjunction with the work by the Contractor.

When a new electric service account is required for an MaineDOT project, the contractor shall contact Ron Cote (MaineDOT representative) for establishing a new account with the appropriate power company. The contractor shall provide the following information for the new
 msl_utility coordinator

account: electrician name performing the work; the voltage and amperage; the municipality (town/city), street name and existing pole set number; the distance from the existing pole to the new control cabinet; and the existing meter number. The contractor shall allow a twenty-eight (28) day minimum duration for establishment of a new account.

The aerial utilities have existing service lines crossing the highway corridor at each intersection. Each of the existing service lines provide a source of power or communication to the surrounding residents or commercial properties.

If the work activities within the intersection show to cause-a-risk to any of the power lines surrounding the intersections, the contractor shall contact the power service company to coordinate/oversee/install/remove line protection safety materials.

Utility Specific Information:

CITY OF AUGUSTA:

Consolidated Communications of Northern New England Company:

Consolidated Communications of Northern New England Company has aerial facilities existing at the following intersections that have old/cut-off poles:

- Civic Center Drive/Leighton Road (sheet #6)
- Civic Center Dr/Community Dr/Townsend Road (sheet #8): one new pedestal foundation
- Eastern Avenue/Spring Road/Togus Road (sheet #11)
- North Belfast Avenue/Church Hill Road (sheet #13)
- South Belfast Avenue/Cony Road/Church Hill Road (sheet #18)
- Western Avenue/Orchard Street/Meadow Road (sheet #26)
- Civic Center Drive/Wilson Street (sheet #33): one new pedestal foundation

The contractor is responsible for coordination with Consolidated to complete the transfers for the remaining aerial lines and remove the remaining old/cut-off poles. At a number of these intersections the old/cut-off pole quantity could be up to four (4), and the locations extend into the corridors.

CITY OF BELFAST:

No adjustments are anticipated for the aerial facilities.

TOWN OF BENTON:

No adjustments are anticipated for the aerial facilities.

TOWN OF CHINA:

No adjustments are anticipated for the aerial facilities.

TOWN OF FAIRFIELD:

No adjustments are anticipated for the aerial facilities.

TOWN OF FARMINGTON:

No adjustments are anticipated for the aerial facilities.

CITY OF GARDINER:

No adjustments are anticipated for the aerial facilities.

TOWN NORRIDGWOCK:

No adjustments are anticipated for the aerial facilities.

TOWN OF OAKLAND:

No adjustments are anticipated for the aerial facilities.

TOWN OF RANDOLPH:

No adjustments are anticipated for the aerial facilities.

CITY OF SANFORD:

Consolidated Communications of Northern New England Company:

Consolidated Communications of Northern New England Company has aerial facilities existing at the following intersections that need coordination of F12 fiber cable attachment to existing pole sets:

- Main Street/Walmart entrance (sheet #60)
- Main Street/Jagger Mill Road (sheet #61)
- Main Street/Shaw's entrance (sheet #62)
- Main Street/Westview Drive (sheet #63)
- Main Street/Old Mill Road (sheet #64)
- Main Street/Emery Street (sheet #65):
- Winter Street/Cottage Street/River Street (sheet #69)
- Pleasant Street/Shaw's Ridge Road/River Street (sheet #71)
- Cottage Street/Grammar Street/Route #224 (sheet #72)
- Main Street/Nason Street/Maple Street (no sheet): Wireless equipment attaching.

The contractor is responsible for coordination with Consolidated for line transfers and removal of old/cut-off poles (4 total) at the Winter Street/Cottage Street/River Street intersection (sheet #69). The existing old/cut-off poles are in the vicinity of the intersection and along the corridor.

Central Maine Power (CMP):

Central Maine Power has aerial facilities existing at the following intersections that need coordination of F12 fiber cable attachment to existing pole sets:

- Main Street/Walmart entrance (sheet #60)
- Main Street/Jagger Mill Road (sheet #61)

- Main Street/Shaw's entrance (sheet #62)
- Main Street/Westview Drive (sheet #63)
- Main Street/Old Mill Road (sheet #64)
- Main Street/Emery Street (sheet #65)

Cities: Augusta/Belfast/Gardiner/Sanford/Waterville/Winslow
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- Winter Street/Cottage Street/River Street (sheet #69)
- Pleasant Street/Shaw's Ridge Road/River Street (sheet #71)
- Cottage Street/Grammar Street/Route #224 (sheet #72)
- Main Street/Nason Street/Maple Street (no sheet): Wireless equipment attaching.

CITY OF WATERVILLE:

No adjustments are anticipated for the aerial facilities.

CITY OF WINSLOW:

No aerial adjustments are anticipated for the aerial facilities.

SUBSURFACE

Subsurface utility adjustments **are not** anticipated as part of this project. If any unexpected utility relocations become necessary, they shall be scheduled in compliance with Section 104 of the Standard Specifications and shall be done by the utilities in conjunction with the work by the Contractor.

At each intersection (104 total), electrical subsurface facilities exist feeding power to a traffic control cabinet which directs electrical service to the existing/new strain poles, mast-arm poles, and pedestal poles. The contractor is responsible for coordinating with a municipality representative or a MaineDOT representative the location of these electrical subsurface facilities prior to performing any excavation activities at the intersection. Each intersection shall receive a new traffic control cabinet. These new cabinets shall utilize existing or new construction concrete foundations (48" typical depth).

The new strain pole, mast-arm pole and pedestal pole locations are identified at each intersection by the letters A, B, C or D. These letters representing the intersection corners, and the letter M and a number representing a mast arm and quantity. The letter A identification shall begin at the intersection corner where the new traffic control cabinet is shown, traveling clockwise with the lettering.

The utilities companies listed below represent existing subsurface active facilities that feed the surrounding areas with communication, water, sewer or natural gas services. Prior to performing excavation work activities, the contractor is responsible for confirming with a utility representative the locations of the existing subsurface facilities at each intersection.

CITY OF AUGUSTA:

Utility Specific Information:

Consolidated Communications of Northern New England Company:

Consolidated Communications of Northern New England Company has subsurface facilities existing at the following intersections (18 total):

- Capital Street/Sewell Street (sheet #1): one new pedestal foundation
- Civic Center Drive/I-95 Northbound Ramps (sheet #4)
- Civic Center Drive/I-95 Southbound Ramps (sheet #5)
- Civic Center Drive/University Drive (sheet #7): one new pedestal foundation
- Eastern Avenue/Hospital Street/Stone Street (sheet #10): three (3) new pedestal foundations
- North Belfast Avenue/Church Hill Road (sheet #13)
- Route #3/Riverside Drive (sheet #15)
- State Street/Capital Street (sheet #19): three (3) new pedestal foundations
- State Street/Union Street (sheet #20)
- Western Avenue/Edison Drive (sheet #25): three (3) new pedestal foundations
- Western Avenue/Sewell Street (sheet #28): three (3) new pedestal foundations
- Western Avenue/Shuman Avenue (sheet #29)
- State Street/Winthrop Street (sheet #34)
- State Street/Bridge Street (sheet #35): two (2) new pedestal foundations
- Water Street/Bridge Street (sheet #36): three (3) new mast-arm foundations
- Cony Street/Willow Street (sheet #37): one new pedestal foundation
- Bangor Street/Linden Street/Quimby Street (sheet #38): four (4) new pedestal foundations
- Bangor Street/Locke Street (sheet #39): four (4) new pedestal foundation

These subsurface facilities consist of communication conduits encased in bituminous or concrete material with an average cover depth of 24" to top of encasement; and manhole structures varying in size. No adjustments are anticipated for the Consolidated facilities.

Spectrum-Charter Communications:

Spectrum-Charter Communications has subsurface facilities existing at the following intersections (8 total):

- Capital Street/Sewell Street (sheet #1): one new pedestal foundation
- Civic Center Drive/Commerce Drive (sheet #2): one new pedestal foundation
- Civic Center Drive/University Drive (sheet #7): one new pedestal foundation
- Stone Street/Hannaford Drive (sheet #21): one new pedestal foundation
- Western Avenue/Crossing Way (sheet #24): one new pedestal foundation
- Western Avenue/Senator Way (sheet #27): two (2) new pedestal foundation
- Water Street/Bridge Street (sheet #36): three (3) new mast-arm foundations
- Cony Street/Willow Street (sheet #37): one new pedestal foundation

These surface facilities could utilize empty conduits, owned by Consolidated, encased in bituminous or concrete materials. No adjustments are anticipated for the Spectrum facilities.

Otelco:

Otelco has subsurface facilities existing at the following intersections (8 total):

- Civic Center Drive/Commerce Drive (sheet #2): one new pedestal foundation
- Civic Center Drive/Darin Drive/Blue Star Avenue (sheet #3): one new pedestal foundation

- Civic Center Drive/Leighton Road (sheet #6)
- Western Avenue /Edison Drive (sheet #25): three (3) new pedestal foundations
- Civic Center Drive/Wilson Street (sheet #33): one new pedestal foundation
- State Street/Bridge Street (sheet #35): two (2) new pedestal foundations
- Water Street/Bridge Street (sheet #36): three (3) new mast-arm foundations
- Cony Street/Willow Street (sheet #37): one new pedestal foundation

These surface facilities could utilize empty conduits, owned by Consolidated, encased in bituminous or concrete materials. No adjustments are anticipated for the Otelco facilities.

FirstLight Fiber:

FirstLight Fiber has subsurface facilities existing at the following intersections (2 total):

- Civic Center Drive/Commerce Drive (sheet #2): one new pedestal foundation
- Civic Center Drive/Leighton Road (sheet #6)

No adjustments are anticipated for the FirstLight facilities.

Greater Augusta Utility District (GAUD):

Greater Augusta Utility District represents both water/sewer existing subsurface facilities at the following intersections (35 total):

- Capital Street/Sewell Street (sheet #1): one new pedestal foundation
- Civic Center Drive/Commerce Drive (sheet #2): one new pedestal foundation
- Civic Center Drive/Darin Drive/Blue Star Avenue (sheet #3): one new pedestal foundation
- Civic Center Drive/I-95 Northbound Ramps (sheet #4)
- Civic Center Drive/I-95 Southbound Ramps (sheet #5)
- Civic Center Drive/Leighton Road (sheet #6)
- Civic Center Drive/University Drive (sheet #7): one new pedestal foundation
- Civic Center Dr/Community Dr/Townsend Road (sheet #8): one new pedestal foundation
- Eastern Avenue/Cony Road (sheet #9): one new pedestal foundation
- Eastern Avenue/Hospital Street/Stone Street (sheet #10): three (3) new pedestal foundations
- Eastern Avenue/Spring Road/Togus Road (sheet #11)
- Hospital Street/Piggery Road/Tyson Dr (sheet #12): one new pedestal foundations
- Route #3/Riverside Drive (sheet #15)
- Senator Way/Crossing Way (sheet #17)
- State Street/Capital Street (sheet #19): three (3) new pedestal foundations
- State Street/Union Street (sheet #20)
- Stone Street/Hannaford Drive (sheet #21): one new pedestal foundation
- Western Avenue/Airport Road (sheet #22): three (3) new pedestal foundations
- Western Avenue/Armory Street (sheet #23): three (3) new pedestal foundations
- Western Avenue/Crossing Way (sheet #24): one new pedestal foundation
- Western Avenue/Edison Drive (sheet #25): three (3) new pedestal foundations

- Western Avenue/Orchard Street/Meadow Road (sheet #26)
- Western Avenue/Senator Way (sheet #27): two (2) new pedestal foundation
- Western Avenue/Sewell Street (sheet #28): three (3) new pedestal foundations
- Western Avenue/Shuman Avenue (sheet #29)

- Western Avenue/U-Haul Drive (sheet #30)
- Western Avenue/Whitten Road (sheet #31)
- Old Belgrade/Henrys Way/Medical Center PK (sheet #32): one new pedestal foundation
- State Street/Winthrop Street (sheet #34)
- State Street/Bridge Street (sheet #35): two (2) new pedestal foundations
- Water Street/Bridge Street (sheet #36): three (3) new mast-arm foundations
- Cony Street/Willow Street (sheet #37): one new pedestal foundation
- Bangor Street/Linden Street/Quimby Street (sheet #38): four (4) new pedestal foundations
- Bangor Street/Locke Street (sheet #39): four (4) new pedestal foundation
- Whitten Road/Hannaford Drive (sheet #40)

These existing facilities consist of a water main system and a sewer main system, various in pipe sizes, each having attached water and sewer service piping routing to adjacent properties. No adjustments are anticipated for the GAUD facilities.

Summit Natural Gas (SNG):

Summit Natural Gas has subsurface facilities existing at the following intersections (24 total):

- Capital Street/Sewell Street (sheet #1): one new pedestal foundation
- Civic Center Drive/Commerce Drive (sheet #2): one new pedestal foundation
- Civic Center Drive/Darin Drive/Blue Star Avenue (sheet #3): one new pedestal foundation
- Civic Center Drive/I-95 Northbound Ramps (sheet #4)
- Civic Center Drive/I-95 Southbound Ramps (sheet #5)
- Civic Center Drive/Leighton Road (sheet #6)
- Civic Center Drive/University Drive (sheet #7): one new pedestal foundation
- Civic Center Dr/Community Dr/Townsend Road (sheet #8): one new pedestal foundation
- Eastern Avenue/Cony Road (sheet #9): one new pedestal foundation
- North Belfast Avenue/Church Hill Road (sheet #13)
- Route #3/North Belfast Avenue (sheet #14)
- Route #3/Riverside Drive (sheet #15)
- South Belfast Avenue/Cony Road/Church Hill Road (sheet #18)
- Western Avenue/Airport Road (sheet #22): three (3) new pedestal foundations
- Western Avenue/Armory Street (sheet #23): three (3) new pedestal foundations
 - a. At B-corner a gas pipe exists near the location where B-P1 pedestal foundation shall be installed. Coordination of this pedestal foundation location needs to occur.
- Western Avenue/Sewell Street (sheet #28): three (3) new pedestal foundations
- Western Avenue/U-Haul Drive (sheet #30)
- Old Belgrade/Henrys Way/Medical Center PK (sheet #32): one new pedestal foundation
- State Street/Winthrop Street (sheet #34)
- State Street/Bridge Street (sheet #35): two (2) new pedestal foundations
- Water Street/Bridge Street (sheet #36): three (3) new mast-arm foundations

- Cony Street/Willow Street (sheet #37): one new pedestal foundation
- Bangor Street/Linden Street/Quimby Street (sheet #38): four (4) new pedestal foundations
 - a. At D-corner a gas pipe exists near the location where D-P1 pedestal foundation shall be installed. Coordination of this pedestal foundation location needs to occur.

- Bangor Street/Locke Street (sheet #39): four (4) new pedestal foundations

These subsurface facilities consist of natural gas main piping having various diameters and depths within the intersections. No adjustments are anticipated for the SNG facilities.

Maine Natural Gas (MNG):

Maine Natural Gas has subsurface facilities existing at the following intersections:

- Capital Street/Sewell Street (sheet #1): one new pedestal foundation
- Civic Center Drive/Commerce Drive (sheet #2): one new pedestal foundation
- Civic Center Drive/Darin Drive/Blue Star Avenue (sheet #3): one new pedestal foundation
- Civic Center Drive/I-95 Northbound Ramps (sheet #4)
- Civic Center Drive/I-95 Southbound Ramps (sheet #5)
- Civic Center Drive/Leighton Road (sheet #6)
- Civic Center Drive/University Drive (sheet #7): one new pedestal foundation
- Civic Center Dr/Community Dr/Townsend Road (sheet #8): one new pedestal foundation
- Eastern Avenue/Cony Road (sheet #9): one new pedestal foundation
- Eastern Avenue/Hospital Street/Stone Street (sheet #10): three (3) new pedestal foundations
- Eastern Avenue/Spring Road/Togus Road (sheet #11)
- Hospital Street/Piggery Road/Tyson Dr (sheet #12): one new pedestal foundations
- Western Avenue/Armory Street (sheet #23): three (3) new pedestal foundations
 - a. At A-corner a gas pipe exists near the location where A-P1 pedestal foundation shall be installed. Coordination of this pedestal foundation location needs to occur.
- Western Avenue/Crossing Way (sheet #24): one new pedestal foundation
- Western Avenue/Edison Drive (sheet #25): three (3) new pedestal foundations
- Western Avenue/Orchard Street/Meadow Road (sheet #26)
- Western Avenue/Senator Way (sheet #27): two (2) new pedestal foundation
- Western Avenue/Shuman Avenue (sheet #29)
- Western Avenue/U-Haul Drive (sheet #30)
- Western Avenue/Whitten Road (sheet #31)
- Old Belgrade/Henrys Way/Medical Center PK (sheet #32): one new pedestal foundation
- State Street/Winthrop Street (sheet #34)
- State Street/Bridge Street (sheet #35): two (2) new pedestal foundations
- Water Street/Bridge Street (sheet #36): three (3) new mast-arm foundations
 - a. At C-corner a gas pipe exists near the location where C-M1 mast-arm foundation shall be installed. Coordination of this mast-arm foundation location needs to occur.
- Cony Street/Willow Street (sheet #37): one new pedestal foundation
- Whitten Road/Hannaford Drive (sheet #40)

These subsurface facilities consist of natural gas main piping having various diameters and depths within the intersections. No adjustments are anticipated for the MNG facilities

CITY OF BELFAST:

Consolidated Communications of Northern New England Company:

Consolidated Communications of Northern New England Company has subsurface facilities existing at the following intersection:

- Route #1/Route #52 (sheet #44): two (2) new pedestal foundations

These subsurface facilities consist of communication conduits encased in bituminous or concrete material with an average cover depth of 24" to top of encasement; and manhole structures varying in size. No adjustments are anticipated for the Consolidated facilities.

Belfast Water District:

Belfast Water District has subsurface facilities existing at the following intersections:

- Route #3/Hatley Road (sheet #41): four (4) new pedestal foundations
- Main Street/Starrett Drive (sheet #42): four (4) new pedestal foundations
- Main Street/High Street (sheet #43): three (3) new pedestal foundations
- Route #1/Route #52 (sheet #44): two (2) new pedestal foundations

These subsurface facilities are active and feed the surrounding area. They consist of a water main piping system having a typical 12" pipe diameter with attached water service piping routing to adjacent properties. No adjustments are anticipated for the BWD facilities.

City of Belfast_Waste Water Department:

City of Belfast_Waste Water Department has subsurface facilities existing at the following intersections:

- Route #3/Hatley Road (sheet #41): four (4) new pedestal foundations
- Main Street/Starrett Drive (sheet #42): four (4) new pedestal foundations
- Main Street/High Street (sheet #43): three (3) new pedestal foundations
- Route #1/Route #52 (sheet #44): two (2) new pedestal foundations

These subsurface facilities are active and feed the surrounding area. These existing sewer facilities consist of sewer main piping systems, ranging in various pipe diameters, with attached sewer service piping routing to adjacent properties. No adjustments are anticipated for the city of Belfast facilities.

TOWN OF BENTON:

No adjustments are anticipated for the subsurface facilities.

TOWN OF CHINA:

Utility Specific Information:

Consolidated Communications of Maine Company:

Consolidated Communications of maine Company has subsurface facilities existing at the following intersection:

- Route #202/Route #32 (sheet #73)

These subsurface facilities consist of communication conduits encased in bituminous or concrete material with an average cover depth of 24" to top of encasement; and manhole structures varying in size. No adjustments are anticipated for the Consolidated facilities.

TOWN OF FAIRFIELD:

Utility Specific Information:

Consolidated Communications of Northern New England Company:

Consolidated Communications of Northern New England Company has subsurface facilities existing at the following intersection:

- Upper Main Street/Bridge Street/Lawrence Ave (sheet #46): four (4) new pedestal foundations

These subsurface facilities consist of communication conduits encased in bituminous or concrete material with an average cover depth of 24" to top of encasement; and manhole structures varying in size. No adjustments are anticipated for the Consolidated facilities.

Kennebec Water District (KWD):

Kennebec Water District has subsurface facilities existing at the following intersections:

- Upper Main Street/Bridge Street/Lawrence Ave (sheet #46): four (4) new pedestal foundations
- Route #201/Johnny's Seed/KVCOG entrance (sheet #47): two (2) new pedestal foundations

These subsurface facilities are active and feed the surrounding area. They consist of a water main piping system having a typical 12" pipe diameter with attached water service piping routing to adjacent properties. No adjustments are anticipated for the KWD facilities.

Kennebec Sanitary Treatment District (KSTD)

Kennebec Sanitary Treatment District has subsurface facilities existing at the following intersection:

- Upper Main Street/Bridge Street/Lawrence Ave (sheet #46): four (4) new pedestal foundations

These subsurface facilities are active and feed the surrounding area. These existing sewer facilities consist of sewer main piping systems, ranging in various pipe diameters, with attached sewer service piping routing to adjacent properties. No adjustments are anticipated for the KSTD facilities.

Summit Natural Gas (SNG):

Summit Natural Gas has subsurface facilities existing at the following intersections:

- Upper Main Street/Bridge Street/Lawrence Ave (sheet #46): four (4) new pedestal foundations
- Route #201/Johnny's Seed/KVCOG entrance (sheet #47): two (2) new pedestal foundations

These subsurface facilities consist of natural gas main piping at various pipe diameters and depths within the intersection. No adjustments are anticipated for the SNG facilities.

TOWN OF FARMINGTON:

Utility Specific Information:

Consolidated Communications of Northern New England Company:

Consolidated Communications of Northern New England Company has subsurface facilities existing at the following intersections:

- Main Street/Broadway (sheet #48)
- Main Street/Farmington Falls Road (sheet #49): two (2) new pedestal foundations
 - a. At B-corner a communication structure (6' width x 7' height x 12' length) exists at the location where B-P1 pedestal foundation shall be installed. Coordination of this pedestal foundation location needs to occur.

- Route #2-#4/Bridge Street (sheet #50): two (2) new pedestal foundations

These subsurface facilities consist of communication conduits encased in bituminous or concrete material with an average cover depth of 24" to top of encasement; and manhole structures varying in size. No adjustments are anticipated for the Consolidated facilities.

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Farmington Water Department (FWD):

Farmington Water Department has subsurface facilities existing at the following intersections:

- Main Street/Broadway (sheet #48)
- Main Street/Farmington Falls Road (sheet #49): two (2) new pedestal foundations
- Route #2-#4/Bridge Street (sheet #50): two (2) new pedestal foundations
- Wilton Road/Hannaford Drive entrance (sheet #51)
- Wilton Road/Walmart Drive entrance (sheet #52)
- Wilton Road/Hospital Street/Livermore Falls Road (sheet #53)

These subsurface facilities are active and feed the surrounding areas. They consist of a water main piping system having a typical 12” pipe diameter with attached water service piping routing to adjacent properties. No adjustments are anticipated for the FWD facilities.

Town of Farmington_Waste Water Department:

Farmington Wastewater Treatment has subsurface facilities existing at the following intersections:

- Main Street/Broadway (sheet #48)
- Main Street/Farmington Falls Road (sheet #49): two (2) new pedestal foundations
- Route #2-#4/Bridge Street (sheet #50): two (2) new pedestal foundations
- Wilton Road/Hannaford Drive entrance (sheet #51)
- Wilton Road/Walmart Drive entrance (sheet #52)
- Wilton Road/Hospital Street/Livermore Falls Road (sheet #53)

These subsurface facilities are active and feed the surrounding areas. These existing sewer facilities consist of sewer main piping systems, ranging in various pipe diameters, with attached sewer service piping routing to adjacent properties. No adjustments are anticipated for the town of Farmington facilities.

CITY OF GARDINER:

Utility Specific Information:

Consolidated Communications of Northern New England Company:

Consolidated Communications of Northern New England Company has subsurface facilities existing at the following intersection:

- Bridge Street/Maine Avenue (sheet #54): three (3) new mast-arm foundations
 - a. At A-corner a communication structure (6’ width x 7’ height x 12’ length) exists at the location where A-M1 mast-arm foundation shall be installed. Coordination of this mast-arm foundation location needs to occur.

These subsurface facilities consist of communication conduits encased in bituminous or concrete material with an average cover depth of 24” to top of encasement; and manhole structures varying in size. No adjustments are anticipated for the Consolidated facilities.

Spectrum-Charter Communications:

Spectrum-Charter Communications has subsurface facilities existing at the following intersection:

- Bridge Street/Maine Avenue (sheet #54): three (3) new mast-arm foundations

No adjustments are anticipated for the Spectrum facilities.

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Gardiner Water District (GWD):

Gardiner Water District has subsurface facilities existing at the following intersection:

- Bridge Street/Maine Avenue (sheet #54): three (3) new mast-arm foundations

No adjustments are anticipated for the GWD facilities.

City of Gardiner_Waste Water Treatment:

Gardiner Wastewater Treatment has subsurface facilities existing at the following intersection:

- Bridge Street/Maine Avenue (sheet #54): three (3) new mast-arm foundations

No adjustments are anticipated for the town of Gardiner facilities.

Summit Natural Gas (SNG):

Summit Natural Gas has subsurface facilities existing at the following intersection:

- Bridge Street/Maine Avenue (sheet #54): three (3) new mast-arm foundations

These subsurface facilities consist of natural gas main piping at various pipe diameters and depths within the intersection. No adjustments are anticipated for the SNG facilities.

TOWN OF NORRIDGWOCK:

Utility Specific Information:

Norridgewock Water District (NWD):

Norridgewock Water District has subsurface facilities existing at the following intersection:

- Bridge Street/Main Street/Route #2: two (2) new mast-arm foundations

No adjustments are anticipated for the NWD facilities.

Summit Natural Gas (SNG):

Summit Natural Gas has subsurface facilities existing at the following intersection:

- Bridge Street/Main Street/Route #2: two (2) new mast-arm foundations

These subsurface facilities consist of natural gas main piping at various depths within the intersection. No adjustments are anticipated for the SNG facilities.

TOWN OF OAKLAND:

Utility Specific Information:

Town of Oakland_Maine Water Company (MWC):

Maine Water Company manages the town of Oakland existing subsurface water facilities. These water facilities exist at the following intersections:

- Main Street/Fairfield Street (sheet #57): three (3) new pedestal foundations
- Pleasant Street/Oak Street (sheet #58): two (2) new pedestal foundations

No adjustments are anticipated for the MWC facilities.

Town of Oakland_Sewer Department:

Town of Oakland_Sewer Department has subsurface facilities existing at the following intersections:

- Main Street/Fairfield Street (sheet #57): three (3) new pedestal foundations
- Pleasant Street/Oak Street (sheet #58): two (2) new pedestal foundations

No adjustments are anticipated for the Oakland sewer facilities.

Summit Natural Gas (SNG):

Summit Natural Gas has subsurface facilities existing at the following intersections:

- Main Street/Fairfield Street (sheet #57): three (3) new pedestal foundations

No adjustments are anticipated for the SNG facilities.

TOWN OF RANDOLPH:

Utility Specific Information:

Consolidated Communications of Northern New England Company:

Consolidated Communications of Northern New England Company has subsurface facilities existing at the following intersection:

- Route #9/Route #27 (sheet #59): two (2) new mast-arm foundations

These subsurface facilities consist of communication conduits encased in bituminous or concrete material with an average cover depth of 24" to top of encasement; and a manhole structure. No adjustments are anticipated for the Consolidated facilities.

Spectrum-Charter Communications:

Spectrum-Charter Communications has subsurface facilities existing at the following intersection:

- Route #9/Route #27 (sheet #59): two (2) new mast-arm foundations

No adjustments are anticipated for the Spectrum facilities.

Gardiner Water District (GWD):

Gardiner Water District has subsurface facilities existing at the following intersection:

- Route #9/Route #27 (sheet #59): two (2) new mast-arm foundations

No adjustments are anticipated for the GWD facilities.

Town of Randolph_Waste Water Department:

Town of Randolph_Waste Water Department has subsurface facilities existing at the following intersection:

- Route #9/Route #27 (sheet #59): two (2) new mast-arm foundations

No adjustments are anticipated for the town of Randolph facilities.

Summit Natural Gas (SNG):

Summit Natural Gas has subsurface facilities existing at the following intersection:

- Route #9/Route #27 (sheet #59): two (2) new mast-arm foundations

These subsurface facilities consist of natural gas main piping at various depths within the intersections. No adjustments are anticipated for the SNG facilities.

CITY OF SANFORD:

Utility Specific Information:

Consolidated Communications of Northern New England Company:

Consolidated Communications of Northern New England Company has subsurface facilities existing at the following intersections:

- Main Street/Emery Street (sheet #65): one new pedestal foundation

- Main Street/Washington Street (sheet #66): one new pedestal foundation
- Main Street/Route #11/Route #4A (sheet #67): three (3) new pedestals foundations/two (2) new mast-arm foundations
- Main Street/Route #11A/Route #224 (sheet #68): two (2) new pedestal foundations/three (3) new mast-arm foundations
- Winter Street/Cottage Street/River Street (sheet #69): five (5) new pedestal foundations
- Route 4 (Alford Road)/Grammar Road/New Dam Road (sheet #70)

These subsurface facilities consist of communication conduits encased in bituminous or concrete material with an average cover depth of 24" to top of encasement; and manhole structures varying in size. No adjustments are anticipated for the Consolidated facilities.

Sanford Water District (SWD):

Sanford Water District has subsurface facilities existing at the following intersections:

- Main Street/Walmart entrance (sheet #60)
- Main Street/Jagger Mill Road (sheet #61)
- Main Street/Sanford Center entrance (sheet #62)
- Main Street/Westview Drive (sheet #63)
- Main Street/Old Mill Road (sheet #64)
- Main Street/Emery Street (sheet #65): one new pedestal foundation
- Main Street/Washington Street (sheet #66): one new pedestal foundation
- Main Street/Route #11/Route #4A (sheet #67): three (3) new pedestal foundations/two (2) new mast-arm foundations
- Main Street/Route #11A/Route #224 (sheet #68): two (2) new pedestal foundations/three (3) new mast-arm foundations
 - a. A SWD representative needs to be present during the installation of the new mast-arm foundation at C-corner. This concrete foundation shall be located, in the existing granite-curb island, a minimum 15" distance from the existing 12" diameter water main pipe. The existing water main pipe lays in a direction of east-to-west, on the north side of the existing mast-arm location. The contractor shall be responsible for excavating/backfilling around this existing 12" water main at C-corner.
- Winter Street/Cottage Street/River Street (sheet #69): five (5) new pedestal foundations
- Route 4 (Alford Road)/Grammar Road/New Dam Road (sheet #70)
- Pleasant Street/Shaw's Ridge Road/River Street (sheet #71)

This existing water main system, ranging in pipe diameters from 6" to 12", with attached water service piping routing to adjacent properties. No adjustments are anticipated for the SWD facilities.

Sanford Sewerage District (SSD):

Sanford Sewerage District has subsurface facilities existing at the following intersections:

- Main Street/Walmart entrance (sheet #60)
- Main Street/Jagger Mill Road (sheet #61)
- Main Street/Westview Drive (sheet #63)
- Main Street/Old Mill Road (sheet #64)

- Main Street/Emery Street (sheet #65): one new pedestal foundation
- Main Street/Washington Street (sheet #66): one new pedestal foundation
- Main Street/Route #11/Route #4A (sheet #67): three (3) new pedestal foundations/two (2) new mast-arm foundations
- Main Street/Route #11A/Route #224 (sheet #68): two (2) new pedestal foundations/three (3) new mast-arm foundations
- Winter Street/Cottage Street/River Street (sheet #69): five (5) new pedestal foundations
- Pleasant Street/Shaw's Ridge Road/River Street (sheet #71)

These existing sewer facilities consist of sewer main piping systems, ranging in pipe diameters from 6" to 20", with attached sewer service piping routing to adjacent properties. No adjustments are anticipated for the SSD facilities.

Unitil Corp.:

Unitil has subsurface natural gas facilities existing at the following intersections:

- Main Street/Walmart entrance (sheet #60)
- Main Street/Jagger Mill Road (sheet #61)
- Main Street/Sanford Center entrance (sheet #62)
- Main Street/Westview Drive (sheet #63)
- Main Street/Old Mill Road (sheet #64)
- Main Street/Emery Street (sheet #65): one new pedestal foundation
- Main Street/Washington Street (sheet #66): one new pedestal foundation
- Main Street/Route #11/Route #4A (sheet #67): two (2) new pedestal foundations/two (2) new mast-arm foundations
- Main Street/Route #11A/Route #224 (sheet #68): two (2) new pedestal foundations/three (3) new mast-arm foundations
- Winter Street/Cottage Street/River Street (sheet #69): five (5) new pedestal foundations

These existing natural gas facilities consist of a piping system with attached service piping routing to adjacent properties. No adjustments are anticipated for the Unitil facilities.

CITY OF WATERVILLE:

Utility Specific Information:

Consolidated Communications of Northern New England Company:

Consolidated Communications of Northern New England Company has subsurface facilities existing at the following intersections:

- Kennedy Memorial Drive/Washington Street (sheet #77)
- Kennedy Memorial Drive/1st Rangeway (sheet #79)
- Kennedy Memorial Drive/Hannaford Entrance (sheet #80)
- Kennedy Memorial Drive/Cool Street (sheet #81): one new pedestal foundation

- Kennedy Memorial Drive/West River Road (sheet #82): two (2) new pedestal foundations
- Kennedy Memorial Drive/Carter Memorial Drive (sheet #83): one new pedestal foundation
- Elm Street/Silver Street (sheet #84): three (3) new pedestal foundations
- Elm Street/Western Avenue (sheet #85): two (2) new pedestal foundations
- Elm Street/Park Street (sheet #86): seven (7) new pedestal foundations
- Elm Street/Spring Street (sheet #89): four (4) new pedestal foundations

- Main Street/Armory Drive (sheet #93)
- Main Street/Commons Drive (sheet #94)
- Main Street/I-95 Northbound (sheet #95)
- Main Street/I-95 Southbound (sheet #96)
- Kennedy Memorial Drive/Airport Road (sheet #98)

These subsurface facilities consist of communication conduits encased in bituminous or concrete material with an average cover depth of 24" to top of encasement; and manhole structures varying in size. No adjustments are anticipated for the Consolidated facilities.

Otelco:

Otelco has subsurface facilities existing at the following intersections:

- Kennedy Memorial Drive/Washington Street (sheet #77)
- Kennedy Memorial Drive/Camden National Bank entrance (sheet #78)
- Kennedy Memorial Drive/1st Rangeway (sheet #79)
- Elm Street/Silver Street (sheet #84): three (3) new pedestal foundations
- Elm Street/Western Avenue (sheet #85): two (2) new pedestal foundations
- Elm Street/Park Street (sheet #86): seven (7) new pedestal foundations
- Elm Street/Spring Street (sheet #89): four (4) new pedestal foundations
- Kennedy Memorial Drive/Airport Road (sheet #98)

These subsurface facilities consist of communication conduits encased in concrete materials. No adjustments are anticipated for the Otelco facilities.

Kennebec Water District (KWD):

Kennebec Water District has subsurface facilities existing at the following intersections:

- Kennedy Memorial Drive/First Park Drive (sheet #74)
- Kennedy Memorial Drive/I-95 Southbound (sheet #75)
- Kennedy Memorial Drive/I-95 Northbound (sheet #76)
- Kennedy Memorial Drive/Washington Street (sheet #77)
- Kennedy Memorial Drive/Camden National Bank entrance (sheet #78)
- Kennedy Memorial Drive/1st Rangeway (sheet #79)
- Kennedy Memorial Drive/Hannaford Entrance (sheet #80)
- Kennedy Memorial Drive/Cool Street (sheet #81): one new pedestal foundation
- Kennedy Memorial Drive/West River Road (sheet #82): two (2) new pedestal foundations
- Kennedy Memorial Drive/Carter Memorial Drive (sheet #83): one new pedestal foundation
- Elm Street/Silver Street (sheet #84): three (3) new pedestal foundations
- Elm Street/Western Avenue (sheet #85): two (2) new pedestal foundations
- Elm Street/Park Street (sheet #86): seven (7) new pedestal foundations
- Main Street/Spring Street (sheet #87): pedestal/mast-arm foundations constructed per WIN #24371

- Spring Street/Silver Street (sheet #88): three (3) new mast-arm foundations
- Elm Street/Spring Street (sheet #89): four (4) new pedestal foundations
- Main Street/Temple Street (sheet #90): pedestal/mast-arm foundations constructed per WIN #24371
- Main Street/Elm Street (sheet #91): pedestal/mast-arm foundations constructed per WIN #24371
- Main Street/Eustis Parkway (sheet #92)
- Main Street/Armory Drive (sheet #93)

- Main Street/Commons Drive (sheet #94)
- Main Street/I-95 Northbound (sheet #95)
- Main Street/I-95 Southbound (sheet #96)
- College Avenue/Hazelwood Avenue (sheet #97)
- Kennedy Memorial Drive/Airport Road (sheet #98)

These subsurface water facilities are active and feed the surrounding areas. They consist of water main piping systems, ranging in various pipe diameters, with attached water service piping routing to adjacent properties. No adjustments are anticipated for the KWD facilities.

Waterville Sewerage District (WSD):

Waterville Sewerage District has subsurface facilities existing at the following intersections:

- Kennedy Memorial Drive/First Park Drive (sheet #74)
- Kennedy Memorial Drive/I-95 Southbound (sheet #75)
- Kennedy Memorial Drive/I-95 Northbound (sheet #76)
- Kennedy Memorial Drive/Washington Street (sheet #77)
- Kennedy Memorial Drive/Camden National Bank entrance (sheet #78)
- Kennedy Memorial Drive/Hannaford Entrance (sheet #80)
- Kennedy Memorial Drive/Cool Street (sheet #81): one new pedestal foundation
- Kennedy Memorial Drive/Carter Memorial Drive (sheet #83): one new pedestal foundation
- Elm Street/Silver Street (sheet #84): three (3) new pedestal foundations
- Elm Street/Western Avenue (sheet #85): two (2) new pedestal foundations
- Elm Street/Park Street (sheet #86): seven (7) new pedestal foundations
- Main Street/Spring Street (sheet #87): pedestal/mast-arm foundations constructed per WIN #24371
- Spring Street/Silver Street (sheet #88): three (3) new mast-arm foundations
- Elm Street/Spring Street (sheet #89): four (4) new pedestal foundations
- Main Street/Temple Street (sheet #90): pedestal/mast-arm foundations constructed per WIN #24371
- Main Street/Elm Street (sheet #91): pedestal/mast-arm foundations constructed per WIN #24371
- Main Street/Eustis Parkway (sheet #92)
- Main Street/Armory Drive (sheet #93)
- Main Street/Commons Drive (sheet #94)
- College Avenue/Hazelwood Avenue (sheet #97)
- Kennedy Memorial Drive/Airport Road (sheet #98)

These subsurface sewer facilities are active and feed the surrounding areas. These existing sewer facilities consist of sewer main piping systems, ranging in various pipe diameters, with attached sewer service piping routing to adjacent properties. No adjustments are anticipated for the WSD facilities.

Summit Natural Gas (SNG):

Summit Natural Gas has subsurface facilities existing at the following intersections:

- Kennedy Memorial Drive/Washington Street (sheet #77)
- Kennedy Memorial Drive/Camden National Bank Entrance (sheet #78)
- Kennedy Memorial Drive/1st Rangeway (sheet #79)
- Kennedy Memorial Drive/Hannaford Entrance (sheet #80)

- Kennedy Memorial Drive/Cool Street (sheet #81): one new pedestal foundation
- Elm Street/Silver Street (sheet #84): three (3) new pedestal foundations
- Elm Street/Western Avenue (sheet #85): two (2) new pedestal foundations
- Elm Street/Park Street (sheet #86): seven (7) new pedestal foundations
- Main Street/Spring Street (sheet #87): pedestal/mast-arm foundations constructed per WIN #24371
- Spring Street/Silver Street (sheet #88): three (3) new mast-arm foundations
- Elm Street/Spring Street (sheet #89): four (4) new pedestal foundations
- Main Street/Temple Street (sheet #90): pedestal/mast-arm foundations constructed per WIN #24371
- Main Street/Elm Street (sheet #91): pedestal/mast-arm foundations constructed per WIN #24371
- Main Street/Eustis Parkway (sheet #92)
- Main Street/Armory Drive (sheet #93)
- College Avenue/Hazelwood Avenue (sheet #97)
- Kennedy Memorial Drive/Airport Road (sheet #98)

These subsurface facilities consist of natural gas main piping at various depths within the intersections. No adjustments are anticipated for the SNG facilities.

CITY OF WINSLOW:

Utility Specific Information:

Consolidated Communications of Northern New England Company:

Consolidated Communications of Northern New England Company has subsurface facilities existing at the following intersections:

- Carter Memorial Drive/Cushman Road (sheet #99)
- China Road/Cushman Road (sheet #100): one new pedestal foundation
- Route #201/Clinton Avenue (sheet #101): three (3) new mast-arm foundations
- Route #201/Halifax Street (sheet #102)
- Route #201/China Road (sheet #103).

The subsurface facilities consist of communication conduits encased in bituminous or concrete material with an average cover depth of 24" to top of encasement; and manhole structures varying in size. No adjustments are anticipated for the Consolidated facilities.

Kennebec Water District (KWD):

Kennebec Water District has subsurface facilities existing at all the intersections:

- Carter Memorial Drive/Cushman Road (sheet #99)
- China Road/Cushman Road (sheet #100): one new pedestal foundation
- Route #201/Clinton Avenue (sheet #101): three (3) new mast-arm foundations
- Route #201/Halifax Street (sheet #102)
- Route #201/China Road (sheet #103)

- Route #201/Carter Memorial Drive (sheet #104)

These subsurface facilities consist of water main piping systems, ranging in various pipe diameters, with attached water service piping routing to adjacent properties. No adjustments are anticipated for the KWD facilities.

Winslow Sewer Department (WSD):

Winslow Sewer Department has subsurface facilities existing at the following intersections:

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Cities: Augusta/Belfast/Gardiner/Sanford/Waterville/Winslow
 Towns: Benton/China/Fairfield/Farmington/
 Norridgewock/Oakland/Randolph
 Project: #24301_Build Grant Traffic Signal Modernization
 Date: 09/11/20

- China Road/Cushman Road (sheet #100): one new pedestal foundation
- Route #201/Clinton Avenue (sheet #101): three (3) new mast-arm foundations
- Route #201/Halifax Street (sheet #102)
- Route #201/China Road (sheet #103)

These sewer facilities consist of a main piping system, ranging in various pipe diameters, with attached sewer service piping routing to adjacent properties. No adjustments are anticipated for the WSD facilities.

Summit Natural Gas (SNG):

Summit Natural Gas has subsurface facilities existing at the following intersections:

- Route #201/Halifax Street (sheet #102)
- Route #201/China Road (sheet #103).

These subsurface facilities consist of inactive natural gas cross piping, at various depths, adjacent or within the intersections. No adjustments are anticipated for the SNG facilities.

RAILROAD

CITY OF WATERVILLE:

Springfield Terminal Railway (STR):

Springfield Terminal Railway has a rail crossing along Route #104/Main Street. This rail crossing (44.556769/-69.632121) exists between the Main Street/Eustis Parkway intersection (sheet #92) and Main Street/Elm Street intersection (sheet #91). No track protection or safety personnel are anticipated for the STR facilities.

CITY OF WINSLOW:

Springfield Terminal Railway (STR):

Springfield Terminal Railway has a rail crossing at the Benton Avenue (Route #201)/Clinton Avenue intersection (sheet #101)_three (3) new mast-arm foundations. STR needs to be notified **ten (10) working days** prior to working within 50’ of the existing rail crossing location to allow for proper scheduling of track protection personnel, and installation of all track safety items. No work activities or equipment staging shall occur; or create a hazard within the limits of the railroad right-of-way without proper track protection. This railroad is operated and owned by STR.

The contractor shall be responsible for all requirements as stated in the special provision entitled “Protection of Railroad Traffic and Structures (PRTS)” dated 09/10/20. This special provision is enclosed within this project booklet. See the below table for STR estimated work days.

The rail activity consists of two (2) trains per day traveling at an approximate speed of 10 mph.

Railroad	Summary of Work	Estimated Working Days
Springfield Terminal Railways	perform track protection services (install/remove derail & personnel)	15

Cities: Augusta/Belfast/Gardiner/Sanford/Waterville/Winslow
Towns: Benton/China/Fairfield/Farmington/
Norridgewock/Oakland/Randolph
Project: #24301_Build Grant Traffic Signal Modernization
Date: 09/11/20

Total:	15
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MAINTAINING UTILITY LOCATION MARKINGS

The Contractor shall be responsible for maintaining the buried utility location markings following the initial locating by the appropriate utility or their designated representative.

UTILITY SIGNING

Any utility working within the construction limits of this project shall ensure that the traveling public is adequately protected at all times. All work areas shall be signed, lighted, and traffic flaggers employed as determined by field conditions. All traffic controls shall be in accordance with the latest edition of the Manual on Uniform Traffic Control Devices for Streets and Highways, as issued by the Federal Highway Administration.

**PROTECTION OF RAILROAD TRAFFIC AND STRUCTURES (PRTS)
SPECIAL PROVISIONS**

1. GENERAL REQUIREMENTS

Part of the work required by the Contract will be performed within a railroad right of way and/or adjacent to the tracks, telephone, telegraph, signal and electric supply lines of a railroad or railroads. The Contractor agrees to perform all such work in compliance with all of the terms of this Special Provision and all safety rules, regulations, or standards applicable to the Railroad. The Contractor shall be fully responsible for all damages arising from his failure to comply with the requirements of this Special Provision. The Contractor shall be deemed to have included all costs in the unit prices of the Schedule of Prices and the Proposal.

2. AMOUNT OF RAILROAD WORK

The estimated amount of work to be done within 20 feet of the track of Springfield Terminal Railways is less-than 1% of the contract.

3. NUMBER OF TRAINS AND TRAIN SPEED

The Contractor is notified that a maximum speed of 10 mph will be considered as prevailing for the operation of trains of the Railroad at this project and that the approximate number of trains per day at this project is two (2).

4. PRIORITY OF RAILROAD OPERATIONS

The train movements of the Railroad, and its lessees, and licensees shall have absolute priority over the performance of the Construction Project within the railroad right of way. The Contractor hereby agrees that the hours and times of work within the Railroad right of way must be coordinated through the Railroad and that such hours and times are subject to change without prior notice to the Contractor, unless other prior arrangements have been made through the Railroad.

5. AUTHORITY OF RAILROAD TO STOP WORK

If the Contractor fails to comply with the safety terms of this Special Provision, or if the Chief Engineer of the Railroad determines that the Contractor is using unsafe practices that threaten the safety of rail traffic, rail workers, or the general public, the Railroad shall have the right to immediately order the Contractor to cease work and vacate the Railroad's property. The Railroad agrees to confirm any cessation of work in writing by delivering to the Department's Construction Manager a completed Stop Work Order form attached as Exhibit A within 24 hours of giving any such order.

6. ENTRY UPON RAILROAD PROPERTY

The Railroad hereby agrees to permit the Contractor, together with their subcontractors, suppliers, consultants and engineers (the "Contractor"), to enter upon the Railroad property for the purpose of performing the Construction Project, PROVIDED THAT the Contractor complies with all of the terms of this Special Provision and all safety requirements and directions of the Chief Engineer of the Railroad, or his authorized representative (the "Railroad's Chief Engineer").

7. NOTICE REQUIRED BEFORE ENTRY

The Contractor shall give written notice to the Railroad's Chief Engineer at least 7 calendar day(s) in advance of the time it proposes to do work within the limits of the Railroad right-of-way or perform operations that may create a Hazard as specified by this Special Provision. The Contractor shall give such notice regardless of whether the work may also be within the limits of a public highway.

8. HAZARDS

The Contractor shall assess to its own satisfaction hazards which may be caused by its operations. At a minimum, the Contractor agrees that the following shall constitute Hazards.

An operating track shall be considered fouled and subject to hazard when any object is brought nearer than 5 feet to the gauge line of the near rail of the track.

A signal line or communication line shall be considered fouled and subject to hazard when any object is brought nearer than 4 feet to any wire or cable.

An electric supply line shall be considered fouled and subject to hazard when any object is brought nearer than 10 feet to any wire of the line.

Cranes, trucks, power shovels or any other equipment shall be considered as fouling and subjecting to hazard a track, signal line, communication or electric supply line when working in such position that failure of equipment, with or without load, could foul the track, signal line, communication or electric supply line.

Railroad operation will be considered subject to hazard when explosives are used in the vicinity of railroad premises, or during the driving or pulling of sheeting for any footing adjacent to a track, or when erecting structural steel adjacent to a track, or when performing work under, across or adjacent to a track, or when operations involve swinging booms or chutes that could in any way come nearer than 15 feet to the gauge line of the near rail of the track, or when erection or removal of staging, false work or forms fouls a track or wire line.

None of the operations specified as a Hazard above shall be carried on during the approach or passing of a train or without permission from the Railroad's Chief Engineer and the presence of a railroad inspector/flagman, unless other prior arrangements have been made through the Railroad.

9. MINIMUM CLEARANCES

During the construction of staging, false work or forms, the Contractor shall at all times maintain a minimum vertical clearance of 22.5 feet above the top of high rail and a minimum side clearance of 10 feet from the gauge line of the near rail where track is tangent. Additional side clearance must be maintained where track is on a curve.

10. WORK PLAN SUBMITTAL AND APPROVAL

The Contractor shall submit in writing to the Railroad's Chief Engineer or duly authorized representative, and the Department's Railroad Property Manager or his appointed representative, at least 30 calendar day(s) in advance of the start of the project, an outline of his plan for work within the Railroad right of way including contemplated method(s) of construction. This plan must meet with the approval of the Railroad's Chief Engineer and the Department's Railroad Property Manager in every respect. If the Contractor contemplates the use of "on the track equipment", it should so state and obtain from the Railroad the conditions pertaining to such operations. All Railroad costs included in this operation will be borne by the Contractor. In a like manner, any of the Contractor's equipment or material on cars for this project shall be handled in conformance with existing traffic rules with all costs borne by the Contractor.

Prior to submitting their Proposal, the Contractor shall have ascertained from the Railroad and from the Department's Railroad Property Manager or his appointed representative, all information relating to its requirements and regulations and all costs in connection with compliance thereto.

11. EXCAVATIONS

Before excavation for footings adjacent to tracks and/or within the Railroad's right-of-way may commence, whether or not also within the limits of a public highway, plans and calculations for such excavations, prepared by a Professional Engineer authorized to practice in Maine, shall be submitted to the Railroad's Chief Engineer for review and approval. Unless other prior arrangements have been made, the Railroad's Chief Engineer shall have 14 calendar day(s) to perform such review and approval and issue a written permission to proceed with the excavation. No excavation shall proceed without such permission.

At a minimum, excavations must utilize proper bracing, shoring, sheeting or other support as determined by the Railroad's Chief Engineer, to support the tracks with railroad traffic. Open excavation shall be suitably planked over when construction operations are not in progress. No excavation work shall be performed by the Contractor within the limits of the Railroad right of way, whether or not also within the limits of a public highway, until the Contractor has ascertained from the Chief Engineer of the Railroad the location of any wires, conduits, pipes, cables or other railroad

facilities below the surface of the ground. Damage to any such facilities caused by the failure of the Contractor to ascertain the location of such facilities or by failure to use due care to avoid injury to such facilities shall be at the expense of the Contractor.

12. EQUIPMENT

Equipment of the Contractor shall be in such condition so as to prevent failure that would cause delay in the operation of trains or damage to railroad facilities. Equipment shall not be placed or put in operation adjacent to a track without first obtaining permission of the Railroad. The Railroad agrees that such permission shall not be unreasonably withheld.

13. RAILROAD SERVICES - GENERALLY

When work is to be performed within the Railroad's right-of-way, the Railroad shall provide the services, equipment and materials provided in this Special Provision including, but not limited to, engineering, flagging, inspection, signal protection and/or relocation, and restoration or replacement of the Railroad's track structure or ballast. Further, if the Railroad's Chief Engineer determines that the Contractor's operations do not comply with all of the safety requirements of this Special Provision and all safety requirements and directions of said Chief Engineer, the Railroad will employ the necessary qualified employees to protect its trains and other facilities. The Contractor shall pay to the Railroad the cost for performing all Railroad Services unless said costs are to be paid by the Department as specified in this Special Provision.

14. INSPECTION / FLAGGING

The Railroad shall furnish and assign all safety personnel for general inspection purposes of general protection of railroad property and operations during construction as the Railroad's Chief Engineer determines are necessary to preserve safety.

(a) Responsibility for Cost. The Department will bear the cost of safety personnel or inspection (including travel time) or any combination thereof up to 15 calendar days of said safety personnel or inspection. If, in the opinion of the Railroad's Chief Engineer, further services of a flagger or inspector will be required due to the operations of the Contractor, the services will be furnished and the cost thereof (salary, expenses, insurance, taxes and vacation allowance, etc.) shall be paid to the Railroad by the Department, and will be recovered by the Department from the Contractor.

(b) Terms. The minimum hours per day for the Railroad employees engaged in inspection flagging services shall be eight (8) hours. Time at rates for straight time, overtime or for deadheading starts in accordance with established practices in effect in the territory in which the project is located. Information as to these practices should be obtained from the Railroad's Chief Engineer.

The Contractor shall notify the Railroad's Chief Engineer and the Chief Engineer of the Department in writing 14 calendar day(s) before beginning, resuming or suspending work within 25 feet of the track, so that an inspector may be provided or removed in accordance with the requirements of this Special

Provision. An inspector may be removed upon 3 calendar day(s) notice. Failure to give notice of intent to suspend work shall be cause of charge to the Contractor the cost of inspection during the period when work is suspended.

(c) Estimated Cost. The following is an estimate of the cost per day of inspection/flagging necessary for this project. The rates shown include all overhead charges, travel time, deadheading and personal expenses.

Date of estimate: 09/10/20

Estimated daily rate for four (4) consecutive hours Monday-Friday (straight time): \$500.00

Estimated daily rate for four (4) consecutive hours Saturday, Sunday, Holiday (overtime): \$750.00

Estimated rate for hours worked in excess of eight (8) hours in any one day: \$187.50/hour

Rates charged will be those in effect at the time of the performing the inspection/ flagging which may be different than the rates used at the date of the Estimate. The Railroad agrees to notify the Department if rates used to calculate the above estimates change before the date of bids are received for this Contract.

(d) Definitions.

Man day (M.D.) - eight (8) consecutive hours or any portion thereof.

Overtime - Each additional hour or fraction thereof consecutive to and beyond the standard man day will count as 3/16 of a man day.

Standard Man day - Eight (8) consecutive hour, Monday - Friday between the hours of 7a.m. to 3:30p.m. unless otherwise noted and agreed to by all parties.

Travel Time - Time required by flagger and/or inspector to commute between his or her point of headquarters to the project site. This time shall not be charged in determining available man days.

15. OTHER CONTRACTOR RESPONSIBILITIES

The restoring and resurfacing of tracks, if disturbed due to Contractor's operations, shall be at the expense of the Contractor.

Any other changes made, or services furnished by the Railroad as a result of the Contractor will be at the Contractor's expense.

16. EXTRA-CONTRACT SERVICES

Temporary and permanent changes of tracks and telephone, signal and electric supply lines made necessary by or to clear the permanent work of the Contractor as shown on the construction plans and included in the Railroad force account as collectable from the State will be made or caused to be made by the Railroad without expense to the Contractor.

17. INDEMNIFICATION

Where work is being performed over, under, across or adjacent to Railroad premises, the Contractor shall defend, indemnify and save harmless the Railroad and the Maine Department of Transportation from and against any and all loss, cost, damage, claims, suits, demands, or liability for damages for personal injury including death and for damage to property, which may arise from or out of the operations conducted under his contract, occurring by reason of any act or omission of the Contractor, his agents, servants or employees, or by reason of any act or omission of any subcontractor, his agents, servants or employees.

18. INSURANCE

In addition to any other forms of insurance or bonds required under the terms of the Contract, the Contractor will be required to procure and maintain, at its sole cost and expense, the following insurance coverages naming the Railroad as an insured.

(a) Railroad Protective Liability Insurance with limits not less than \$2,000,000 per single occurrence and \$6,000,000 per aggregate total occurrences.

(b) Comprehensive General Liability Insurance protecting against liability from bodily injury or property damage arising out of the Construction Project with limits of not less than \$2,000,000 per single occurrence and \$6,000,000 per aggregate total occurrences.

(c) Workers Compensation and Occupational Disease Insurance, as required by law.

(d) Automobile Liability Insurance covering all motor vehicles used about or in connection with the Construction Project.

If any part of the work is sublet, these insurance coverages shall be provided by or on behalf of the subcontractors to cover their operations

Each policy shall carry an endorsement covering the "save harmless" clause in favor of the Railroad and the Maine Department of Transportation, as set forth in the paragraph, "Responsibility for Damage Claims".

If blasting is to be done in the vicinity of the Railroad, the insurance policies shall include such coverage.

The policies shall be in force before any work is done on the project and shall remain in effect until all work required to be performed under the terms of the contract is satisfactorily completed as evidenced by the formal acceptance by the State and the Railroad.

Before any work is done on the project, the Department of Transportation and the Railroad's Chief Engineer shall be furnished certificates of each policy. Further, the original policy of the Comprehensive General Liability Insurance and the Railroad Protective Liability Insurance shall be furnished to the Railroad's Chief Engineer and a duplicate shall be furnished to the Department of Transportation.

The policy or policies of the Railroad's protective public liability and property damage liability shall be written by a Company authorized to do business in the State of Maine, and shall be signed by the President and Secretary of the Insurance Company and shall be countersigned by an authorized representative of the Company.

19. ROADWAY WORKER SAFETY REGULATION

Notice to all Contractors/Subcontractors and individuals must be aware of the Federal Roadway Worker Safety Regulation, CFR 49, Part 214(c). They may be required to comply with this regulation. Any requirements for them to comply will be discussed at the pre-construction utility meeting.

EXHIBIT A
 ORIGINAL TO CONTRACTOR

MDOT/RAILROAD STOP WORK ORDER

Section A - Contractor	Town
	DOT Railroad Project #
Railroad Name	Location
	Notice #
DESCRIPTION OF SAFETY HAZARD/REASON FOR ORDER	
Standard Violated	RAC (Risk Assessment Code)
	N/R
Railroad Official (Flagger/Inspector) Name	Date
Signature	
SECTION B - ACTION TAKEN:	

cc: MDOT - R.E. or Inspector
 MDOT - Utility Section
 MDOT - Construction Division
 Railroad - Chief Engineer

1. Risk Assessment. Each identified/validated hazard shall be assigned a Risk Assessment Code (RAC) by the Safety Office. The RAC represents the degree of risk associated with the deficiency and combines the elements of hazard severity and mishap probability. The RAC is derived as follows:

a. Hazard Severity. The hazard severity is an assessment of the worst potential consequence: Defined by degree of injury, occupational illness, or property damage, which is likely to occur as a result of a deficiency. Hazard severity categories shall be assigned by roman numeral according to the following criteria.

- (1) Category I - Catastrophic: The hazard may cause death or loss of a facility.
- (2) Category II - Critical: May cause severe injury, severe occupational illness, or major property damage.
- (3) Category III - Marginal: May cause minor injury, minor occupational illness, or minor property damage.
- (4) Category IV - Negligible: Probably would not affect personnel safety or health, but is nevertheless in violation of a NAVOSH standard.

b. Mishap Probability. The mishap probability is the probability that a hazard will result in a mishap, based on an assessment of such factors as location, exposure in terms of cycles or hours of operation, and affected population. Mishap probability shall be assigned an Arabic letter according to the following criteria:

- (1) Sub-category A - Likely to occur immediately or within a short period of time.
- (2) Sub-category B - Probably will occur in time.
- (3) Sub-category C - May occur in time.
- (4) Sub-category D - Unlikely to occur.

c. Risk Assessment Code. The RAC is an expression of risk which combines the elements of hazard severity and mishap probability. Using the matrix shown below, the RAC is expressed as a single Arabic number that can be used to help determine hazard abatement priorities.

	Mishap Probability				RAC	
		A	B	C	D	
Hazard Severity	I	1	1	2	3	1 - Critical
	II	1	2	3	4	2 - Serious
	III	2	3	4	5	3 - Moderate
	IV	3	4	5	5	4 - Minor
						5 - Negligible

SPECIAL PROVISION
SECTION 104
GENERAL RIGHTS AND RESPONSIBILITIES
(Electronic Payroll Submission)
(Payment Tracking)

104.3.8.1 Electronic Payroll Submission The prime contractor and all subcontractors and lower-tier subcontractors will submit their certified payrolls electronically on this contract utilizing the Elation System web based reporting. There is no charge to the contracting community for the use of this service. The submission of paper payrolls will not be allowed or accepted. Additional information can be found at <http://www.maine.gov/mdot/contractors/> under the first “Notice”.

104.3.8.2 Payment Tracking The prime contractor and all subcontractors and lower-tier subcontractors will track and confirm the delivery and receipt of all payments through the Elation System

SPECIAL PROVISION
SECTION 105
General Scope of Work
(Limitations of Operations)

Daytime work is allowed however lane closures are not allowed from 6:30am to 7pm on the following intersections.

Augusta

Civic Center Dr & Commerce Dr
Civic Center Dr & Darin Dr
Civic Center Dr & I-95 NB
Civic Center Dr & I-95 SB
Civic Center Dr & Leighton Rd
Civic Center Dr & University Dr
Civic Center Dr & Townsend Rd
Eastern Ave & Stone St
Route 3 & N Belfast Ave
Route 3 & Riverside Dr
Route 3 & Route 104
Senator Way & Crossing Way
State St & Capitol St
State St & Union St
Stone St & Hannaford Dr
Western Ave & Airport Rd
Western Ave & Armory St
Western Ave & Crossing Way
Western Ave & Edison Dr
Western Ave & Orchard St/Meadow Rd
Western Ave & Senator Way
Western Ave & Sewall St
Western Ave & Shuman Dr
Western Ave & U-Haul Dr
Western Ave & Whitten Rd
State St & Bridge St
Water St & Bridge St
Bangor St & Linden St /Quimby St
Bangor St & N Belfast Ave/Locke St
Whitten Rd & Hannaford Dr

Belfast

Route 3 & Hatley Rd
Main St & Hannaford Dr
Main St & High St

Benton

Bridge St & Benton Ave

Fairfield

Route 201 & Bridge St

Farmington

Route 4 & Broadway
Route 4 & Route 2/27

Gardiner

Bridge St & Maine Ave
Bridge St & Water St

Randolph

Water St & Bridge St

Sanford

Route 4A/202 & River St
Route 4 & Grammar Rd/New Dam Rd
Route 224 & River St
Route 4A/202 & Route 224

Waterville

Silver St & Elm St
Elm St & Western Ave
Elm St & Park St
Spring St & Main St
Spring St & Silver St
Spring St & Elm St
Main St & Temple St
Main St & Elm St
Main St & Eustis Pkwy
Main St & Armory St
Main St & Waterville Commons Dr
Main St & I-95 NB
Main St & I-95 SB
College Ave & Hazelwood Ave
Kennedy Memorial Dr & Airport Rd

Winslow

Route 201 & Clinton Ave
Route 201 & Halifax St
Route 201 & China Rd
Route 201 & Carter Memorial Dr

Daytime work is allowed anytime however lane closures are not allowed from 6:30am to 9am and 3pm to 6pm at the following intersections:

Augusta

Eastern Ave & Cony Rd
Hospital St & Piggery Rd
Eastern Ave & Togus Rd
Route 3 & Church Hill Rd
S Belfast Ave & Cony Rd
Cony St & Willow St/ City Center Dr
State St & Winthrop St
Capitol St & Sewall St
Route 3 & Medical Center Pkwy
Route 3/Wilson St & Route 27

Belfast

Route 1 & Route 52

South China

Route 3 & Route 32

Norridgewock

Main St & Perkins St

Oakland

Main St & Fairfield St
Pleasant St & Oak St

Fairfield

Route 201 & KVCOG

Winslow

China Rd & Cushman Rd
Carter Memorial Dr & Cushman Rd

Lane closures are allowed from 6:30am to 7pm provided that at least 1 lane can be maintained on each approach at the following intersections:

Waterville

Kennedy Memorial Dr & First Park Dr
Kennedy Memorial Dr & I-95 SB
Kennedy Memorial Dr & I-95 NB
Kennedy Memorial Dr & Washington St
Kennedy Memorial Dr & Shaws Dr
Kennedy Memorial Dr & 1st Rangeway
Kennedy Memorial Dr & Hannaford Dr
Kennedy Memorial Dr & Cool St
Kennedy Memorial Dr & West River Rd
Kennedy Memorial Dr & First Park Dr

Sanford

Main St & Walmart Dr
Main St & Jagger Mill Rd
Main St & Shaws Dr
Main St & Westview Dr
Main St & Alumni Dr/ Old Mill Rd
Main St & Emery St
Main St & Washington St
Main St & Route 202
Main St & Route 224

Farmington

Route 4 & Bridge St
Route 4 & Hannaford Dr
Route 4 & Walmart Dr
Route 4 & Hospital St

SPECIAL PROVISION
SECTION 105
GENERAL SCOPE OF WORK
(NDAA Telecommunication Equipment)

The provisions of Section 105 of the Standard Specifications shall apply with the following additions:

105.11 Other Federal Requirements Add the following as final paragraphs:

To comply with the FY 2019 National Defense Authorization Act (NDAA), Section 889(b), in accordance with 2 CFR 200.216 and 2 CFR 200.471 regulations, as amended, the Contractor shall provide a written certification from the vendor/manufacturer/producer and signed by the Contractor for all telecommunication and/or video surveillance equipment, services, or systems. Such certification shall include a statement that none of the equipment, parts, or systems of the identified telecommunication and/or video surveillance equipment, parts, services or systems provided by the Contractor have been produced by the following entities:

- Huawei Technologies Company or ZTE Corporation (or any subsidiary or affiliate of such entities), and
- Hytera Communications Corporation, Hangzhou Hikvision Digital Technology Company or Dahua Technology Company (or any subsidiary or affiliate of such entities).

**SPECIAL PROVISION
SECTION 105
GENERAL SCOPE OF WORK
(Reserve Limits)**

It is hereby brought to the Contractor's attention that use of the following areas will not become available to the Contractor until May 1, 2021:

- The Contractor cannot work on any parcel outside the existing Right of Way as indicated on the City of Augusta Right of Way plans #'s 1R, 10R, 12R, 19R, 20R, 22R, 24R, 25R, 28R, 30R, 36R, & 38R until May 1, 2021 or unless released prior to that date by the Department.
- The Contractor cannot work on any parcel outside the existing Right of Way as indicated on the remaining Right of Way plans #'s 47R, 56R, 63R, 65R, 66R, 67, 68R, 69R, 85R & 97R until January 1, 2022 or unless released prior to that date by the Department.

The following list of Towns will have one or more intersections where rights will be acquired:

Augusta
Belfast
Fairfield
Farmington
Norridgewock
Oakland
Sanford
Waterville
Winslow

SPECIAL PROVISION
SECTION 105
GENERAL SCOPE OF WORK

The Contractor shall coordinate their work with any other projects and Contractors located within the limits of this project.

The Contractor shall cooperate with other parties at all times and provide project access as necessary and as directed by the Resident. Compliance with this specification including all efforts related to coordinating work with any other projects in the vicinity is considered incidental to the Contract. No separate payment will be made.

SPECIAL PROVISION 105
GENERAL SCOPE OF WORK
Equal Opportunity and Civil Rights
(Disadvantaged Business Enterprises Program)

105.10.1.1 Disadvantaged Business Enterprises Program The Maine Department of Transportation (MaineDOT) has established a Disadvantaged Business Enterprise (DBE) program in accordance with regulations of the United States Department of Transportation (USDOT), 49 CFR Part 26. The MaineDOT receives federal financial assistance from USDOT, and as a condition of receiving this assistance, the Department has signed an assurance that it will comply with 49 CFR Part 26. The MaineDOT is responsible for determining the eligibility of and certifying DBE firms in Maine.

A DBE is defined as a for-profit business that is owned and controlled by one or more socially and economically disadvantaged person(s). For the purpose of this definition:

1. "Socially and economically disadvantaged person" means an individual who is a citizen or lawful permanent resident of the United States and who is Black, Hispanic, Native American, Asian, Female; or a member of another group or an individual found to be disadvantaged by the Small Business Administration pursuant to Section 3 of the Small Business Act.
2. "Owned and controlled" means a business which is:
 - a. A sole proprietorship legitimately owned and controlled by an individual who is a disadvantaged person.
 - b. A partnership or limited liability company in which at least 51% of the beneficial ownership interests legitimately are held by a disadvantaged person(s).
 - c. A corporation or other entity in which at least 51% of the voting interest and 51% of the beneficial ownership interests legitimately are held by a disadvantaged person(s).

The disadvantaged group owner(s) or stockholder(s) must possess control over management, interest in capital, and interest in earnings commensurate with the percentage of ownership. If the disadvantaged group ownership interests are real, substantial and continuing and not created solely to meet the requirements of this program, a firm is considered a bona fide DBE.

105.10.1.2 Commercially Useful Function MaineDOT will count expenditures of a DBE contractor toward DBE goals only if the DBE is performing a commercially useful function on that contract. A DBE performs a commercially useful function when it is responsible for execution of the work of the contract and is carrying out its responsibilities by actually performing, managing, and supervising the work involved. Credit will only be given when the DBE meets all conditions for a CUF. Credit for labor will be in accordance with the responsibilities outlined in the contract. To perform a commercially useful function, the DBE must also be responsible, with respect to materials and supplies used on the Contract, for negotiating price, determining quality and quantity, ordering the materials, and installing (where applicable) and paying for the material itself. To determine whether a DBE is performing a commercially useful function, MaineDOT will evaluate the amount of work subcontracted, industry practices, whether the amount the firm is to be paid under the Contract is commensurate with the work it is actually performing and DBE credit claimed for its performance of the work, and other relevant factors.

Rented equipment used by the DBE must not be rented from the Prime Contractor on a job that the DBE is subcontracted with that Prime Contractor for regular course of business.

A current listing of certified DBEs that may wish to participate in the highway construction program and the scope of work for which they are certified can be found at <http://www.maine.gov/mdot/disadvantaged-business-enterprises/pdf/directory.pdf>. Credit will be given for the value described by a DBE performing as:

- A. A prime contractor; 100% of actual value of work performed by own workforces.
- B. An approved subcontractor; 100% of work performed by own workforces.
- C. An owner-operator of construction equipment; 100% of expenditures committed.
- D. A manufacturer; 100% of expenditures committed. The manufacturer must be a firm that operates or maintains a factory or establishment that produces on the premises the materials or supplies obtained by the Contractor. Brokers and packagers shall not be regarded as manufacturers.
- E. A regular dealer; 60% of expenditures committed. A regular dealer is defined as a firm that owns, operates, or maintains a store, warehouse or other establishment in which the materials or supplies required for the performance of the contract are bought, kept in stock, and regularly sold to the public. For purposes of this provision a "Broker" is a DBE that has entered into a legally binding relationship to provide goods or services delivered or performed by a third party. Brokers and packagers shall not be regarded as regular dealers.
- F. A bona fide service provider; 100% of reasonable fees or commissions. Eligible services include professional, technical, consultant, or managerial, services and assistance in the procurement of essential personnel, facilities, equipment, materials or supplies required for the performance of the contract. Eligible services also include agencies providing bonding and insurance specifically required for the performance of the contract.
- G. A trucking, hauling or delivery operation. 100% of expenditures committed when trucks are owned, operated, licensed and insured by the DBE and used on the contract and, if applicable, includes the cost of the self supplied materials and supplies. 100% of expenditures committed when the DBE leases trucks from another DBE firm including an owner-operator. 100% of reasonable fees or commissions the DBE receives as a result of a lease arrangement for trucks from a non-DBE, including an owner-operator.
- H. Any combination of the above.

105.10.1.3 Race-neutral Goals The Maine DOT is required to set an annual goal (approved on a three year basis) for DBE participation in Federal-aid projects. In order to fulfill that goal, bidders are encouraged to utilize DBE businesses certified by the MaineDOT. MaineDOT seeks to meet the established DBE goal solely through race-neutral means. *Race-neutral* DBE participation occurs when a DBE is awarded a prime contract through customary competitive procurement procedures, is awarded a subcontract on a contract that does not carry a DBE contract goal, or wins a subcontract from a prime contractor that did not consider its DBE status in making the award. A DBE/subcontractor Utilization Proposed Form is required to be included in bid documents.

MaineDOT will analyze each project and create a Project Availability Target (PAT), based on a number of factors including project scope, available DBE firms, firms certified in particular project work, etc. Each bid will request that the contractor attempt to meet the PAT. This PAT is developed to assist contractors to better understand what the MaineDOT expectations are for a

specific project. The PAT is NOT a mandate but an assessment of what this particular project can bear for DBE participation. The Department anticipates that each contractor will make the best effort to reach or exceed this PAT for the project.

105.10.1.4 Race-conscious Project Goals If it is determined by the Department that the annual DBE goal will not be met through *race-neutral* means, the Department may implement *race-conscious contract goals* on some projects. Race-conscious contract goals are goals that are enforceable by the Department and require that the prime contractor use good faith effort to achieve the goal set by the Department for that particular project. If race conscious means are implemented on a project, the Prime must comply with the requirements of 49 CFR.

At the time of the bid opening, all Bidders shall submit with their bid a Disadvantaged Business Enterprise (DBE) Commitment Form provided by the Department. This form will list the DBE and non-DBE firms that are proposed to be used during the execution of the Work. The list shall show the name of the firm, the item/material/type of work involved and the dollar amount of work to be performed. The dollar total of each commitment shall be totaled and a percentage determined.

If the project goal is not met, acceptable documentation showing all good faith efforts made to obtain participation may be required in order to award the project. Failure to provide the required listing with the dollar participation total or acceptable documentation of good faith efforts to obtain DBE participation within 3 days after the bid opening date will be considered a lack of responsiveness on the part of the low bidder. Rejection of the low bid under these circumstances will require the low bidder to surrender the Proposal Guaranty to the Department. The submission and approval of the above forms does not constitute a formal subcontract.

If for any reason during the progress of the Work the Contractor finds that DBEs included on the list are unable to perform the proposed work, the Contractor, with written release by the committed DBE or approval of the Department, may substitute other DBE firms for those named on the list. If the Contractor is able to clearly document their inability to find qualified substitute firms to meet the project goal, the Contractor may request in writing approval to substitute the DBE with a non-DBE firm. If at any time during the life of the Contract it is determined that the Contractor is not fulfilling the goal or commitment(s) and is not making a good faith effort to fulfill the DBE requirement, the Department may withhold progress payments. If good faith effort is determined by the Department, failure to meet the DBE contract goal will not be a detriment to the bid award. Fulfillment of the goal percentage shall be determined by dividing the dollars committed to the DBEs by the actual contract dollars. These requirements are in addition to all other Equal Employment Opportunity requirements on Federal-aid contracts.

105.10.1.5 Certification of DBE attainment on Contracts The MaineDOT must certify that it has conducted post-award monitoring of all contracts to ensure that DBEs had done the work for which credit was claimed. The certification is for the purpose of ensuring accountability for monitoring which the regulation already requires. The MaineDOT will certify these contracts through review of CUF forms, Elations sub-contract payment tracking as well as occasional on-site reviews of projects and through the project's final closeout documentation provided by our Contracts Section.

105.10.1.6 Bidders' List Survey Pursuant to 49 CFR 26.11 the MaineDOT is required to “create and maintain” a bidders list and gather bidder information on our construction/consultant projects, Contractors will maintain information on all subcontract bids submitted by DBE and Non-DBE firms and provide that information to the Department. The Following information is required:

Firm Name

Firm Address

Firm status (DBE or non-DBE)

Age of firm (years)

And the annual gross receipts amount as indicated by defined brackets, i.e. \$500,000 to \$800,000, rather than requesting exact figures.

Not only is this information critical in determining the availability of DBE businesses relative to other businesses that do similar work, but the Federal Highway Administration requires that we obtain this information.

MaineDOT DBE Project Attainment Target (PAT)
for this Project is N/A

The MaineDOT seeks to meet the specified annual Disadvantaged Business Enterprise (DBE) usage goal set out by 49 CFR 26.45 through the efforts of contractors seeking to employ qualified DBE subcontractors. We seek to meet this goal by race neutral means and do not, at this time, use contract specific requirements for each project. We do however, understand the capacity of Maine's DBE community and the unique characteristics a project may have that would differ from the broad annual goal.

Taking this into consideration, the MaineDOT will review each project and develop an anticipated attainment or Project Attainment Target (PAT) based on several factors that are project specific. Those factors include:

- Scope of Work
- DBE availability according to Specification Item
- Geographic location
- DBE capacity

This PAT is developed to assist contractors to better understand the DBE participation that the MaineDOT can reasonably expect for a specific project. The PAT is NOT a mandate but an assessment of the DBE opportunities that this project could meet or exceed. MaineDOT anticipates that each contractor will make the best effort to reach or exceed the PAT for this project.

SPECIAL PROVISION
SECTION 105
GENERAL SCOPE OF WORK
(Buy America Certification)

105.11 Federal Requirements Add the following as the third and subsequent paragraphs:

“Prior to payment by the Department, the Contractor shall provide a certification from the producer of steel or iron, or any product containing steel or iron as a component, stating that all steel or iron furnished or incorporated into the furnished product was manufactured in the United States in accordance with the requirements of the Buy America provisions of 23 CFR 635.410, as amended. Such certification shall also include (1) a statement that the iron or steel product or component was produced entirely within the United States, or (2) a statement that the iron or steel product or component was produced within the United States except for minimal quantities of foreign steel and iron valued at \$ (actual value).

All manufacturing processes must take place domestically. Manufacturing begins with the initial melting and mixing, and continues through the coating stage. Any process which modifies the chemical content, the physical size and shape, or the final finish is considered a manufacturing process. These processes include rolling, extruding, machining, bending, grinding, drilling, and coating. “Coating” includes epoxy coating, galvanizing, painting, or any other coating that protects or enhances the value of the material.

A Buy America Certification is required from each manufacturer, fabricator, supplier, subcontractor, etc. that meets the “manufacturing” definition above.

Buy America does not apply to raw materials (iron ore and alloys), scrap, pig iron, or processed, pelletized, and reduced iron ore.”

SPECIAL PROVISION
SECTION 106
QUALITY

106.6 Acceptance

Revise this Subsection by replacing the first two paragraphs with:

106.6 Acceptance The Department is responsible for determining the acceptability of the Work. Acceptance of the Material is based on the visual inspection of the construction, monitoring of the Contractor’s QCP, and Acceptance Test results. Acceptance sampling and testing is the responsibility of the Department (unless alternate procedures are specified) except for furnishing facilities, testing equipment, transportation, and Material samples as required.

Acceptance of Hot Mix Asphalt Pavement will be based on Method A or C Statistical Acceptance, or Method B or D Acceptance as specified. The method of acceptance for each item is defined in Special Provision, Section 403, Hot Mix Asphalt Pavement. When items of Hot Mix Asphalt Pavement are not so designated, Method A will be utilized whenever there are more than 1000 tons per Hot Mix Asphalt Pavement item, and Method B will be utilized when there are less than or equal to 1000 tons per Hot Mix Asphalt Pavement item.”

Revise Subsection “B” by replacing it with:

“B. Items not designated for Statistical Acceptance will utilize Method B or D Acceptance testing to validate the quality of the material incorporated into the Project. For material paid under Item 403.209 – Method D, or designated to be visually accepted, the Contractor shall provide the Department with a Certification Letter that indicates that the material supplied complies with the Specifications. Test results representative of the certified material shall be attached to the letter.

The Department will randomly sample and test the certified Material for properties noted in Table 1 of Section 502 - Structural Concrete or Table 14 of Section –401.21 Acceptance Method B & D. Material will be subject to rejection as noted in Structural Concrete Section 502.195 - Quality Assurance Method C Concrete or Hot Mix Asphalt, Section 401.2022 Pay Adjustment – Method B & D.”

106.7.1 Standard Deviation Method Revise 106.7.1, subsection H by removing the following from the first paragraph:

“Method B: $PF = [70 + (\text{Quality Level} * 0.33)] * 0.01$ ”

SPECIAL PROVISION
SECTION 107
PROSECUTION AND PROGRESS
(Contract Time)

The contractor will be allowed to commence work on this project as long as all applicable plans required under this contract have been submitted, approved, and a pre-construction meeting held.

The completion date for all work in the municipality of Augusta is **April 30, 2022**. The Contractor will be charged supplemental liquated damages at a rate of \$500 for every day that the work in the municipality of Augusta is not complete past the above completion date.

The completion date for all work in the municipalities of Waterville/Winslow is **April 30, 2023**. The Contractor will be charged supplemental liquated damages at a rate of \$500 for every day that the work in the municipalities of Waterville/Winslow is not complete past the above completion date.

The completion date for all work in the remaining municipalities is **April 30, 2024**. Liquidated damages will be assessed in accordance with the standard specifications.

All work schedule changes must be submitted for approval to the Department a minimum of 48 hours prior to the requested change.

All travel lanes shall be open to traffic and the roadway in safe operating condition when the contractor suspends work for holidays or extended periods of time as directed.

Absences must be requested at least 72 hours in advance and are subject to Department approval based on existing roadway condition, paving deadlines, adherence to schedule, traffic restrictions, etc. The Contractor must assure that the roadway surface and signage are maintained for safe passage of the traveling public during any approved absences. The Contract Completion Date will not be modified due to approved absences.

DIVISION 400
SPECIAL PROVISION
SECTION 401 - HOT MIX ASPHALT PAVEMENT

401.01 Description The Contractor shall furnish a uniformly blended, homogeneous mixture placed as one or more courses of Hot Mix Asphalt Pavement (HMA) on an approved base in accordance with the contract documents and in reasonably close conformity with the lines, grades, thickness, and typical cross sections shown on the plans or established by the Resident. The Department will accept this work under Quality Assurance provisions, in accordance with these specifications and the requirements of Section 106 – Quality, the provisions of AASHTO M 323 except where otherwise noted in sections 401 and 703 of these specifications, and the MaineDOT Policies and Procedures for HMA Sampling and Testing.

401.02 Materials Materials shall meet the requirements specified in Section 700 - Materials:

Asphalt Cement	702.01
Aggregates for HMA Pavement	703.07
RAP for HMA Pavement	703.08
HMA Mixture Composition	703.09

401.03 Composition of Mixtures The Contractor shall compose the Hot Mix Asphalt Pavement with aggregate, Performance Graded Asphalt Binder (PGAB), approved antistrip, warm mix additive, and/or mineral filler if required. HMA shall be designed and tested according to AASHTO R 35 and the volumetric criteria in Table 1. The Contractor shall size, uniformly grade, and combine the aggregate fractions in proportions that provide a mixture meeting the grading requirements of the Job Mix Formula (JMF). Unless otherwise noted in Special Provision 403 - Hot Mix Asphalt Pavement, the design, verification, Quality Control, and Acceptance tests for this mix will be performed at 65 gyrations.

TABLE 1: VOLUMETRIC DESIGN CRITERIA

Design ESAL's (Millions)	Required Density (Percent of G _{mm})			Voids in the Mineral Aggregate (VMA) (Minimum Percent)					Voids Filled with Binder (VFB) (Minimum %)	Fines/Eff · Binder Ratio
				Nominal Maximum Aggregate Size (mm)						
	N _{initial}	N _{design}	N _{max}	25.0	19.0	12.5	9.5	4.75		
< 3.0	≤90.5	96.0	≤98.0	25.0	19.0	12.5	9.5	4.75	65-80*	0.6-1.2
3 to <10	≤89.0			13.0	14.0	15.0	16.0	16.0		
≥ 10				13.0	14.0	15.0	16.0	16.0		

*For 9.5 mm nominal maximum aggregate size mixtures, the maximum VFB is 82. For 4.75 mm nominal maximum aggregate size mixtures, the maximum VFB is 84.

The Contractor shall submit a JMF to the Department for each mixture to be supplied. The JMF will be approved by the Department in accordance with the MaineDOT HMA Policies and Procedures for HMA Sampling and Testing Manual. At the time of JMF submittal, the Contractor shall identify and make available the stockpiles of all proposed aggregates at the plant site. There must be a minimum of 150 ton for coarse aggregate stockpiles and 75 ton for fine aggregate stockpiles before the JMF

may be submitted. The Contractor shall provide aggregate samples to the Department unless otherwise required. The Contractor shall also make available to the Department the PGAB proposed for use in the mix in sufficient quantity to test the properties of the asphalt and to produce samples for testing of the mixture. The first day's production shall be monitored, and the approval may be withdrawn if the mixture exhibits undesirable characteristics such as checking, shoving or displacement. The Contractor shall be allowed to submit aim changes for a JMF as outlined in the MaineDOT HMA Policies and Procedures for HMA Sampling and Testing Manual: Mix Design Approval Section.

The Contractor shall submit a new JMF for approval each time a change in material source or materials properties is proposed. The same approval process shall be followed. The cold feed percentage of any aggregate may be adjusted up to 10 percentage points from the amount listed on the JMF, however no aggregate listed on the JMF shall be eliminated. The cold feed percentage for RAP may be reduced up to 10 percentage points from the amount listed on the JMF and shall not exceed the percentage of RAP approved in the JMF or for the specific application under any circumstances.

401.031 Warm Mix Technology The Contractor may place Hot Mix Asphalt Pavement produced with an accepted WMA technology if approved by the Department. Methods or technologies shall generally be at the Contractors option, but will be limited to proven, Agency and Industry accepted practice. Mixture production, placement and volumetric testing details, including temperatures, shall be included in the project specific QCP, and submitted to the Department for approval prior to any work.

401.04 Temperature Requirements The temperature of the mixture shall conform to the tolerances in Table 2 as measured at the truck at the mixing plant and at the paver unless otherwise authorized by the Department.

TABLE 2: ALLOWABLE TEMPERATURE RANGES

PGAB Grade(s)	Temperature Range (°F)
PG58-28 / PG64-28	275-325
PG64E-28 / PG70E-28	285-335

401.05 Performance Graded Asphalt Binder The Contractor shall utilize either a PG58-28, PG64-28, PG64E-28, PG70E-28, or other grade as specified in the 403 Special Provision. The Contractor shall utilize a PG64-28 if no liquid grade is specified within the 403 Special Provision.

401.06 Weather and Seasonal Limitations The State is divided into two paving zones as follows:

- a. Zone 1 Areas north of US Route 2 from Gilead to Bangor and north of Route 9 from Bangor to Calais.
- b. Zone 2 Areas south of Zone 1 including the US Route 2 and Route 9 boundaries.

TABLE 3: SEASONAL AND TEMPERATURE LIMITATIONS

Use	Minimum Ambient Air Temperature	Zone 1 Allowable Placement Dates	Zone 2 Allowable Placement Dates
Surface course (travelway & adjacent shoulders) less than 1 in. thick placed during conditions defined as “night work”	50°F	June 1 to Saturday following September 1	
Surface course (travelway & adjacent shoulders) less than 1 in. thick	50°F	May 15 to Saturday following September 15	
Travelway surface course greater than or equal to 1 in. thick	50°F	May 1 to Saturday following October 1	April 15 to Saturday following October 15
HMA for surface course on bridge decks	50°F	May 1 to Saturday following October 1	April 15 to Saturday following October 15
HMA for base or shim course on bridge decks	50°F	April 15 to November 15	
HMA for use other than travelway surface course	40°F	April 15 to November 15	
HMA for curb, driveways, sidewalks, islands, or other incidentals	40°F	N/A	N/A
HMA produced with an approved WMA technology for base or shim course	35°F	April 15 to November 15	

The ambient air temperature shall be determined by an approved thermometer placed in the shade at the paving location. Unless otherwise specified, the Contractor shall not place Hot Mix Asphalt Pavement on a wet or frozen surface regardless of the ambient air temperature. The Hot Mix Asphalt Pavement produced with an approved WMA technology shall meet the requirements of section 401.04 - Temperature Requirements, unless otherwise approved by the Department. For the purposes of this Section, the traveled way includes truck lanes, ramps, approach roads and auxiliary lanes.

401.07 Hot Mix Asphalt Plant

401.071 General Requirements HMA plants shall conform to AASHTO M 156, Standard Specification for Requirements for Mixing Plants for Hot-Mixed, Hot-Laid Bituminous Paving Mixtures with exception of Section 4.2.1, 4.2.2, 4.3.4, 4.3.5, and 4.12.2.

All HMA plants will be inspected annually by the Department prior to producing HMA for Department projects. The Contractor shall provide the Department at least 72 hours’ notice that the plant is ready for inspection. The Contractor shall equip the plant with ladders and platforms that are accessible and safe to obtain samples of PGAB, aggregate and mix from the relevant tanks, collector belts and haul units. Silo storage time of mixtures shall not exceed 36 hours.

401.072 Stockpiles The Contractor shall provide sufficient space for stockpiles and maintain a minimum of supply for 2 days production of all aggregate products used in MaineDOT approved mix designs currently under production. A minimum stockpile supply of 100 ton (70 yards) shall be maintained at all times. The Contractor shall construct stockpiles to prevent intermingling and to

minimize segregation. All stockpiles used in MaineDOT mixes shall be identified with weatherproof signs at least 12" high and 24" wide, with reflective lettering at least 2" high.

401.073 Cold Feeds Cold Feed Bins will have bin dividers to keep aggregate products separated. Adequate means must be provided for obtaining samples of the combined flow of all Cold feed bins.

401.074 Dryer Dryer shall be capable of heating aggregate to required mixing temperature and shall be in good operation and condition. Dryer shall be subject to annual inspection prior to start-up. The Contractor shall dry and heat the aggregates for the HMA to the required temperature, adjusting flames to avoid damaging the aggregates. The Contractor shall provide the Department a minimum period of 72 hours to inspect the dryer and provide at least 24 hours' notice that the dryer is ready for inspection.

401.075 Asphalt Binder The plant shall include a heating system and insulation to maintain the asphalt binder at a uniform temperature for proper mixing and compaction. A thermometer shall be provided in the asphalt binder line. No direct flame may come in contact with tank. A sampling valve shall be provided in the circulation line downstream of any binder additive used unless otherwise approved by the Department. The Contractor shall drain down the asphalt as low as safely possible in any tank that will be switched to a new source or grade prior to adding the new PGAB.

401.076 Additives Additives (WMA, anti-strip, etc.) introduced into the binder at the HMA plant shall be introduced per the supplier's recommendations and shall be approved by the Department. The system for introducing additives shall be interlocked with the aggregate feed or weigh system to maintain correct proportions for all production rates and batch sizes. Additive introduction systems shall be controlled by a proportioning device to the amount required on the JMF plus or minus 0.1% of the target. Additive introduction systems shall be interlocked with the plant and the recordation (batch tickets or drum recordation) shall display the additive and the weight and percentage added.

401.077 Batch Plants

Hot Bins Hot bins shall provide uniform continuous operation and be in good working condition. The plant shall be able to provide samples of hot bins upon request. Overflow shall be provided for each hot bin. Hot bin gates shall close without leaking. Bin walls must prevent intermingling between bins. Each hot bin shall have low level indicators which will alert the operator when the bin is empty.

Mixer Unit Clearance between blades and liner shall be 1" maximum, unless the aggregate exceeds 1 ¼" then the clearance shall be 1 ½". The spray bar length shall be at least 75% of the mixer length. The mixer unit shall be a twin pug mill-type mixer capable of mixing continuously for at least 45 seconds after all materials have been introduced into the mixer. The blades in the mixer shall be capable of producing a homogenous mixture. If the mixer is not enclosed, it shall be equipped with an adjustable hood to prevent loss of dust by dispersion. The mixer unit shall be subject to annual inspection prior to removal of safety features and being readied for service. The Contractor shall provide the Department the opportunity to inspect the mixer unit prior to the annual inspection. The Contractor shall provide the Department a minimum period of 72 hours to inspect the mixer unit and provide at least 24 hours' notice that the mixer unit is ready for inspection.

Mineral Filler Mineral filler and fiber shall utilize separate bins and feed systems to store and proportion the required quantity into the mixture. The feed systems shall be accurate to no more than 10% of the required weight with a convenient and accurate means of calibration. Mineral filler and

fiber shall be introduced in the weigh hopper and uniformly distributed prior to the injection of the asphalt binder.

Automation The HMA batch plant shall automatically batch, mix and discharges mixes. The batch plant shall accurately proportion the various materials in the proper order by weight. The entire batching and mixing cycle shall be continuous and shall not require any manual operations. The batch plant shall use auxiliary interlock circuits to trigger an audible alarm whenever an error exceeding the acceptable tolerance occurs. Along with the alarm, the printer shall print an asterisk on the delivery slip in the same row containing the out-of-tolerance weight. The automatic proportioning system shall be capable of consistently delivering material within the full range of batch sizes. When RAP is being used, the plant must be capable of automatically compensating for the moisture content of the RAP.

The HMA batch plant shall be operated within the following tolerances:

Each aggregate component	+/- 1.5% cumulative, per bin
Mineral Filler	+/- 0.5%
Bituminous Material	+/- 0.1%
Zero return (aggregate)	+/- 0.5%
Zero Return (AC)	+/- 0.1%
Additives	+/- 0.1%

Recordation All plants shall be equipped with an approved digital recording device. The printer shall mark any weight on the ticket that exceeds tolerance. The delivery slip shall contain information required under Section 108.1.3 - Provisions Relating to Certain Measurements, Mass and paragraphs a, b, and c of Section 401.078.

401.078 Drum Plants

Cold Feeds and Delivery System A scalper screen shall be used to remove oversize material. The accuracy of the belt scale shall be within +/- 1.0% of the actual weight being measured. The plant shall be capable of correcting for aggregate moisture. Mineral filler and fiber shall utilize separate bin(s) and feeder systems to store and proportion the required quantity into the mixture. The feed systems shall be accurate to no more than +/- 10% of the required weight with a convenient and accurate means of calibration. The plant shall be equipped with a single control to change all feed rates. Mineral filler and fiber shall be introduced such that dry mixing is accomplished no less than 18 inches prior to the injection of the asphalt binder. The Contractor shall ensure that the mineral filler does not become entrained in the exhaust stream of the dryer.

Binder System The flow of asphalt binder shall adjust automatically with dry aggregate weights. The Department will conduct an asphalt flow meter check annually and after each change of plant location. The flow meter check must be performed prior to producing mix for Department projects. The plant must be configured to provide a convenient means to check accuracy of the flow meter. The flow meter will be considered accurate if the measured weight is within 1% of actual weight.

Drum Mixer The plant shall be equipped with a diversion system where mix can be diverted at startup/shutdown and any time. The drum mixer shall be subject to annual inspection prior to removal

of safety features and being readied for service. The Contractor shall provide the Department a minimum period of 72 hours to inspect the drum mixer while providing at least 72 hours' notice that the drum mixer is ready for inspection.

Recordation An approved automatic ticket printer system shall be used to print delivery slips. The requirements for delivery slips for payment of materials measured by weight, as given in the following Sections, shall be waived: 108.1.3 a., 108.1.3 b., 108.1.3 c., and 108.1.3 d. The automatic printed ticket will be considered as the Weight Certificate. The dry aggregate weights and binder flow shall be recorded as well as mineral filler and all binder additives. The recordation of materials shall be printed a minimum of every ten minutes while in production.

The requirements of Section 108.1.3 f. - Delivery Slips, shall be met by the delivery slip printed by the automatic system, which accompanies each truckload, except for the following changes:

- a. The quantity information required shall be individual weights of each batch or total net weight of each truckload.
- b. Signatures (legible initials acceptable) of Weighmaster (required only in the event of a malfunction as described in 401.074 c.).
- c. The MaineDOT designation for the JMF.

401.079 Scales and Weight Checks Scales shall meeting the requirements of Section 108 - Payment. The scales shall be inspected and sealed by the State Sealer (or approved alternative) as often as the Department deems necessary to verify their accuracy. Plant scales shall be checked prior to the start of the paving season, and each time a plant is moved to a new location. Subsequent checks will be made as determined by the Resident. The Contractor will have at least ten 50 pound masses for scale testing at batch plants. At Contractor's option, the Contractor can use one single test weight that has been checked on sealed scales. This weight shall be 1,000 lbs. or greater. At least twice during each 5 days of production either of the following checks will be performed:

- a. A loaded truck may be intercepted and weighed on a platform scale that has been sealed by the State Sealer of Weights and Measures within the past 12 months. The inspector will notify the producer to take corrective action on any discrepancy over 1.0%. The producer may continue to operate for 48 hours under the following conditions.
 1. If the discrepancy does not exceed 1.5%; payment will still be governed by the printed ticket.
 2. If the discrepancy exceeds 1.5%, the plant will be allowed to operate as long as payment is determined by truck platform scale net weight.

If, after 48 hours the discrepancy has not been addressed and reduced below 1.0%, then plant operations will cease. Plant operation may resume after the discrepancy has been brought within 1.0%.

- b. Where platform scales are not readily available, a check will be made to verify the accuracy and sensitivity of each scale within the normal weighing range and to assure that the interlocking devices and automatic printer system are functioning properly. If platform scales are not readily available, a weight with a known mass-verified and sealed annually by a licensed scale company, may be used by hanging weight from silo or surge hopper, at lower middle and upper third levels upon request to verify scale accuracy.

c. In the event of a malfunction of the automatic printer system, production may be continued without the use of platform truck scales for a period not to exceed the next two working days, providing total weights of each batch are recorded on weight tickets and certified by a Licensed Public Weighmaster.

401.08 Hauling Equipment Units hauling HMA shall have tight, clean, and smooth metal bodies, which have been thinly coated with a small amount of approved release agent to prevent the mixture from adhering to the bodies. Release agents that dissolve or strip asphalts, including diesel fuel, will not be allowed.

All mix haul units shall have a cover of water repellent material capable of heat retention, which completely covers the mixture. The cover shall be securely fastened on the truck, unless unloading. Haul units shall have an opening on both sides near the midpoint of the body, at least 12 in above the bed, which will accommodate a thermometer stem.

401.09 Pavers The Contractor shall use pavers meeting the requirements of this section unless otherwise authorized by the Department. Pavers shall meet the requirements of Table 4: Paver Requirements.

TABLE 4: PAVER REQUIREMENTS

Use	Paver Requirement
Traveled Way & Auxiliary Lanes	Equipped with a 10 ft minimum main screed with activated extensions. The minimum tractor weight shall be 30,000 pounds.
	Equipped with automatic grade and slope controls that automatically adjust the screed and increase or decrease the layer thickness to compensate for irregularities in the preceding course. The controls shall maintain the proper transverse slope and be readily adjustable so that transitions and superelevated curves can be properly paved. The controls shall operate from a fixed or moving reference such as a grade wire or ski type device (floating beam) with a minimum length of 30 ft, a non-contact grade control with a minimum span of 24 ft, except that a 40 ft reference shall be used on interstate and divided highway projects.
All HMA Placement	Self-contained, self-propelled units of sufficient class and size to place Hot Mix Asphalt Pavement in full lane widths specified in the contract on the main line, shoulder, or similar construction.
	Equipped with a free-floating activated heated main screed with activated extensions. Pavers with extendible screeds shall have auger extensions and tunnel extenders as per the manufacturer’s recommendations, a copy of which shall be available if requested.
	Equipped with a receiving hopper with sufficient capacity for a uniform spreading operation and a distribution system to place the mixture uniformly, without segregation in front of the screed.
	Operated in such a manner as to produce a visually uniform surface texture and a thickness within the requirements of Section 401.11 - Surface Tolerances. The screed assembly shall produce a finished surface of the required evenness and texture without tearing, shoving, or gouging the mixture.

The Contractor shall have the paver at the project site sufficiently before the start of paving operations to be inspected and approved by the Department. The Contractor shall repair or replace any paver found worn or defective, either before or during placement, to the satisfaction of the Department. Pavers that produce an unevenly textured or non-uniform mat will be repaired or replaced before

continuing to place HMA on MaineDOT projects. On a daily basis, the Contractor shall perform density testing across that mat as detailed in Section 401.191 Quality Control - Method A, B & C.

401.10 Rollers Rollers shall be static steel, pneumatic tire, oscillatory, or approved vibrator type. Rollers shall be in good mechanical condition, capable of starting and stopping smoothly, and be free from backlash when reversing direction. Rollers shall be equipped and operated in such a way as to prevent the picking up of hot mixed material by the roller drums or tires. Crushing of the aggregate or displacement of the HMA during rolling will not be permitted. Any HMA Pavement that becomes loose, broken, contaminated, shows an excess or deficiency of PGAB, or is in any other way defective shall be removed and replaced at no additional cost with fresh material which shall be immediately compacted to conform to the adjacent area.

The Contractor shall repair or replace any roller found to be worn or defective, either before or during placement, to the satisfaction of the Department. Rollers that produce grooved, unevenly textured or non-uniform mat will be repaired or replaced before continuing to place HMA. The type of rollers to be used and their relative position in the compaction sequence shall generally be the Contractor's option unless otherwise specified in the contract, provided specified density is attained and with the following requirements:

- a. On variable-depth courses, the first lift of pavement over gravel, reclaimed pavement, on irregular or milled surfaces, or on bridges, at least one roller shall be 16 ton pneumatic-tired. Pneumatic-tired rollers shall be equipped with skirting to minimize the pickup of HMA materials from the paved surface. When required by the Resident, the roller shall be ballasted to 20 ton.
- b. Compaction with a vibratory or steel wheel roller shall precede pneumatic-tired rolling, unless otherwise authorized by the Department.
- c. Vibratory rollers shall not be operated in the vibratory mode on bridge decks.
- d. Any method, which results in cracking or checking of the mat, will be discontinued and corrective action taken.
- e. The use of an oscillating steel roller shall be required to compact all mixtures placed on bridge decks.

The maximum operating speed for a steel wheel or pneumatic roller shall not exceed the manufacturer's recommendations, a copy of which shall be available if requested.

401.11 Surface Tolerances The Department will check the following surface tolerances:

- a.) Longitudinally: The pavement surface profile shall be free of deviations in excess of +/- 1/4 inches from the required pavement surface profile grade. To verify the surface tolerance a straight plane shall be established using 16 foot straight edge or a taught string line placed parallel to the direction of travel and checked continuously across the width of the lane.
- b.) Transversely: The pavement surface profile shall be free of deviations in excess of 0 inches below and 1/4 inches above the required cross-sectional profile grade. To verify the surface tolerance a straight plane shall be established using a 10 foot straight edge or taught string line placed perpendicular to the direction of travel and checked continuously along the length of the lane.

The Contractor shall correct defective areas by removing defective work and replacing it with new material as directed by the Department. The Contractor shall furnish a 10 foot straightedge for the Department's use.

401.12 Preparation of Existing Surface The Contractor shall thoroughly clean the surface upon which Hot Mix Asphalt Pavement is to be placed of all objectionable material. When the surface of the existing base or pavement is irregular, the Contractor shall bring it to uniform grade and cross section. All surfaces shall have a tack coat applied prior to placing any new HMA course. Tack coat shall conform to the requirements of Section 409 – Bituminous Tack Coat, Section 702 – Bituminous Material, and all applicable sections of the contract.

401.13 Spreading and Finishing On areas where irregularities or unavoidable obstacles make the use of mechanical spreading and finishing equipment impracticable, the Contractor shall spread, rake, and lute the HMA with hand tools to provide the required compacted thickness. Release agents that dissolve or strip asphalts, including diesel fuel, will not be allowed. On roadways with adjoining lanes carrying traffic, the Contractor shall place each course per the conditions in Table 5, unless otherwise noted by the Department in Section 403 - Hot Mix Asphalt Pavement.

TABLE 5: PLACEMENT CONDITIONS FOR ADJOINING LANES

Depth (at centerline)	Placement Conditions
Vertical Longitudinal Joint	
¾" and less (incl. shim)	The Contractor may place the HMA course over the full single travel lane width for each production day.
1" to 1 ¼"	The Contractor may place the HMA course over the full single travel lane width for each production day and will be required to place a matching course of HMA over the adjacent section of travel lane before weekend or holiday suspension.
1 ½" to 2"	The Contractor may place the HMA course over the full single travel lane width for each production day and will be required to place a matching course of HMA over the adjacent section of travel lane before the end of the following calendar day.
Greater than 2"	The Contractor shall place each course over the full width of the traveled way section being paved that day.
Notched-Wedge Longitudinal Joint	
1 ½" to 2"	The Contractor may place the HMA course over the full single travel lane width for each production day and will be required to place a matching course of HMA over the adjacent section of travel lane before weekend or holiday suspension. A maximum unmatched centerline joint length of 0.5 miles will be permitted over the weekend.
Greater than 2"	The Contractor may place the HMA course over the full single travel lane width for each production day and will be required to place a matching course of HMA over the adjacent section of travel lane before the end of the following calendar day.

The Contractor shall place the specified course over the full width of the mainline traveled way being paved, regardless of use, depth, or longitudinal joint type prior to Memorial Day, July 4th, Labor Day, paving suspensions exceeding three days, or other dates as specified by special provision.

The Contractor shall install additional warning signage that clearly defines the centerline elevation differential hazard. Unless otherwise addressed in the contract, the Contractor shall install additional

centerline delineation such as a double application of raised pavement markers at 100 foot intervals, or temporary painted line. For any exposed vertical edge between the shoulder and traveled way, at

a minimum, the use of temporary painted line, or RPMs placed along the edge of traveled way at 200 foot intervals is required. The Traffic Control Plan shall be amended to include this option and the additional requirements. All signs and traffic control devices will conform to Section 719.01, and Section 652, and will be installed prior to the work, at a maximum spacing of 0.50 mile for the entire length of effected roadway section. If this option is utilized, all additional signing, labor, traffic control devices, or incidentals will not be paid for directly, will be considered incidental to the appropriate 652 items.

401.14 Hot Mix Asphalt Placement on Bridge Decks Hot mix asphalt pavement placed on bridges shall also conform to Section 508.04 and the following requirements.

- a. The minimum production and placement temperature for the Hot Mix Asphalt placed over membrane shall conform to the manufacturer's recommendations.
- b. The bottom course shall be placed with an approved rubber mounted paver of such type and operated in such a manner that the membrane waterproofing will not be damaged in any way.
- c. The top course shall not be placed until the bottom course has cooled sufficiently to provide stability.
- d. The Contractor will not be required to cut sample cores from the compacted pavement on the bridge deck, unless otherwise directed by Special Provision.
- e. After the top course has been placed, the shoulder areas shall be sealed 3 ft wide with two applications of an emulsified bituminous sealer meeting the requirements of Section 612.03 – Sealing and Section 702.12 - Emulsified Bituminous Sealing Compound. The first application shall be pre-mixed with fine, sharp sand, similar to mortar sand, as needed to fill all voids in the mix in the area being sealed. The second application may be applied without sand. The sealer shall be carried to the curb at the gutter line in sufficient quantity to leave a bead or fillet of material at the face of the curb. The area to be sealed shall be clean, dry and the surface shall be at ambient temperature. The furnishing and applying of the required quantity of sealer for the bridge shoulder areas shall be incidental to placing the hot mix asphalt pavement.
- f. The area between the edge of the membrane and the vertical surface shall be completely sealed with hot-applied rubberized asphalt material, meeting the requirements of Type 4 crack seal; shall be applied to form a complete seal between the membrane and the vertical surface and shall extend up the vertical surface to within ½ inch of the top of the HMA wearing surface. This work shall be considered incidental to the contract pavement items unless 508 membrane items are included in the contract.

401.15 Compaction Immediately after the Hot Mix Asphalt Pavement has been spread, struck off, and any surface irregularities adjusted, the Contractor shall thoroughly and uniformly compact the HMA by rolling.

The Contractor shall roll the surface when the mixture is in the proper condition and when the rolling does not cause undue displacement, cracking, or shoving. The Contractor shall prevent adhesion of the HMA to the rollers or vibrating compactors without the use of fuel oil or other petroleum-based release agents. Solvents designed to strip asphalt binders from aggregates will not be permitted as release agents on equipment, tools, or pavement surfaces.

The Contractor shall immediately correct any displacement occurring as a result of the reversing of the direction of a roller or from other causes to the satisfaction of the Department. Any operation other than placement of variable depth shim course that results in breakdown of the aggregate shall be discontinued. Any new pavement that shows obvious cracking, checking, or displacement shall be removed and replaced for the full lane width as directed by the Resident at no cost to the Department.

Along forms, curbs, headers, walls, and other places not accessible to the rollers, the Contractor shall thoroughly compact the HMA with mechanical vibrating compactors. The Contractor shall only use hand tamping in areas inaccessible to all other compaction equipment. On depressed areas, the Contractor may use a trench roller or cleated compression strips under a roller to transmit compression to the depressed area.

Any HMA that becomes unacceptable due to cooling, cracking, checking, segregation or deformation as a result of an interruption in mix delivery shall be removed and replaced with material that meets contract specifications at no cost to the Department.

For all items requiring pavement density testing, the Contractor shall cut 6-inch diameter cores at no additional cost to the Department by the end of the working day following paving. Cores shall be cut such that the nearest edge at least 9 inches from any joint. Pre-testing of the cores will not be allowed. If the Contractor and the Department mutually determine that a core is damaged, the Contractor shall cut new core(s) at the same offset and within 3 ft of the initial sample. The Contractor and the Department will mutually determine if underlying material is adhered to the core and if so will mark the core at the point where sawing is needed. The Department will place the cores in a secure container and the Contractor shall transport the cores to the designated MaineDOT lab. The cores will be saw cut by the Department to remove underlying layers. No recuts are allowed at a test location after the core has been tested.

On all sections of overlay with wearing courses designed to be 1 in or less in thickness, there shall be no pay adjustment for density otherwise noted in Section 403 - Hot Mix Asphalt Pavement. For overlays designed to be 1 in or less in thickness, density shall be obtained by the same rolling train and methods as used on mainline travelway surface courses with a pay adjustment for density, unless otherwise directed by the Department.

There shall be no pay adjustment for density on shoulders unless otherwise noted in Section 403 - Hot Mix Asphalt Pavement. Density for shoulders shall be obtained by the same rolling train and methods as used on mainline travelway, unless otherwise directed by the Department. Efforts to obtain optimum compaction will not be waived by the Department unless it is apparent during construction that local conditions make densification to this point detrimental to the finished pavement surface course.

401.16 Joints The Contractor shall construct wearing course transverse and longitudinal joints in such a manner that minimum tolerances shown in Section 401.11 - Surface Tolerances are met when measured with a straightedge. The paver screed shall maintain a uniform head of HMA during transverse and longitudinal joint construction. The HMA shall be free of segregation and meet temperature requirements outlined in Section 401.04. Transverse joints of the wearing course shall be straight and neatly trimmed. The Contractor may form a vertical face exposing the full depth of the course by inserting a header, by breaking the bond with the underlying course, or by cutting back

with hand tools. The Contractor shall apply a coating of emulsified asphalt immediately before paving all joints to the vertical face and 3 in of the adjacent portion of any pavement being overlaid except those formed by pavers operating in echelon. The Contractor shall use an approved spray apparatus designed for covering a narrow surface. The Department may approve application by a brush for small surfaces, or in the event of a malfunction of the spray apparatus, but for a period of not more than one working day.

Where pavement under this contract joins an existing pavement, or when the Department directs, the Contractor shall cut the existing pavement along a smooth line, producing a neat, even, vertical joint. The Department will not permit broken or raveled edges. The cost of all work necessary for the preparation of joints is incidental to related contract pay items. Longitudinal joints shall be generally straight to the line of travel and constructed in a manner that best ensure joint integrity. Methods or activities that prove detrimental to the construction of straight, sound longitudinal joints will be discontinued.

The Contractor may utilize an approved notched wedge joint device on all HMA layers 1 ½ inches in depth or greater. A notched wedge joint shall be constructed as shown in Figure 1 using a device that is attached to the paver screed and is capable of independently adjusting the top and bottom vertical notches.

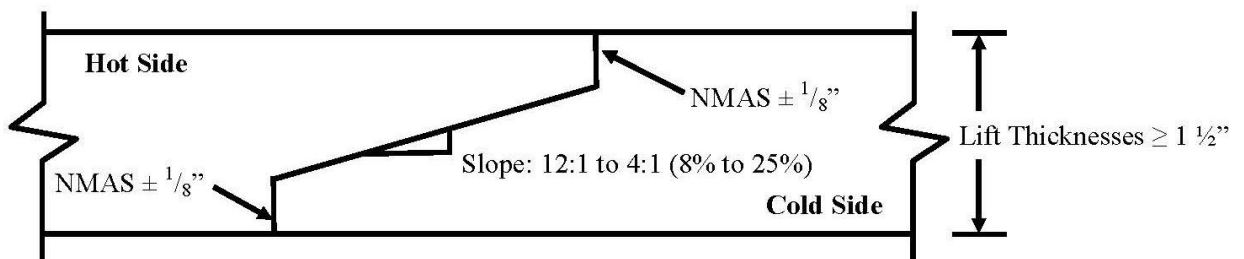


FIGURE 1: Notched Wedge Joint

Notes

1. An emulsified tack coat shall be applied to the vertical edges and the wedge surface so that the total rate is 0.05 G/SY plus the normal specified rate prior to placing the adjacent layer. The Contractor may elect to apply the emulsified tack coat in one or multiple passes.
2. Dimensions shown are compacted depths (after rolling is complete).

The Department reserves the right to have centerline cores cut by the Contractor's QC personnel for informational purposes to monitor the density along the joint. Informational cores at the centerline joint will be taken centered over the tapered part of the wedge joint.

Any notched wedge joint constructed areas that become cracked or broken shall be trimmed back to the limits affected prior to placing the adjoining lane. Any materials that become unbound or separated from the wedge or tapered joint section, or contaminated by materials determined by the Department as being detrimental to the construction of a sound construction joint, shall be removed by sweeping, compressed air and lance, or by hand tools as required. This work, if necessary, will not be paid for directly, but shall be considered incidental to the related contract items.

The Contractor shall apply a coating of emulsified asphalt on the vertical and tapered surface of the longitudinal centerline joint immediately before paving if the notched wedge joint device is used. The total rate of application shall be 0.050 G/SY plus the normal specified tack coat rate. The Contractor

shall use an approved spray apparatus designed for covering a narrow surface. The Department may approve application by a brush for small surfaces.

401.17 Hot Mix Asphalt Documentation The Contractor and the Department shall agree on the amount of Hot Mix Asphalt Pavement that has been placed each day. All delivery slips shall conform to the requirements of 401.078.

401.18 Prepave Meeting Prior to placing any mix, the Department and the Contractor shall hold a Pre-paving conference to discuss the paving schedule, source of mix, type and amount of equipment to be used, sequence of paving pattern, rate of mix supply, random sampling, project lots and sublots and traffic control. A copy of the density QC random numbers to be used on the project shall be provided to the Resident. The Departments' random numbers for Acceptance testing shall be generated and on file with the Resident and the Project Manager. All personnel of the Department and the Contractor who have significant information relevant to the paving items shall attend, including the responsible onsite paving supervisor for the Contractor. The Resident will prepare minutes of the conference and distribute them to all attendees. Any requests to revise the minutes must be made to the Resident within 7 Days of Receipt. These minutes will constitute the final record of the Pre-paving conference. On the first day of paving and whenever there is a change in the onsite paving foreman or paving inspector, the Department and the Contractor shall hold an informal onsite meeting to review the minutes of the Pre-paving conference, Project Specific QCP, Plans, Typical, Special Provisions and communication process. This meeting shall be held prior to placing any mix. The onsite paving supervisor, QCT, Superintendent, Resident and/or paving inspector shall attend.

401.19 Contractor Quality Control – Method A, B, C & D

The Contractor shall operate in accordance with the approved Quality Control Plan (QCP) to assure a product meeting the contract requirements. The Contractor shall not begin paving operations until the Department approves the QCP in writing.

401.191 Quality Control The QCP shall meet the requirements of Section 106.6 - Acceptance and this Section. The QCP shall address any items that affect the quality of the Hot Mix Asphalt Pavement, and shall include the following personnel meeting these minimum requirements:

- a. QCP Administrator - The QCP Administrator must be a full-time employee of or a consultant engaged by the Contractor or paving subcontractor. The QCP Administrator shall have full authority to institute any and all actions necessary for the successful operation of the QCP. The QCP Administrator (or their designee in the QCP Administrator's absence) shall be available to communicate with the Department at all times.
 - For items accepted under Methods A and B, the QCP Administrator shall be certified as a Quality Assurance Technologist (QAT) by NETTCP.
 - For items accepted under Methods C and D, the QCP Administrator shall be certified by NETTCP as a Quality Assurance Technologist (QAT), Plant Technician, or Paving Inspector.
- b. Process Control Technician(s) (PCT) shall utilize test results and other quality control practices to assure the quality of aggregates and other mix components and control proportioning to meet the JMF(s). The PCT shall inspect all equipment used in mixing to assure it is operating properly and that mixing conforms to the mix design(s) and other Contract requirements, and that delivery

slips and plant recordation accurately reflects the mix being produced with all the required information. The QCP shall detail how these duties and responsibilities are to be accomplished and documented, and whether more than one PCT is required. The Plan shall include the criteria to be utilized by the PCT to correct or reject unsatisfactory materials. The PCT shall be certified as a Plant Technician by the NETTCP.

c. Quality Control Technician(s) (QCT) shall perform and utilize quality control tests at the job site to assure that delivered materials meet the requirements of the JMF(s). The QCT shall inspect all equipment utilized in transporting, laydown, and compacting to assure it is operating properly and that all laydown and compaction conform to the Contract requirements. The QCP shall detail how these duties and responsibilities are to be accomplished and documented, and whether more than one QCT is required. The QCP shall include the criteria utilized by the QCT to correct or reject unsatisfactory materials. The QCT shall be certified as a Paving Inspector by the NETTCP.

The QCP shall detail the coordination of the activities of the Plan Administrator, the PCT and the QCT. The Project Superintendent shall be named in the QCP, and the responsibilities for successful implementation of the QCP shall be outlined.

The QCP shall address any items that affect the quality of the Hot Mix Asphalt Pavement including, but not limited to, the following:

a. General Requirements:

- Job Mix Formulas (JMFs)
- Name of QCP Administrator, and certification number
- Description of corrective action process
- Disposition of defective material
- A procedure to take immediate possession of acceptance samples once released by MaineDOT and deliver said samples to the designated acceptance laboratory.

b. Process Control Requirements: Each Hot Mix Asphalt plant shall have a Plant Specific Process Control Plan. At minimum the plan shall include:

- Name of Plant Specific Process Control Technician(s) and certification number(s)
- Hot mix asphalt plant details
- Stockpile Management
- Mixing & transportation
- Silo management and details
- A detailed description of RAP processing, stockpiling and introduction into the plant
- PG Binder management:
 - Tanks and storage (including polymer modified binders if applicable)
 - Binder temperature
 - Sample points
 - Method to ensure mixture contains the specified binder grade
 - Additive introduction details if introduced at the plant
- Testing and inspection plan for control of aggregates and RAP
- Mix Testing and inspection plan

c. Quality Control Requirements – Method A & B

- Name of Quality Control Technicians(s) and certification number(s)
- Laydown operations
- Longitudinal joint construction including the tacking of all joints.
- Procedures for avoiding paving in inclement weather
- Compaction of shoulders
- Methods to ensure that segregation is minimized
- Procedures to determine the maximum rolling and paving speeds based on best engineering practices and past experience in achieving acceptable pavement smoothness.
- Sequence for paving around drainage structures, under guard rail, around curb, at bridges, intersections, drives and minor approaches to ensure proper compaction, finish, and drainage.
- Type of release agent to be used on haul units, tools and rollers.

d. Quality Control Requirements – Method C and D

- Name of QCP Administrator and certification number(s) as specified in Section 401.19.
- Name of Process Control Technicians(s) and certification number(s).
- Name of Quality Control Technicians(s) and certification number(s).
- Anticipated Compaction Temperature Zones for each roller pass during placement.
- Mix TMD to be used for density gauge setting for method spec density work
- Procedures for avoiding paving in inclement weather.
- Type of release agent to be used on haul units, tools and rollers.
- A note stating that the use of petroleum-based fuel oils, such as diesel or kerosene, or asphalt stripping solvents will not be permitted.

Unless otherwise noted in section 401.192, or Special Provision 403 - Hot Mix Asphalt Pavement, the Contractor shall submit a QC Plan detailing what equipment is to be used, and what HMA plant is to be used for items covered under the Plan. All mix designs (JMF) shall be approved and verified by MaineDOT prior to use. The Contractor shall also supply a Laydown Operation Plan that addresses sequence of work, layout of work, longitudinal joint construction, compaction of shoulders, methods to minimize segregation, and procedures to achieve acceptable pavement smoothness.

For each production day, a summary of each day's results, including a daily paving report, summarizing the mixture type, mixture temperature, equipment used, environmental conditions, and the number of roller passes, shall be recorded and signed by the QCT and presented to the Department's representative by 1 PM the following working day.

The Contractor shall certify the mix and the test results for each item by a Certificate of Compliance.

The Contractor shall have a testing lab at the plant site, equipped with all testing equipment necessary to complete the tests in Table 6. The Contractor shall generate QC sampling random numbers for each approved mix design. A copy of the random numbers shall be emailed to the QC.mainedot@maine.gov email address and remain on-file (in print) and be available for inspection at the QC laboratory.

The Contractor shall sample, test, and evaluate Hot Mix Asphalt Pavement in accordance with the minimum frequencies per each approved mix design:

TABLE 6: MINIMUM QUALITY CONTROL FREQUENCIES

Test or Action	Frequency	Test Method
Temperature of mix	6 per day at street and plant	-
Temperature of mat	4 per day	-
%TMD (In-Place Density - Surface)	1 per 125 ton	AASHTO T 355 or AASHTO T 343
%TMD (In-Place Density - Base)	1 per 250 ton	AASHTO T 355 or AASHTO T 343
Fines / Effective Binder	1 per 500 ton	AASHTO T 312*
Gradation	1 per 500 ton	AASHTO T 30
PGAB Content	1 per 500 ton	AASHTO T 164 or AASHTO T 308
Voids at N_{design}	1 per 500 ton	AASHTO T 312*
VMA at N_{design}	1 per 500 ton	AASHTO T 312*
Rice Specific Gravity	1 per 500 ton	AASHTO T 209
Percent Fractured Particles	1 per 5,000 ton	AASHTO T 335
Flat and Elongated Particles	1 Per 5,000 ton	ASTM D4791
Fine Aggregate Angularity	1 Per 5,000 ton	AASHTO T 304

*Method A and B only

The Contractor shall monitor plant production on each approved mix design using running average of three control charts as specified in Section 106 - Quality. Control limits shall be as noted in Table 7 below. The UCL and LCL, shall not exceed the allowable gradation control points for the particular type of mixture as outlined in Table 1 of Section 703.09.

TABLE 7: CONTROL LIMITS

Property	UCL and LCL
Percent Passing 4.75 mm and larger sieves	Target +/- 4.0
Percent Passing 2.36 mm sieve	Target +/- 2.5
Percent Passing 0.075 mm sieve	Target +/- 1.0
PGAB Content	Target +/- 0.25
VMA at N_{design}	LCL = LSL + 0.2
Voids at N_{design}	JMF Target +/- 1.2
Theoretical Maximum Specific Gravity	JMF Target +/- 0.020

The Contractor shall retain splits of the previous 5 QC tests, with QC results enclosed for random selection and testing by the Department. Test results of splits that do not meet the Dispute Resolution Variance Limits in Table 18 shall trigger an investigation by the MaineDOT Independent Assurance Unit and may result in that lab losing NETTCP certification and the ability to request a dispute [Section 401.50 - Process for Dispute Resolution].

The Contractor shall make density test results, including randomly sampled densities, available to the Department onsite. Summaries of each day's results, including a daily paving report summarizing the mixture type, mixture temperature, equipment used, environmental conditions, and the number of roller passes, shall be recorded and signed by the QCT and provided to the QC.mainedot@maine.gov

email address and Resident in writing by 1:00 p.m. the next working day. The Contractor shall fill all holes in the pavement resulting from cutting cores by the Contractor or the Department with a properly compacted, acceptable mixture no later than the following working day. Before filling, the Contractor shall carefully clean the holes and apply a coating of emulsified asphalt. The Contractor may only cut additional cores for verification of the densometer, at a rate not to exceed 3 per day or 2 per 1000 ton placed.

If the Contractor's control chart shows the process for a given mix design to be out of control (defined as a single point outside of the control limits on the running average of three chart) on any property listed in Table 7: Control Limits, the Contractor shall notify the Resident of all affected projects in writing of the corrective action by 1:00 PM the next working day. The written description shall detail what action is being taken by the Contractor to bring the property in question back within control limits. Subsequent quality control results are expected to demonstrate an improvement and regression towards the aim. The Department reserves the right to take action, to include cessation of production, in the case of repeated results outside the Table 7 control chart control limits.

On a daily basis, or whenever equipment type or sequence is modified, the Contractor shall perform density testing across the mat being placed, prior to being compacted by equipment at 12 in intervals. If the density values vary by more than 2.0% from the mean, the Contractor shall make adjustments to the screed until the inconsistencies are remedied. Failure to replace or repair defective placement equipment may result in a letter of suspension of work and notification of a quality control violation resulting in possible monetary penalties as governed by Section 106 – Quality.

The Contractor shall cease paving operations whenever one of the following occurs:

- a. The quality level for density using all quality control tests for the current Lot is less than 60 PWL.
- b. The Coarse Aggregate Angularity or Fine Aggregate Angularity value falls below the requirements of Section 703.07, Table 3: Aggregate Consensus Properties Criteria for the design traffic level.
- c. The Flat and Elongated Particles value exceeds 10% by ASTM D4791.
- d. There is any visible damage to the aggregate due to over-densification other than on variable depth shim courses.
- e. The Contractor fails to follow the approved QCP.

The Contractor shall notify the Resident in writing as to the reason for shutdown, as well as the corrective action, by the end of the workday. Failure to do so will be treated as a second incident under 106.4.6 QCP Non-compliance. The Department will only allow the continuation of paving operations when it is satisfied the corrective action will result in an improvement in results. The Department may require the submittal of a passing verification sample to allow further production. The Department

retains the exclusive right, with the exception of the first day's production of a new JMF, to determine whether the resumption of production involves a significant change to the production process. If the

Department so determines, then the current lot will be terminated, a pay factor established, and a new lot will begin.

The Contractor may utilize innovative equipment or techniques not addressed by the Contract documents to produce or monitor the production of the mix, subject to approval by the Department.

401.192 Prepave and Quality Control requirements for Sidewalks, Drives, Islands & Incidentals - Method D and Visual Acceptance Items

Unless otherwise noted in Special Provision 403, a QCP, certified QC personnel, or Prepave Meeting shall not be required for Item 403.209 - Hot Mix Asphalt, 9.5 mm Nominal Maximum Size (sidewalks, drives, islands & incidentals) accepted under Method D, or for any items visually accepted. An approved JMF shall be provided to the Resident prior to placement.

401.20 Acceptance Method A & C

These methods utilize Quality Level Analysis and pay factor specifications. For Hot Mix Asphalt Pavement designated for acceptance under Quality Assurance provisions, the Department will sample once per subplot on a statistically random basis, test, and evaluate in accordance with the Acceptance Properties as outlined in Table 8:

TABLE 8: ACCEPTANCE PROPERTIES – METHOD A & C

Properties	Point of Sampling	Test Method
Gradation	Paver Hopper	AASHTO T 30
PGAB Content	Paver Hopper	AASHTO T 308
% TMD (In-Place Density)	Mat behind all Rollers	AASHTO T 269
Voids at N_{design}	Paver Hopper	AASHTO T 312
VMA at N_{design}	Paver Hopper	AASHTO T 312
Fines to Effective Binder	Paver Hopper	AASHTO T 312
VFB	Paver Hopper	AASHTO T 312

The Department will obtain samples of Hot Mix Asphalt Pavement in conformance with AASHTO R 97, Sampling Asphalt Mixtures, and the MaineDOT Policies and Procedures for HMA Sampling and Testing.

The Contractor shall transport the samples in containers provided by the Department to the designated MaineDOT Laboratory within 48 hours except when otherwise noted in the project specific QCP or as directed by the Resident. Failure to deliver an acceptance sample to the designated acceptance laboratory will be considered the second incident under 106.4.6–QCP Non-Compliance.

Target values shall be as specified in the JMF. The Department will withhold reporting of the test results for the Acceptance sample until 7:00 AM, on the second working day of receipt of the sample, or after receipt of the Contractors results of the Acceptance sample split.

Upon conclusion of each lot being evaluated under quality level analysis, where there is a minimum of four subplots, results shall be examined for statistical outliers, as stated in Section 106.7.2 - Statistical Outliers.

Lot sizes and subplot sizes shall be determined as outlined in Table 9.

TABLE 9: LOT AND SUBLOT SIZES – METHOD A & C

Lot Size*	Entire production per item per contract up to 6000 ton
Maximum Sublot Size – Mix	750 ton
Maximum Sublot Size – Density	Surface Layers – 250 ton Base / Intermediate Layers – 500 ton
Minimum Number of Samples – Mix	Four
Minimum Number of Samples – Density	Five

*Unless otherwise agreed upon at the Prepave Meeting

If there is less than one-half of a subplot remaining at the end, then it shall be combined with the previous subplot. If there is more than one-half subplot remaining at the end, then it shall constitute the last subplot and shall be represented by test results. If it becomes apparent partway through a Lot that, due to an underrun, there will be insufficient mix quantity to obtain the minimum number of sublots needed, the Resident may adjust the size of the remaining sublots and select new sample locations based on the estimated quantity of material remaining in the Lot. Unanticipated over-runs of up to 1500 ton shall be rolled into the last lot. Cases where the lot is terminated prior to reaching completion shall be handled in accordance with Section 106.7.3 Early Termination of Lots. In cases where density incentive/disincentive provision apply, additional cores shall be taken to attain a minimum of three for the Lot.

Isolated Areas During the course of inspection, should it appear that there is an isolated area that is not representative of the lot based on a lack of observed compactive effort, excessive segregation, a change in process or any other questionable practice, that area may be isolated and tested separately. An area so isolated that has a calculated pay factor below 0.80 for Method A, based on three random tests shall be removed and replaced at the expense of the Contractor for the full lane width and a length not to be less than 150 ft.

TABLE 10: ACCEPTANCE LIMITS – METHOD A & C

Property	USL and LSL	
	Method A	Method C
Percent Passing 4.75 mm and larger sieves	Target +/- 7%	Target +/- 7%
Percent Passing 2.36 mm to 1.18 mm sieves	Target +/- 4%	Target +/- 5%
Percent Passing 0.60 mm sieve	Target +/- 3%	Target +/- 4%
Percent Passing 0.30 mm to 0.075 mm sieve	Target +/- 2%	Target +/- 2%
PGAB Content	Target +/- 0.4%	Target +/- 0.4%
Voids at N_{design}	4.0% +/- 1.5%	N/A
Fines to Effective Binder	0.9 +/- 0.3	N/A
VMA at N_{design}	LSL from Table 1	N/A
VFB	Table 1 plus a 4% production tolerance for USL	N/A
% TMD (In-place Density)	94.5% +/- 2.5%	94.5% +/- 2.5%

Cease Production The Contractor shall cease paving operations whenever one of the following occurs on a lot in progress:

TABLE 11: CEASE PRODUCTION – METHOD A & C

Property	Percent Within Limits (PWL)	
	Method A	Method C
Percent Passing NMAS sieve*	<60 PWL	<60 PWL
Percent Passing 2.36 mm sieve*		
Percent Passing 0.30 mm sieve*		
Percent Passing 0.075 mm sieve*		
PGAB Content		N/A
Voids at N _{design}		
Fines to Effective Binder*		
VMA at N _{design}		
VFB		
% TMD (In-place Density)		

*Paving operations shall not be required to cease if the mean test value is equal to the LSL or USL and $s = 0$.

In cases where the Contractor is to cease paving operations based upon an Acceptance result or payfactor, the Contractor will submit a corrective action plan to the Department. The Department will only allow the continuation of paving operations when it is satisfied the corrective action will result in an improvement in results. The Department may require the submittal of a passing verification sample to allow further production.

401.2021 Pay Adjustment - Method A & C The Department will use the following criteria for pay adjustment at the completion of the Lot using the pay adjustment factors under Section 106.7 - Quality Level Analysis:

Density Upon conclusion of each lot, density results shall be examined for statistical outliers as stated in Section 106.7.2. If the pay factor for Density falls below 0.80, all of the cores will be randomly re-cut by Sublot. A new pay factor will be calculated that combines all initial and retest results. If the resulting pay factor is below 0.80, the entire Lot shall be removed and replaced with material meeting the specifications at no additional cost to the Department, except that the Department may, when it appears that there is a distinct pattern of defective material, isolate any defective material by investigating each mix sample subplot and require removal of defective mix sample sublots only, leaving any acceptable material in place if it is found to be free of defective material. Pay factors equal to or greater than the reject level will be paid accordingly.

Mix Properties The Department will determine a pay factor (PF) using the applicable Acceptance Limits. If all three pay factors for PGAB Content, VMA at N_{design}, and Voids at N_{design} fall below 0.80 for Method A, then the composite pay factor for PGAB Content, VMA at N_{design}, and Voids at N_{design} shall be 0.50.

The following variables will be used for pay adjustment:

- PA = Pay Adjustment
- Q = Quantity represented by PF in ton
- P = Contract price per ton
- PF = Pay Factor

The Department will determine a pay adjustment using Table 12: Pay Adjustment Calculations as follows:

TABLE 12: PAY ADJUSTMENT CALCULATIONS – METHOD A & C

Acceptance Method	Mix Properties / Gradation	Density
Method A	$PA = (\text{Voids @ } N_d \text{ PF} - 1.0)(Q)(P)x0.20 + (\text{VMA @ } N_d - 1.0)(Q)(P)x0.20 + (\text{PGAB Content PF} - 1.0)(Q)(P)x0.10$	$PA = (\text{density PF} - 1.0)(Q)(P)x0.50$
Method C	$PA = (\% \text{ Passing Nom. Max PF} - 1.0)(Q)(P)x0.05 + (\% \text{ passing 2.36 mm PF} - 1.0)(Q)(P)x0.05 + (\% \text{ passing 0.30 mm PF} - 1.0)(Q)(P)x0.05 + (\% \text{ passing 0.075 mm PF} - 1.0)(Q)(P)x0.10 + (\text{PGAB Content PF} - 1.0)(Q)(P)x0.25$	$PA = (\text{density PF} - 1.0)(Q)(P)x0.50$

In addition, for 9.5 mm NMAS mixtures the following pay adjustment shall also apply:

The average percent passing for the 0.075 mm sieve shall be evaluated for each Lot. If the average is greater than 6.5%, a pay adjustment according to Table 13 below shall apply in addition to the other pay adjustments for the given method of testing.

TABLE 13: 0.075 MM SIEVE PAY ADJUSTMENT

Average Percent Passing 0.075 mm Sieve	Pay Adjustment
6.6% - 7.0%	-5%
> 7.0%	-10%

The Department shall notify the Contractor whenever the average of at least three samples in a given Lot is greater than 6.5%.

401.21 Acceptance Method B & D

Unless otherwise stated in the 403 Special Provision, the Lot shall be the entire mix quantity per item per contract. The Department will sample once per subplot per pay item on a statistically random basis, test, and evaluate in accordance with the Acceptance Properties in Table 14.

TABLE 14: ACCEPTANCE PROPERTIES – METHOD B & D

Properties	Point of Sampling		Test Method
	Method B	Method D	
Gradation	Paver Hopper	Paver Hopper or Truck	AASHTO T 30
PGAB Content	Paver Hopper	Paver Hopper or Truck	AASHTO T 308
% TMD (In-Place Density)	Mat behind all Rollers	Mat behind all Rollers	AASHTO T 269
Voids at N_{design}	Paver Hopper	N/A	AASHTO T 312
VMA at N_{design}	Paver Hopper	N/A	AASHTO T 312
Fines to Effective Binder	Paver Hopper	N/A	AASHTO T 312
VFB	Paver Hopper	N/A	AASHTO T 312

TABLE 15: LOT AND SUBLOT SIZES – METHOD B & D

Lot Size*	Entire mix quantity per item per contract	
	(Lot size ≤ 1000 tons)	(Lot size > 1000 tons)
Maximum Sublot Size – Mix	250 ton	750 ton
Sublot Size – Density	125 ton (Max 5 Sublots)	250 ton

*General – Lot and Sublot size may be adjusted to accommodate the work scope and schedule, or as otherwise agreed upon at the Prepave Meeting

TABLE 16: ACCEPTANCE LIMITS – METHOD B & D

Property	USL and LSL	
	Method B	Method D
Percent Passing 4.75 mm and larger	Target +/- 7%	Target +/- 7%
Percent Passing 2.36 mm sieve	Target +/- 5%	Target +/- 7%
Percent Passing 1.18 mm sieve	Target +/- 5%	Target +/- 5%
Percent Passing 0.60 mm sieve	Target +/- 4%	Target +/- 4%
Percent Passing 0.30 mm sieve	Target +/- 3%	Target +/- 3%
Percent Passing 0.075 mm sieve	Target +/- 3%	Target +/- 3%
PGAB Content	4.0% +/- 2.0%	Target +/- 0.5%
Voids at N _{design}	4.0% +/- 2.0%	N/A
Fines to Effective Binder	0.9 +/- 0.3	N/A
VMA at N _{design}	LSL from Table 1	N/A
VFB	Table 1 plus a 4% production tolerance for USL	N/A
% TMD (In-place Density)	95.0% +/- 2.5%	LSL of 92.0%

The Contractor shall cease paving operations whenever two consecutive Method B or D tests fall outside specification limits on the same property. The Contractor will submit a corrective action plan to the Department. The Department will only allow the continuation of paving operations when it is satisfied the corrective action will result in an improvement in results. The Department may require the submittal of a passing verification sample to allow further production.

401.2022 Pay Adjustment - Method B & D For items accepted under Method B or D, if the mix is within the tolerances listed in Table 16, the Department will pay the contract unit price, otherwise pay adjustments as shown in Table 17 shall be applied to the quantity of mix represented by the test.

The Contractor shall cut one 6 inch core per subplot unless otherwise noted in Section 403 - Hot Mix Asphalt Pavement. If the density result is not within the specified limits the disincentive shall apply.

If the subplot density is less than 88.5 percent or greater than 99.0 percent of the subplot TMD, two additional cores shall be cut at random locations determined by the Department. If either of the additional cores has a density less than 88.5 percent or greater than 99.0 percent of the subplot TMD, the subplot shall be removed and replaced at no cost to the Department; otherwise, the average of the three cores will be used to determine the subplot pay adjustment.

TABLE 17: PAY ADJUSTMENTS – METHOD B & D

Property	Method B		Method D	
Percent Passing 2.36 mm sieve	N/A		-2.0%	
Percent Passing 0.30 mm sieve	N/A		-1.0%	
Percent Passing 0.075 mm sieve	-2.0%		-2.0%	
PGAB Content	-5.0%		-5.0%	
Voids at N _{design}	-3.0%		N/A	
% TMD (In-place Density)	91.5% - 91.9% or 97.1% - 97.5%	-5.0%	91.5% - 91.9%	-5.0%
	90.5% - 91.4% or 97.6% - 98.5%	-10.0%	90.5% - 91.4%	-10.0%
	89.5% - 90.4% or 98.6% - 99.0%	-20.0%	89.5% - 90.4%	-20.0%
	88.5% - 89.4%	-30.0%	88.5% - 89.4%	-30.0%
	<88.5% or >99.0%	Reject	<88.5% or >99.0%	Reject

401.30 Method of Measurement The Department will measure Hot Mix Asphalt Pavement by the ton in accordance with Section 108.1 - Measurement of Quantities for Payment.

401.40 Basis of Payment The Department will pay for the work, in place and accepted, in accordance with the applicable sections of this Section, for each type of HMA specified.

The Department will pay for the work specified in Section 401.12, for the HMA used, except that cleaning objectionable material from the pavement and furnishing and applying bituminous material to joints and contact surfaces is incidental. Payment for this work under the appropriate pay items shall be full compensation for all labor, equipment, materials, and incidentals necessary to meet all related contract requirements, including design of the JMF, implementation of the QCP, obtaining core samples, transporting cores and samples, filling core holes, applying emulsified asphalt to joints, and providing testing facilities and equipment. The Department will make a pay adjustment for quality as specified in Section 401.20 Acceptance Method A & B or 401.21 Acceptance Method C & D.

401.50 Process for Dispute Resolution At the time of Hot-Mix Asphalt sampling, the Department will obtain a split sample of each Acceptance test random sample for possible dispute resolution testing. The Contractor shall also obtain a split sample of the HMA at this same time. If the Contractor wishes to retain the option of requesting dispute testing of the initial Acceptance sample, the Contractor will test their split of the Acceptance sample in accordance with applicable AASHTO procedure and accepted supplemental practice as described in the Department's HMA Sampling and Testing Policies and Procedures manual. The Contractor shall report their results to the Resident, with a copy to Contractor.mainedot@maine.gov by 7:00 AM, on the second working day from time of QA sampling, otherwise dispute resolution will not be initiated. The Department's dispute resolution split sample will be properly labeled and stored for a period of at least two weeks after it has been reported, or until the sample is tested. The properties eligible for dispute and the respective variances are shown in Table 18.

The Contractor may dispute the Department's Acceptance results and request that the dispute resolution split sample be tested by notifying the Department's Resident and QA Engineer in writing within two working days after the results of the Acceptance test are reported. The following shall be provided in the request:

- Acceptance sample reference number
- The specific test result(s) or property(ies) being disputed, and
- The complete, signed report of the Contractor's testing (In a lab certified by the NETTCP and MaineDOT) of their split of the Acceptance sample indicating that the variances in Table 18 for the specific test result(s) or property(ies) were exceeded.

TABLE 18: DISPUTE RESOLUTION VARIANCE LIMITS

Property	Method A & B	Method C & D*	Variance Limits
PGAB Content	Yes	Yes	+/- 0.4%
G_{mb}	Yes	No	+/- 0.030
G_{mm}	Yes	No	+/- 0.020
Voids at N_{design}	Only if G_{mb} or G_{mm} is not disputable	No	+/- 0.8%
VMA at N_{design}	Only if G_{mb} or G_{mm} is not disputable	No	+/- 0.8%
Percent Passing 4.75 mm and larger sieves	No	Yes	+/- 4.0%
Percent Passing 2.36 mm to 0.60 mm sieves	No	Yes	+/- 3.0%
Percent Passing 0.30 mm to 0.15 mm sieves	No	Yes	+/- 2.0 %
0.075 mm sieve	Only for 9.5 mm NMA mixes	Yes	+/- 0.8%

*Disputes will not be allowed on Item 403.209

The value of any disputed result or property reported for the initial Acceptance sample shall stand if the value reported for the dispute resolution sample is not closer to the value the Contractor reported for their split sample than to the value reported for the initial Acceptance sample. If the value reported for the dispute resolution falls precisely half-way between the other two values the value reported for the dispute resolution will replace the original acceptance value. Otherwise, the value reported for the dispute resolution sample will replace the value reported for the initial Acceptance sample and will be used to re-calculate any other affected results or properties.

SECTION 402 - PAVEMENT SMOOTHNESS

402.00 Smoothness Projects Pavement smoothness shall be analyzed in accordance with this Specification will be so noted in Special Provision 403 - Hot Mix Asphalt Pavement.

402.01 Pavement Smoothness The final pavement surface shall be evaluated for smoothness using a Class I or Class II profiler as defined by ASTM E950 (94). Smoothness measurements will be expressed in terms of the International Roughness Index (IRI) as defined by the World Bank, in units of inches/mile.

402.02 Lot Size Lot size for smoothness will be 3000 lane-feet. A subplot will consist of 50 lane-feet. Partial lots will be included in the previous lot if less than one-half the size of a normal lot. If equal to or greater than one-half the normal lot size, it will be tested as a separate lot.

402.03 Acceptance Testing The Department will conduct Acceptance testing following completion of the surface course. Sections to be excluded from testing include the following:

- Bridge decks and joints (no smoothness measurements will be taken within 100 ft of bridge joints)
- Acceleration and deceleration lanes
- Shoulders and ramps
- Side streets and roads
- Within 100 ft of transverse joints at the beginning and end of the project
- Within 100 ft of railroad crossings
- Urban areas with speed limits of 30 mph or lower

Each lot shall have 2 measurements made in each wheel path. The average of the 4 measurements will determine the smoothness for that lot. The smoothness measurements will be statistically evaluated for pay factors as described in Subsection 106.7 - Quality Level Analysis, using the specification limits shown below.

TABLE 1: ACCEPTANCE LIMITS

Level	USL
I	55 in/mile
II	65 in/mile
III	75 in/mile

Computation of Smoothness Pay Adjustment:

$$PA = (PF-1.0)(Q)(P)$$

where:

Q = Quantity of surface course in the Lot (excluding shoulders, side streets, bridge decks, ramps, acceleration and deceleration lanes)

PF = smoothness pay factor for the Lot

P = Contract unit price for surface pavement

PA = pay adjustment

402.04 Unacceptable Work In the event that any Lot is found to have a pay factor less than 0.80, the Contractor shall take whatever remedial action is required to correct the pavement surface in that Lot at no additional expense to the Department. Such remedial action may include but is not limited to removal and replacement of the unacceptable pavement. In the event remedial action is necessary, the Contractor shall submit a written plan to the Resident outlining the scope of the remedial work. The Resident must approve this plan before the remedial work can begin. Following remedial work, the Lot shall be retested, and will be subject to the specification limits listed above. The resulting pay factor, if within the acceptable range, will be used in the final pay adjustment. The Contractor shall pay the cost of retesting the pavement following corrective action.

Localized surface tolerance defects will be subject to the provisions outlined in Section 401.11 Surface Tolerances.

Payment will be made under:

<u>Pay Item</u>	<u>Pay Unit</u>
402.10 Incentive/Disincentive - Pavement Smoothness	Lump Sum

SECTION 403 - HOT MIX ASPHALT PAVEMENT

403.01 Description This work shall consist of constructing one or more courses of Hot Mix Asphalt pavement on an approved base in accordance with these specifications, and in reasonably close conformity with the lines, grades, thickness and typical cross sections shown on the plans or established. The HMA pavement shall be composed of a mixture of aggregate, filler if required, and asphalt material.

403.02 General The materials and their use shall conform to the requirements of Section 401 - Hot Mix Asphalt Pavement.

403.03 Construction The construction requirements shall be as specified in Section 401 - Hot Mix Asphalt Pavement.

403.04 Method of Measurement Hot mix asphalt pavement will be measured as specified in Section 401.21- Method of Measurement.

403.05 Basis of Payment The accepted quantities of hot mix asphalt pavement will be paid for at the contract unit price per ton for the mixtures, including hot mix asphalt material complete in place. Method A, Method B, Method C and Method D shall be used for acceptance as specified in Section 401 - Hot Mix Asphalt Pavements. (See Complementary Notes, Section 403 - Hot Mix Asphalt Pavement, for Method location).

Payment will be made under:

<u>Pay Item</u>	<u>Pay Unit</u>
403.102 Hot Mix Asphalt Pavement for Special Areas	Ton
403.206 Hot Mix Asphalt, 25 mm Nominal Maximum Size	Ton
403.207 Hot Mix Asphalt, 19.0 mm Nominal Maximum Size	Ton
403.2071 Hot Mix Asphalt, 19.0 mm Nominal Maximum Size (Polymer Modified)	Ton
403.2072 Asphalt Rich Hot Mix Asphalt, 19.0 mm Nominal Maximum Size (Asphalt Rich Base and Intermediate course)	Ton
403.208 Hot Mix Asphalt, 12.5 mm Nominal Maximum Size	Ton
403.2081 Hot Mix Asphalt - 12.5 mm Nominal Maximum Size (Polymer Modified)	Ton
403.209 Hot Mix Asphalt, 9.5 mm Nominal Maximum Size (Sidewalks, Drives, Islands & Incidentals)	Ton
403.210 Hot Mix Asphalt, 9.5 mm Nominal Maximum Size	Ton
403.2101 Hot Mix Asphalt, 9.5 mm Nominal Maximum Size (Polymer Modified)	Ton
403.2104 Hot Mix Asphalt, 9.5 mm Nominal Maximum Size (Thin Lift Surface Treatment)	Ton
403.211 Hot Mix Asphalt, 9.5 mm Nominal Maximum Size (Shimming)	Ton

403.2111	Hot Mix Asphalt, 9.5 mm Nominal Maximum Size (Shimming, Polymer Modified))	Ton
403.212	Hot Mix Asphalt, 4.75 mm Nominal Maximum Size	Ton
403.213	Hot Mix Asphalt, 12.5 mm Nominal Maximum Size (Base and Intermediate Base course)	Ton
403.2131	Hot Mix Asphalt, 12.5 mm Nominal Maximum Size (Base and Intermediate Base course, Polymer Modified)	Ton
403.2132	Asphalt Rich Hot Mix Asphalt, 12.5 mm Nominal Maximum Size (Base and Intermediate Base course)	Ton
403.214	Hot Mix Asphalt, 4.75 Nominal Maximum Size (5/8" Surface Treatment)	Ton

SPECIAL PROVISION
SECTION 403
HOT MIX ASPHALT

Desc. Of Course	Grad Design	Item Number	Total Thick	No. Of Layers	Comp. Notes
<u>3" HMA Overlay Area - Shoulder Construction Areas</u> <u>(As Indicated by Typicals or As Directed)</u>					
Wearing	9.5 mm	403.210	3"/more	2/more	2,4,10,14,16,21
<u>2" HMA Sidewalk Construction Areas</u> <u>(As Indicated by Typicals or As Directed)</u>					
Wearing	9.5 mm	403.210	2"	1/more	2,4,10,14,16

COMPLEMENTARY NOTES

2. The incentive/disincentive provisions for density shall not apply. Rollers shall meet the requirements of this special provision. The use of an oscillating steel roller shall be required to compact all mixtures pavements placed on bridge decks.
4. The design traffic level for mix placed shall be 0 to <3 million ESALS. The design, verification, Quality Control, and Acceptance tests for this mix will be performed at **65 gyrations**.
10. Section 106.6 Acceptance, (2) Method D. **One sample** will be taken per **pay item**, per **day**, per **location** and shall be tested in accordance with section 401.204 Method D.
14. The combined aggregate gradation required for this item shall be classified as a 9.5mm Thin Lift Mixture (TLM) mixture, using the Aggregate Gradation Control Points as defined in 703.09.
16. Compaction of the new Hot Mix Asphalt Pavement will be obtained using a minimal roller train consisting of a **3-5 ton** vibratory roller. Areas less than 2 feet wide shall be compacted with a minimum of a **150 pound** plate compactor. An approved release agent is required to ensure the mixture does not adhere to hand tools, rollers, pavers, and truck bodies. The use of petroleum based fuel oils, or asphalt stripping solvents will not be permitted.
21. At the discretion of the Contractor, the use of concrete fill will be allowed in lieu of pavement and gravel to back fill around granite curbing (Type 1 & 5). When utilized, at least 3" of HMA shall be placed on top of the concrete fill for cover on the mainline edge of curb (face of curb). At minimum, the Concrete shall be a 3000 psi Class A concrete. Flowable fill shall not be permitted. There will not be additional compensation for the Concrete Fill, but shall be considered incidental to the 609 items.

Tack Coat

A tack coat of emulsified asphalt, RS-1, RS-1h, CRS-1 or CRS-1h, Item 409.15 shall be applied to any existing pavement at a rate of approximately 0.030 gal/yd², and on milled pavement approximately 0.05 gal/yd² prior to placing a new course. A fog coat of emulsified asphalt shall be applied between shim /base courses and surface course as well as to any bridge membrane prior to the placement of HMA layers at a rate not to exceed 0.030 gal/yd². Cleaning objectionable material from the pavement and furnishing and applying Item 409.15 bituminous materials to joints and contact surfaces is incidental to the contract paving items.

SPECIAL PROVISION
SECTION 502
STRUCTURAL CONCRETE
(QC/QA Acceptance Methods)

CLASS OF CONCRETE	ITEM NUMBER	DESCRIPTION	P	METHOD
A	608.07	Plain Concrete Sidewalk	-	C
A	608.26	Curb Ramp Detectable Warning Fields	-	C
A	609.21	Concrete Slipform Curb	-	C
A	609.214	Concrete Slipform Curb 4' Terminal End	-	C
A	609.22	Concrete Slipform Curb 8' Terminal End	-	C
A	626.35	Controller Cabinet Foundation	-	C
LP	626.42	24" Diameter Foundations	-	C
LP	626.45	42" Diameter Foundations	-	C
LP	626.46	48" Diameter Foundations	-	C
LP	626.47	54" Diameter Foundations	-	C
LP	626.48	60" Diameter Foundations	-	C
LP	626.60	Grouted, Rock Anchor Foundation	-	C

P value shown represents price per cubic yard (cy)

SPECIAL PROVISION
SECTION 608
BRICK SIDEWALK WITH BITUMINOUS BASE

This section is amended by addition of the following:

608.06 Basis of Payment: For brick sidewalk with bituminous base, the bituminous pavement, sand-cement mix, sand, cement mortar and other related items will not be paid for separately but the cost thereof shall be included in the cost of the brick sidewalk

Pay Item

Pay Unit

608.15	Brick Sidewalk with Bituminous Base	Square Yard
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SPECIAL PROVISION
SECTION 609 – CURB
STRUCTURAL CONCRETE
(Slipform Concrete Curb)

609.01-Description This work shall consist of furnishing and placing Slipform Concrete Curb in close conformity with the plans, or as authorized by the Resident.

609.02 Materials Except as provided below, the materials used shall meet the requirements specified in Section 700 – Materials:

Portland Cement and Portland Pozzolan Cement	701.01
Water	701.02
Fine Aggregate for Concrete	703.01
Coarse Aggregate for Concrete	703.02
Air Entraining Admixtures	703.03

The aggregate shall conform to the requirements of Subsections 703.01 and 703.02.

A mix design for the Portland Cement Concrete shall be submitted to the Resident meeting the requirements of Class A or Class LP with the exception that permeability requirements shall be waived.

Entrained air content of Slipform curbing shall be 4.0% to 7.0%.

Partially discharged loads may be retempered with water provided the maximum water to cement ratio is not exceeded.

Maximum concrete temperature at placement shall be 90 F.

Proposed mix designs may contain polypropylene fibers.

609.03-General

a. Preparation of Base Before placing the curb, the foundation course shall be thoroughly cleaned of all foreign and objectionable material. The Contractor shall not place Slipform Concrete Curb on a wet or frozen base. Base pavement for placing epoxy resin binder and slipform curbing may be in an SSD condition but no standing water shall be allowed. String or chalk lines shall be positioned on the prepared base to provide guide lines. For HMA or PCC base the foundation shall be uniformly painted with an epoxy resin adhesive that meets AASHTO M 235, Type I, II, III, IV, or V. Proposed Epoxy Resin Adhesive from the Departments QPL shall be submitted with the concrete mix design for approval prior to placement and used in accordance with manufacturers recommendations.

b. Placing Concrete shall be placed with an approved Slipform machine that will produce a finished product according to the design specified in the plans. For cold weather Slipforming, the outside temperature must be at least 36°F (2.2°C) and rising. The curb shall be placed on a firm, uniform bearing surface, shall conform to the section profile specified in the plans, and shall match the appropriate grade. Expansion joints will be provided at ends of curve radii, or wherever the curb meets rigid structures such as building foundations or fire hydrants. Contraction joints will be placed at 10 foot (3 m) intervals using sawing methods, which shall cut 1-3" into the concrete. Joints shall be constructed perpendicular to the subgrade and match other joints in roadways, sidewalks or other structures when applicable.

c. Curing and Sealing Proper curing shall be insured through the use of either a combination curing/sealing compound spray that meets ASTM 1315 Type 1-Class A, or a curing compound spray that meets ASTM 309 type 1-D – Class A. Curing may also be accomplished by the methods specified in Section 502.15 of the Specifications.

If a combination curing/sealing compound spray is not used, a separate sealing compound from the MaineDOT Qualified Products List for a Type 2 sealer shall be applied after the concrete has cured.

d. Protection Slipform curb must be adequately protected after placement. The concrete shall be allowed to cure for at least 72 hours. During cold weather conditions, when temperatures drop below the required temperature of 36°F (2.2°C) after placement, curbing shall be protected by concrete blankets or a combination of plastic sheeting and straw. After any placement of Slipform curb, regardless of weather conditions, the placed curb shall be adequately protected by traffic control devices as necessary.

e. Marking When required, the curb shall be painted and coated with glass beads in accordance with Section 627 - Pavement Marking. Curb designated to be painted shall not be sealed unless a combination curing/sealing compound is used.

f. Acceptance Curb shall be accepted or rejected based on finish, alignment, entrained air content, and compressive strength. Acceptance testing for air content and compressive strength will be under 502 Method C. All damaged curb shall be removed and replaced at the Contractor's expense.

609.04-Method of Measurement Concrete Slipform curb will be measured by the linear foot along the front face of the curb at the elevation of the finished pavement, complete in place and accepted.

609.05 Basis of Payment The accepted quantities of curb will be paid for at the contract unit price per linear foot as specified.

There will be no separate payment for concrete, sealing, incidental materials, or labor needed to install the curb, but these will be considered included in the work of the related curb.

Removal of existing curb and necessary excavation for installing curb will not be paid for directly, but shall be considered to be included in the curb pay item. Base and Subbase material will be paid for under Section 304 - Aggregate Base and Subbase Course. Backing up machine laid curb is incidental to the curb items. Loam, as directed, will be paid under 615 – Loam.

Payment will be made under:

<u>Pay Item</u>	<u>Pay Unit</u>
609.161 Concrete slipform curb - Vertical	Linear Foot
609.214 Concrete slipform curb – 4' terminal end	Each

March 9, 2020

SPECIAL PROVISION
SECTION 609
CURBING

609.10 Basis of Payment is amended with the addition of the following:

<u>Pay Item</u>		<u>Pay Unit</u>
609.221	Terminal Curb Type 1	Linear Foot
609.222	Terminal Curb Type1- Circular	Each

**SPECIAL PROVISION 626
FOUNDATIONS, CONDUIT, AND JUNCTION BOXES FOR
HIGHWAY LIGHTING, TRAFFIC SIGNALS, AND HIGHWAY SIGNING**

Standard Specification Section 626 is deleted in its entirety and replaced with the following:

626.01 Description This work shall consist of furnishing, installing, modifying, or removing concrete foundations, conduits, and junction boxes for highway lighting, traffic signals, and highway signing in accordance with these Specifications and in reasonably close conformity with the Contract Documents.

626.02 Materials The materials furnished by the Contractor shall be new. Where an existing system is to be modified, the existing material shall be removed and abandoned or salvaged as shown in the Contract Documents or as directed by the Resident.

All electrical equipment shall conform to NEMA or UL standards, wherever applicable. In addition to these requirements, all materials and workmanship shall conform to the requirements of: NEC, ASTM Standards, the ANSI, the local electrical Utility Company, and any local ordinances that may apply.

Materials shall meet the requirements specified in the following Sections of Division 700, Material Details.

Gravel Borrow	703.20
Reinforcing Steel	709.01
Precast Concrete Units	712.06
Steel Conduit	715.02
Non-metallic Conduit	715.03
Anchor Bolts	720.07

626.021 Miscellaneous Materials

Transformer pads shall conform to the requirements of the local electrical Utility Company.

If grouting is necessary to correct surface irregularities in the top of the concrete foundations a non-shrink material included on the MaineDOT Qualified Product List (QPL) and satisfactory to the Resident shall be used.

All concrete foundations shall be constructed of Class LP concrete in accordance with the applicable requirements of Section 502 – Structural Concrete.

All concrete for concrete encasement of conduit shall be Fill Class concrete in accordance with the applicable requirements of Section 502 – Structural Concrete.

The above ground portion of concrete foundation surfaces shall receive an application of Type 1c penetrating silane concrete sealer from the MaineDOT QPL.

626.022 Equipment List and Drawings Unless otherwise permitted in writing, the Contractor shall within 30 days following execution of the Contract, submit a list of equipment and materials which are to be installed. The list shall include the name of manufacturer, size, and identifying number of each item. The list shall be supplemented by such other data as may be required, including detailed scale drawings of proposed minor deviations from the Contract Documents. If requested, the Contractor shall submit for review, design data and sample articles of the material proposed for use. All of the above data shall be submitted in duplicate except samples for testing. Following checking, correcting, and reviewing, two complete sets of drawings shall be submitted. The Department will not be liable for material purchased, labor performed, or work delayed before such review.

Upon completion of the work, the Contractor shall submit three complete sets of corrected plans showing all construction changes.

626.03 General All work shall conform to NEC and NESC standards as set forth in the NIST Handbook H-32, except when otherwise noted in the Contract Documents or in the Special Provisions.

The Contractor shall be responsible for and shall repair all damage caused to underground drainage structures, utilities or lighting conduit, which are encountered during construction.

The Contractor is responsible for final design of the above-grade components of the highway lighting, traffic signals, and highway signing structure(s) in accordance with Standard Specification Sections 634, 643 and 645, respectively.

626.0301 Electrical Supply Lines and Service Connections The following requirements shall apply to Electric Supply Lines and Service Connections feeding traffic signalization equipment control boxes and lighting breaker boxes.

Whenever possible, the meter and breaker panel feeding traffic signal control boxes or lighting control boxes shall be constructed within 30 feet of the service drop pole.

All underground service connections that are constructed in trenches and carrying Secondary Utility Power to a MaineDOT meter and breaker panel, or, directly to MaineDOT traffic signalization control cabinets or lighting breaker boxes shall be in Rigid Metal Conduit or concrete encased PVC conduit.

Where trenchless technologies are employed to install the service connection conduit, Schedule 120 PVC conduit shall be used for the trenchless bore section of conduit. In addition, concrete encasement shall be used for any PVC conduit placed in trench sections and carrying Secondary Utility Power more than 10 feet before or after the limits of the trenchless bore conduit.

The construction practices described above shall be used for service connections up to a maximum of 600 feet. There may be rare exceptional cases where the service connection must exceed 600 feet. In these cases, the power companies may require primary power be run over 600 feet for the purpose of power consumption and dependable service. These cases will be evaluated on a case-

by-case basis for alternate power feed methods and/or the need for steel or concrete encased conduit.

626.031 Conduit If the trench for conduit is located in wet, spongy or otherwise unsuitable ground, as determined by the Resident, the trench shall be further excavated to a depth sufficient to overcome this condition, as determined by the Resident, and shall be backfilled with approved gravel. The gravel shall be compacted in layers not exceeding 8 inches, loose measure. The grade of the bottom of the trench shall be parallel to the proposed grade of the conduit.

Trenches for conduits shall be excavated to a width that will permit proper installation of the conduit and to a minimum depth of 3 feet below finish grade as measured from the top of the conduit. If deeper depths are required, the conduit shall be installed at the depth shown in the Contract Documents or as directed by the Resident. Conduit shall not interfere with poles, guardrail posts, foundations or other objects.

All junction or pull boxes shall be vehicle rated (22,000 lbs) and concrete junction boxes shall be Class LP concrete, in accordance with the applicable requirements of Section 502 – Structural Concrete and installed as shown in the Contract Documents

Where conduits enter exposed junction boxes, they shall be sloped to drain towards the conduit entrance holes, unless otherwise directed by the Resident. Weep holes of ¼ inch diameter shall be placed in all pull boxes, junction boxes, and fuse boxes.

After the trench has been excavated as specified, the bottom of the trench shall be prepared with a 6-inch thick (minimum) sand bedding material. After placing the conduit, sand shall be placed around the sides and over the top of the conduit, when shown in the Special Details. The entire trench shall then be backfilled with approved material, placed in layers not exceeding 8 inches, and thoroughly tamped. Where concrete encasement is required around the conduit, backfilling with approved material may begin adjacent to and above the encased conduit no sooner than 24 hours after concrete placement.

All conduit ends shall be capped with conduit caps until wiring has begun.

All conduit shall be sealed to prevent rodent ingress after cables have been installed. Any blocking material shall be removable without use of tools.

The size and type of conduit required will be noted in the Contract Documents, except that the minimum size of conduit risers required for traffic signal installations shall be determined by percentage fill in a single conduit, as specified in the latest revision of the NEC. Where more than one conduit is required to be installed in the same location, the conduits may be placed in the same trench.

The weather head on conduit risers on Utility Company poles shall not be less than 1 foot from any utility wires. Conduit risers on Utility Company poles shall be located as required by the Utility Company.

Within 10 days after completion of each section of conduit, the Contractor, in the presence of the Resident, shall rod and pull through each duct a mandrel and brush of a pattern satisfactory to the Resident, but which shall not be more than 1/8 inch smaller than the bore of the ducts. Where obstructions in the ducts prevent passage of the mandrel, the Contractor shall, at their own expense, remove and relay those portions of the ducts necessary to clear the obstruction.

The Contractor shall install a suitable nylon pulling string with a rated 210 lb. tensile strength in all unused conduits. The ends of the string shall be secured in such manner as to prevent accidental withdrawal of the string.

626.032 Metallic Conduit Installation Conduits shall be of the sizes noted in the Contract Documents, which are indicated as the nominal inside diameter. All conduits shall be joined with threaded couplings using approved thread sealant. Conduit shall be installed so that it is continuous and watertight between boxes or equipment. Running threads will not be permitted. When necessary, the Contractor shall use an approved electrical union-type coupling. Conduits shall be protected at all times from the entrance of water or other foreign matter. Conduit runs shall be made with as few couplings as standard lengths will permit. The total angle of all bends in one run and the radius of conduit bends shall conform to the NEC requirements. All field bends and offsets shall be made with approved hickey or conduit benders. Pull boxes shall be used wherever necessary to facilitate the installation of the wires.

In making up a run of conduits, all cut ends shall be reamed to remove rough edges and cut threads shall be painted with an approved thread sealant in such a manner that there will be no unprotected surfaces and joints will be watertight. All conduits shall have electrical continuity and shall be adequately grounded.

Conduits to be placed in the superstructure of bridges and similar structures shall be securely supported and fastened, in order to maintain the conduits' position within the superstructure, as shown in the Contract Documents. Pull boxes shall be located as shown in the Contract Documents. Clearance between conduit runs shall preferably be 2 inches, but at no time shall be less than the maximum size of the aggregate used in the embedding concrete. At all joints where relative movement between adjacent parts of a structure can occur, a double "O"-ring expansion coupling, or other approved expansion device shall be installed.

Exposed conduit shall be rigidly and securely fastened with acceptable fasteners or supports, as indicated in the Contract Documents or approved. Fasteners or supports shall not be placed more than 6 feet apart on centers, except as otherwise authorized. Conduits shall generally be supported by an approved spacer at the point of support, so that there is an air space between the conduit and the supporting surface. Ends of conduit runs terminating in a metallic box without a threaded hub shall be provided with a metallic locknut on the outside of the box, and a metallic locknut and insulated bushings on the inside. A lock washer and a galvanized steel flat washer shall be installed between the outside locknut and face of the box.

626.033 Polyvinylchloride Conduit Installation Polyvinylchloride conduit and High Density Polyethylene, hereafter called PVC conduit, shall be installed in accordance with the applicable methods as specified in Section 626.032 for metallic conduits. In addition, PVC conduit used for

Electrical Supply Lines and Services constructed as underground service connections in trenches and carrying Secondary Utility Power to a MaineDOT meter and breaker panel, or, directly to MaineDOT traffic signalization control cabinets or lighting breaker boxes shall be concrete encased. When trenchless technologies are used to install PVC conduit, concrete encasement shall not be required.

Concrete encasement shall consist of a minimum of 4 inches of concrete above, below and on both sides of the conduit that shall have a minimum compressive strength of 3000 psi and a maximum aggregate size of 1-inch (Fill Class concrete). The concrete encasement may be backfilled no sooner than 24 hours after placement.

Non-Metallic Under Pavement Conduit Installation Where noted in the Contract Documents, non-metallic under pavement conduit of schedule 80 or greater rating shall be provided to facilitate conduit crossing of the existing highway and ramps without disruption to the existing highway and ramp pavement surface. The non-metallic under pavement conduit shall be hydraulically jacked or directional bored below the highway and ramp at a depth of not less than (36 inches). Under pavement conduit shall extend for a distance of (10 feet) beyond the highway or ramp edge at each side.

PVC conduit shall be made watertight by joining with solvent or in accordance with the manufacturer's specifications.

Conduit shall be bent carefully to avoid damage and without the use of an open flame. Bends sharper than 45° [$\frac{1}{8}$ bend] will not be permitted in PVC conduit. The total angle of all bends in one run and the radius of bends shall conform to the NEC requirements.

Conduits to be placed in the superstructure of bridges and similar structures shall be securely supported and fastened, in order to maintain the conduits' position within the superstructure, as shown in the Contract Documents. Pull boxes shall be located as shown in the Contract Documents. Clearance between conduit runs shall preferably be 2 inches, but at no time shall be less than the maximum size of the aggregate used in the embedding concrete. At all joints where relative movement between adjacent parts of a structure can occur, a double "O"-ring expansion coupling, or other approved expansion device shall be installed.

To allow for expansion and contraction of PVC conduit during installation of long runs, one end shall be left unconnected or a double "O"-ring expansion coupling shall be inserted near one end of the run until final covering of the conduit is in progress.

Where PVC conduit runs are placed parallel to other conduit runs or cross one over another, they shall be separated by a minimum of 3 inches of sand or soil cushion. The bottom of trenches for PVC conduit shall be lined with a 6-inch minimum bedding of tamped sand or soil before laying the conduit. Backfill to a compacted depth of 6 inches above the top of the conduit shall be sand or soil, free from rocks or hard lumps.

No aluminum wire shall be allowed underground. No pre-wired conduit shall be allowed. Conduit and wire sizes shall be as shown in the Contract Documents.

626.034 Concrete Foundations The Department has completed an appropriate test boring program to characterize the subsurface conditions in the general vicinity of proposed foundations for highway lighting, traffic signals, and highway signing foundations. The associated boring log(s), as well as foundation type and size and any other foundation-specific details and information, as designed by the Department, are provided in the Contract Documents. The Contractor shall construct the foundation(s) as shown in the Contract Documents and in accordance with these Specifications, unless otherwise directed by the Resident. Alternate foundations to those designed by the Department and shown in the Contract Documents will not be permitted unless directed by the Department.

Foundations shall consist of cast-in-place, reinforced concrete, drilled shafts in soil or bedrock unless another foundation type (i.e., grouted, rock-anchored foundations; spread footings; or Special Foundations) is specified in the Contract Documents. Reinforcing shall be as specified in the Contract Documents. Precast foundations shall not be allowed except as specified in Section 626.036. Special Foundations shall only be permitted if designated by the Department.

Design computations for the Contractor's design of the above-grade components of the highway lighting, traffic signals, and highway signing structure(s) shall be submitted to the Department and shall include the actual loads (bending moment, shear force, torsion and axial load) at the top of each foundation. These actual loads at the top of each foundation will be used by the Department to check the efficacy of the foundation design shown in the Contract Documents. The Contractor shall not commence foundation construction prior to receiving approval from the Department.

All unsuitable material (including but not limited to peat, organic material, and material that has been disturbed and/or dumped) within the limits of a foundation shall be removed to the minimum limits directed by the Resident. Foundation depths shall be increased as directed by the Department to account for the unsuitable material. Unsuitable material removed from below subgrade for spread footing foundations shall be replaced with compacted material as set forth below for foundation backfill.

In areas where bedrock is encountered above the proposed bottom of the foundation, the Contractor shall notify the Resident and the Department will determine whether: 1.) the bedrock should be removed and the foundation should be constructed at the design depth shown in the Contract Documents, or 2.) the foundation should be constructed using a grouted, rock-anchored foundation system or spread footing. If an alternative grouted, rock-anchored foundation system or spread footing foundation design is required due to shallow bedrock it will be provided by the Department.

Drilled shaft foundation holes, except in bedrock, shall be excavated by auger method to the neat line of the outside dimensions of the shaft without disturbing the soil around or below the proposed shaft. Drilled shafts in bedrock shall be excavated by standard rock drilling method. Drilled shafts shall not be permanently cased except for the top 3.0 feet or as otherwise shown in the Contract Documents. Concrete shall be tremie poured directly against the surrounding soil and/or bedrock. Spread footings shall be founded at least 5.0 feet below the lowest surrounding proposed finished grade for frost protection. The 5.0-foot embedment for spread footings constructed on cleaned

bedrock is waived. If soil conditions differ materially from those described on the boring logs, the Contractor shall stop work on that foundation and contact the Resident.

Concrete for drilled shafts shall be placed (via tremie methods) as soon after excavation as practicable to prevent debris from collecting in the excavated area. The Contractor shall provide temporary dewatering of excavations for foundations such that concrete is placed in the dry. Concrete for drilled shafts shall be placed in accordance with Section 502.10 as temporary casing is withdrawn to prevent debris from contaminating the foundation and to ensure concrete is cast against the surrounding soil. At all times, the level of the concrete inside the temporary casing shall be above the bottom of the casing.

Grout used for rock-anchored foundations shall be non-shrink grout included on the MaineDOT Qualified Product List (QPL) and approved by the Resident.

Backfill for spread footing foundations shall be Gravel Borrow meeting the requirements of Section 703.20 - Gravel Borrow. Gravel Borrow shall be placed in layers not exceeding 8 inches in depth before compaction (i.e., loose lifts). Each layer of backfill shall be thoroughly compacted to at least 95% of the material's maximum dry density as measured in the field by an approved method using a calibrated nuclear device. All backfilling and compacting shall be in accordance with the applicable provisions of Section 206 – Structural Excavation.

Before placing concrete, the required elbows of entrance conduits, reinforcing steel and anchor bolts shall be carefully positioned in accordance with Standard Specification 633. The anchor bolt size and the bolt circle diameter shall be determined from data furnished by the supplier of the above-grade components of the highway lighting, traffic signals, and highway signing structure(s) or as shown in the Contract Documents. Anchor bolts for use with breakaway couplings, longitudinally grooved-type, shall be 1-inch diameter and shall project between 2½ and 3 inches above the top of the foundation. All other anchor bolts shall be a minimum of 1-inch diameter and shall project sufficiently to accommodate the thickness of the base plus all nuts and washers. The bolt length shall also be sufficient to allow clearances of approximately ½ inch below the leveling nut and ¼ inch above the top nut. At least two threads on each anchor bolt shall project beyond the outside of the nuts holding the plumbed pole.

All foundations shall be warrantied against leaning and corrosion for two (2) years after the project is completed. If the lean is greater than 2 degrees from normal or the foundation is spalling within the first two (2) years, the Contractor shall replace the foundation at no extra cost.

The finished ground at each foundation shall be graded flush with the top of the foundation except at locations where the foundation is protected by guardrail, by curb, or is outside the clear zone in which case the foundation shall have a 3-inch reveal. If required, approved backfill material shall be added to grade the slopes as specified. There will be no additional compensation for furnishing, placing and compacting material flush around the foundation. In all cases, the surface area around the foundations shall be graded to drain away from the foundation and loamed and seeded in accordance with the requirements of Section 615 and Section 618.

The concrete portion of the foundations exposed to view shall have a troweled finish. A drainage groove shall be formed in the horizontal surface of the foundation. The top of the concrete foundation shall be horizontal.

The above ground portion of concrete foundation surfaces shall receive an application of Type 1c penetrating silane concrete sealer from the MaineDOT QPL. The application rate and method of application shall be in accordance with the manufacturer's published recommendations. On surfaces to be treated, all voids shall be filled with mortar and the entire surface shall be dressed by dry rubbing to remove marks and blemishes to present a neat appearance. The silane application shall not be done until a minimum of 14 days after casting and the surfaces shall be free of laitance, oil, grease, dirt, dust, curing compound or any other deleterious material. The temperature of the concrete shall be above 40°F and below 90°F at the time of application, or per the manufacturer's published recommendations.

When the anchor bolt template is removed, the threads of the anchor bolts shall be greased and protected with a metal sleeve, held in position with nuts and washers to be furnished with the bolts. This thread protection shall remain in place until the pole or other equipment is installed.

A copper-clad steel ground rod shall be installed when shown in the Contract Documents.

626.035 Foundations to be Modified or Removed Concrete foundations designated to be modified or removed shall be modified or removed as shown in the Contract Documents. Debris resulting from the modification or removal shall be removed from the project. Once removal has been completed, the area shall be brought to grade by addition of granular material and loam, or by loam only, depending on the extent of modification or removal as directed by the Resident. The area shall then be seeded in accordance with Section 618.

626.036 Precast Foundations In the absence of foundation type and size and any other foundation-specific details and information, as designed by the Department, provided in the Contract Documents, precast foundations will be permitted for 18- and 24-inch diameter foundations for structures less than 30-feet tall with no projecting arms. No foundation design will be required for precast 18- and 24-inch diameter foundations for structures less than 30-feet tall with no projecting arms. A foundation design prepared by a Professional Engineer licensed in the State of Maine will be required for all other foundations. Where precast foundations are permitted flowable concrete fill shall be used as backfill in the annular space and placed from the bottom up. Construction of precast foundations shall conform to the Standard Details and all requirements of Section 712.061 except that the concrete shall have a minimum permeability of 17 kOhm-cm and the use of calcium nitrite will not be required.

The construction requirements of Section 626.034 apply to precast foundations used by the Contractor and their Subcontractor(s).

626.04 Method of Measurement Precast Concrete Junction Box, and Remove or Modify Concrete Foundation will be measured by each unit.

All conduit will be measured by the number of linear feet.

Drilled shaft foundations in soil, bedrock, or anchored to bedrock will be measured by Linear Foot. Spread footing foundations will be measured by Cubic Yard. Grouted, rock-anchored foundations will be measured by Cubic Yard. Modified or removed concrete foundations will be measured by Each unit. Special Foundations will be measured by Each unit.

The quantity of structural earth excavation to be measured for payment below grade will be the amount actually excavated from 1 foot below the bottom of the foundation to the required foundation bottom elevation, provided the maximum allowable horizontal dimensions do not exceed those bounded by vertical surfaces 9 inches each side of the installation, as shown in the Contract Documents. The quantity of structural rock excavation to be measured for payment will be the number of cubic yards actually removed, provided the maximum allowable horizontal dimensions do not exceed those bounded by vertical surfaces specified herein.

626.05 Basis of Payment The accepted quantity and/or volume of foundations will be paid for at the Contract Unit Price for each type of foundation. This payment shall include: all excavation, bedrock removal, unsuitable soil excavation, concrete, anchor bolts, reinforcing steel, conduit within the foundation and extending 12 inches from the foundation, backfill, loam, seeding, mulching and all labor, equipment, and materials, necessary to complete the work. If a design is required by the Contractor, payment shall include the test boring(s), structural, and geotechnical design.

The accepted quantity of junction boxes will be paid for at the Contract Unit Price Each. Payment for junction boxes shall include furnishing and installing precast concrete or bituminized fiber boxes as designated, including that portion of conduit extending 12 inches outside the box.

Excavating and backfilling for junction boxes, foundations, and excavating, backfilling and sand bedding for conduit ducts will be considered incidental in the respective Contract Unit Prices and no separate payment will be made, except as hereafter provided.

Excavating and backfilling as shown in the Contract Documents, or as required to overcome soft or otherwise unsuitable material, or for excavating rock will be paid for as provided in Section 206. Required backfill material, except sand bedding as shown on the detail Plan, will be paid for as provided in Section 304.

Payment will be made for the total number of linear feet of prewired conduit actually furnished, installed, and accepted at the Contract Price per Linear Foot. This price shall include the cost of hand digging, trenching, or plowing; furnishing and installing the prewired conduit; and all labor, equipment and incidentals necessary to complete the work.

The accepted quantity of ground mounted cabinet foundations will be paid for at the Contract Unit Price Each, which payment shall include conduit within the foundation and extending 12 inches from the foundation and for loam, seeding, mulching and all incidentals necessary to complete the work.

The accepted quantity of Remove or Modify Concrete Foundations will be paid for at the Contract Unit Price Each. Such price shall include disposing of concrete removed, backfilling with granular material, loaming, seeding, and all incidentals necessary to complete the work.

Payment for restoration of roadway pavement, sidewalks, grass areas and resetting curbing removed in conjunction with this work shall be considered incidental to the respective Contract Unit Prices for each related item except as otherwise provided.

Payment will be made for the total number of linear feet of under pavement conduit actually furnished, installed and accepted at the Contract Price per Linear Foot. This price shall include the cost of: furnishing and installing the conduit; excavating; furnishing special backfilling materials, pull wire, fittings, grounding and bonding; test cleaning interiors of conduits and all materials, labor, equipment and incidentals necessary to complete the work.

	<u>Pay Item</u>	<u>Pay Unit</u>
626.11	Precast Concrete Junction Box	Each
626.21	Metallic Conduit	Linear Foot
626.22	Non-metallic Conduit	Linear Foot
626.221	Non-metallic Conduit, Concrete Encased	Linear Foot
626.251	Non-Metallic Under Pavement Conduit (Schedule 80 or greater rating)	Linear Foot
626.35	Controller Cabinet Foundation	Each
626.36	Remove or Modify Concrete Foundation	Each
626.37	Special Foundation	Each
626.38	Ground Mounted Cabinet Foundation	Each
626.411	18-inch Diameter Foundation	Linear Foot
626.421	24-inch Diameter Foundation	Linear Foot
626.43	30-inch Diameter Foundation	Linear Foot
626.44	36-inch Diameter Foundation	Linear Foot
626.451	42-inch Diameter Foundation	Linear Foot
626.46	48-inch Diameter Foundation	Linear Foot
626.47	54-inch Diameter Foundation	Linear Foot
626.48	60-inch Diameter Foundation	Linear Foot
626.501	Spread Footing Foundation	Cubic Yard
626.60	Grouted, Rock-Anchored Foundation	Cubic Yard

Highway Lighting Quality Control Checklist

Subsection 634.09 Field Testing

Project Pin # _____

Location (if multiple services, please be specific)- _____

Grounding Electrode Resistance at service _____

Number of Circuits _____

Hand-Off-Auto Switch? _____

Circuit #1

Open Circuit Resistance- (Ohm out both hot legs at the cabinet while they are shorted together at the last pole and the fuse holders are disconnected at each pole) _____

Megger Test- (Meg out both hot legs to ground at the cabinet while they are shorted together at the last pole and the fuse holders are disconnected at each pole) _____

Current draw- (during normal operation) Leg #1 Leg #2

Operating Voltage at last pole _____

Circuit #2

Open Circuit Resistance- (Ohm out both hot legs at the cabinet while they are shorted together at the last pole and the fuse holders are disconnected at each pole) _____

Megger Test- (Meg out both hot legs to ground at the cabinet while they are shorted together at the last pole and the fuse holders are disconnected at each pole) _____

Current draw- (during normal operation) Leg #1 Leg #2

Operating Voltage at last pole _____

I, _____, certify that this work was done in accordance with subsection 643.14 and current NEC _____ guidelines, and when tested, was functioning as intended. (YEAR)

Electrician's Signature _____

Electrician's License # _____

Highway Lighting Quality Control Checklist

Subsection 634.09 Field Testing

Project Pin # _____

Location (if multiple services, please be specific)- _____

Grounding Electrode Resistance at service _____

Number of Circuits _____

Hand-Off-Auto Switch? _____

Circuit #3

Open Circuit Resistance- (Ohm out both hot legs at the cabinet while they are shorted together at the last pole and the fuse holders are disconnected at each pole) _____

Megger Test- (Meg out both hot legs to ground at the cabinet while they are shorted together at the last pole and the fuse holders are disconnected at each pole) _____

Current draw- (during normal operation) Leg #1 _____ Leg #2 _____

Operating Voltage at last pole _____

Circuit #4

Open Circuit Resistance- (Ohm out both hot legs at the cabinet while they are shorted together at the last pole and the fuse holders are disconnected at each pole) _____

Megger Test- (Meg out both hot legs to ground at the cabinet while they are shorted together at the last pole and the fuse holders are disconnected at each pole) _____

Current draw- (during normal operation) Leg #1 _____ Leg #2 _____

Operating Voltage at last pole _____

I, _____, certify that this work was done in accordance with subsection 643.14 and current NEC _____ guidelines, and when tested, was functioning as intended. (YEAR)

Electrician's Signature _____

Electrician's License # _____

Traffic Signal Quality Control Checklist

Subsection 643.14 Field Testing

Project Pin # _____

Grounding Electrode Resistance at service _____

ID tags on loop amps / detector cards? _____

Location _____

Street Approach	_____		
Loop #	_____	Resistance	_____
Phase #	_____	Meg to ground	_____
L,C, or R Lane	_____	Amount of bondo covering loop	_____
Pulse or Presence	_____		

Street Approach	_____		
Loop #	_____	Resistance	_____
Phase #	_____	Meg to ground	_____
L,C, or R Lane	_____	Amount of bondo covering loop	_____
Pulse or Presence	_____		

Street Approach	_____		
Loop #	_____	Resistance	_____
Phase #	_____	Meg to ground	_____
L,C, or R Lane	_____	Amount of bondo covering loop	_____
Pulse or Presence	_____		

I, _____, certify that this work was done in accordance with subsection 643.14 and current NEC _____ guidelines, and when tested, was functioning as intended. (YEAR)

Electrician's Signature _____

Electrician's License # _____

SPECIAL PROVISION
SECTION 643
TRAFFIC SIGNALS
(Non-Invasive Detection – Stop Bar)

Description. This item shall consist of furnishing and installing a non-invasive stop bar vehicle detection including all necessary fittings and mounting hardware at the locations shown on the plans or as indicated by the Maine Department of Transportation (MaineDOT).

Materials. The Contractor shall furnish and install a Stop Bar Vehicle Detection (SBVD) system that detect vehicles on a roadway by processing images sent from an IP based sensor to an interface board with detector outputs that can be received by the traffic signal controller. The SBVD shall include equipment meeting the following and all the requirements as defined under item 718.13. These IP based traffic sensors shall be installed at the locations shown on the plans and in accordance with these specifications. All remote communications for the Non-Invasive Detection – Stop Bar system shall be routed electrically, and IP based to the Field Monitoring Unit (FMU) or the Fiber Ethernet Switch; the use of a separate cellular modem/data connection shall not be allowed. No additional hardware, software items and/or subscription fees/costs shall be needed/allowed to satisfy the requirements as defined in these specifications. All Non-Invasive Detection – Stop Bar units supplied by the Contractor as part of this project shall be from the same manufacturer and be the identical make/model and firmware revision. The SBVD shall be supplied by one of the following listed manufactures:

- Gridsmart/Cubic
- MioVision
- Flir (Thermal)
- Wavetronix Stop Bar detection system

The SBVD system shall be non-intrusive (i.e. above ground) and shall consist of:

- a. Mounting brackets
- b. IP based Traffic sensor and detection module (radar shall provide IP cabinet interface device)
- c. Communications cable

The SBVD system, at a minimum, shall:

- Collect and store volume, speed, and classification of all vehicle types as well as bicycles and pedestrians;
- Provide stop bar detection;
- Be ATCC 5301 v02 compatible
- Be ATC 5201 v06 compatible
- Provide Turning Movement counts through either manufactures software or as inputs into the MaineDOT Central Management Software (CMS)
- Provide remote access to digital video stream

- Support remote configuration
- Shall be connected to FMU switchable power outlet

The SBVD system shall be connected, via Ethernet, to the Fiber Ethernet switch or Field Monitoring Unit (FMU) in each Advanced Transportation Controller Cabinet (ATCC), and to the cloud-based video management server over the cellular modem.

If the ATCC is supplied with a Fiber Ethernet Switch and connected to the existing City fiber network, the Contractor shall establish a Virtual Private Network (VPN) communication pathway with input from the City IT department to allow for remote monitoring and control.

Components of the SBVD system shall all be the same make and model. As a minimum, the SBVD system shall be supplied and installed with the following functionality:

- Shall have the capability of remotely displaying live video streams and/or live radar telemetry from all IP video/radar detection units installed at the intersections. The setup of detection zones shall be available via remote access. The system shall log which user made any changes to the detection zone configurations.
- Shall support communication of Telemetry Data, Video Data, Alert Data, and Vehicle Identification Data to the Server via the Communication Service.
- Shall be connected to the Ethernet Switch and/or the FMU in each ATCC.
- Shall acquire and record phase, channel, detector, pedestrian detector, pre-emption, alarm and overlap statuses at a frequency of no less than 10 times per second including whether a phase is next or has a call for service on it
- Shall consist of an SBVD system at all project intersections, as shown in the Plans.
- Video detection shall consist of an IP based camera assembly and a digital video detection system. Analog cameras with separate video encoders shall not be allowed.
- Radar detection shall consist of a radar sensor and IP cabinet interface device.
- Every vehicular approach at every project intersection shall be included in the vehicle detection system, as shown in the Plans.
- Shall be supplied with the ability to automatically collect and process data based on the classification of vehicles.
- Shall provide 24/7 turning movement count reports at no additional costs to MaineDOT for the life of the product.
- Shall be connected to the in-cabinet high speed communications bus (SIU) within the controller cabinet.
- Shall transmit detector data to the controller unit via the in-cabinet high speed communications bus (SIU) within the controller cabinet.
- Shall be installed in the ATCC such that SBVD is electrically powered via one of the switchable duplex outlets provided on the FMU. This configuration shall allow MaineDOT to power cycle and reset the SBVD, via remote FMU control (outlet power), in the event that the detection unit locks up.

Construction Requirements. The Contractor shall be responsible for furnishing all training, labor, materials, cables, connectors, tools, equipment, shipping and incidental items necessary to complete the installation and make the non-invasive stop bar vehicle detection system fully operational.

Installation of the non-invasive stop bar vehicle detection system shall include the installation of any and all associated equipment including, but not limited to, the following:

- a. Detector Assembly with integrated machine vision processor. The Contractor shall furnish at a minimum of one assembly per applicable approach and/or a signal device for all approaches.
- b. Detector Communications Interface Panel. The Contractor shall furnish one detector communications interface panel per cabinet.
- c. Detector Cable. The Contractor shall furnish the specified cable type, all connectors, sealing tape and incidental work necessary to complete the installation of the connector cable between the detector assembly and the interface panel.
- d. Mounting Brackets and Ancillary Equipment and Labor. The Contractor shall furnish detector mounting brackets and all associated equipment labor, materials and incidental work necessary to attach the detector assemblies to a mast arm or extension bracket, complete the installation and make the non-invasive stop bar vehicle detection system fully operational.

The Contractor shall install the SBVD system software on any number of computers/systems as required by MaineDOT to allow visual confirmation of the detection zones as shown on the plans. All equipment shall be installed and wired in a neat and orderly manner in conformance with the manufacturer's instructions. The detector assembly(s) shall be affixed to the support structure in accordance with the manufacturer's instructions to provide the optimal field of detection.

The non-invasive stop bar vehicle detection locations shown on the Plans are for illustrative purposes only. Final locations shall be located in the field and shall be approved by MaineDOT and/or the Engineer. The Contractor may be required to adjust and readjust the location of existing and proposed vehicle detection zones in the presence of the Engineer, at no additional cost, to properly set the detection areas

Installation will be considered complete when the Contractor shows the system successfully and consistently places a request to the controller to call and extend the appropriate phase based on a vehicle detected in the detection zone; and remote access to the SBVD via MaineDOT control and or the cloud based CMS/ACST.

Method of Measurement. The non-invasive stop bar vehicle detection system will be measured for payment as a lump sum system fully installed and operational. All items, equipment, labor and incidentals required to create a fully functional system will be considered incidental to the cost of this item. Units shall be pre-approved or unconditionally warranted for at least 3 years from factory purchase and certified to comply with the product’s published specification by an independent laboratory.

Basis of Payment. Payment will be full compensation for furnishing, transporting, handling, installing and testing the materials and equipment specified and for furnishing all labor, tools, equipment, and incidentals necessary to complete the work.

<u>Pay Item</u>	<u>Pay Unit</u>
643.21 Non-Invasive Detection - Stop Bar: Sheet #1 Capitol St & Sewall St	Lump Sum
643.21 Non-Invasive Detection - Stop Bar: Sheet #2 CCD & Commerce Dr	Lump Sum
643.21 Non-Invasive Detection - Stop Bar: Sheet #4 CCD & I-95 NB	Lump Sum
643.21 Non-Invasive Detection - Stop Bar: Sheet #5 CCD & I-95 SB	Lump Sum
643.21 Non-Invasive Detection - Stop Bar: Sheet #6 CCD & Leighton Rd	Lump Sum
643.21 Non-Invasive Detection - Stop Bar: Sheet #7 CCD & University Dr	Lump Sum
643.21 Non-Invasive Detection - Stop Bar: Sheet #8 CCD & Townsend Rd	Lump Sum
643.21 Non-Invasive Detection - Stop Bar: Sheet #9 Eastern Ave & Cony Rd	Lump Sum
643.21 Non-Invasive Detection - Stop Bar: Sheet #10 Eastern Ave & Stone St	Lump Sum
643.21 Non-Invasive Detection - Stop Bar: Sheet #11 Eastern Ave & Spring St/Togus Rd	Lump Sum
643.21 Non-Invasive Detection - Stop Bar: Sheet #12 Hospital St & Piggery Rd/Tyson Dr	Lump Sum
643.21 Non-Invasive Detection - Stop Bar: Sheet #13 Route 3 & Church Hill Rd	Lump Sum
643.21 Non-Invasive Detection - Stop Bar: Sheet #14 Route 3 & N Belfast Ave	Lump Sum
643.21 Non-Invasive Detection - Stop Bar: Sheet #15 Route 3 & Riverside Dr	Lump Sum
643.21 Non-Invasive Detection - Stop Bar: Sheet #16 Route 3 & Route 104	Lump Sum
643.21 Non-Invasive Detection - Stop Bar: Sheet #17 Senator Way & Crossing Way	Lump Sum
643.21 Non-Invasive Detection - Stop Bar: Sheet #18 S Belfast Ave & Cony Rd	Lump Sum
643.21 Non-Invasive Detection - Stop Bar: Sheet #19 State St & Capitol St	Lump Sum
643.21 Non-Invasive Detection - Stop Bar: Sheet #20 State St & Union St	Lump Sum
643.21 Non-Invasive Detection - Stop Bar: Sheet #21 Stone St & Hannaford Dr	Lump Sum
643.21 Non-Invasive Detection - Stop Bar: Sheet #22 Western Ave & Airport Rd	Lump Sum
643.21 Non-Invasive Detection - Stop Bar: Sheet #23 Western Ave & Armory St	Lump Sum
643.21 Non-Invasive Detection - Stop Bar: Sheet #24 Western Ave & Augusta Xing	Lump Sum
643.21 Non-Invasive Detection - Stop Bar: Sheet #25 Western Ave & Edison Dr	Lump Sum
643.21 Non-Invasive Detection - Stop Bar: Sheet #26 Western Ave & Orchard St	Lump Sum
643.21 Non-Invasive Detection - Stop Bar: Sheet #27 Western Ave & Senator Way	Lump Sum
643.21 Non-Invasive Detection - Stop Bar: Sheet #28 Western Ave & Sewall St	Lump Sum
643.21 Non-Invasive Detection - Stop Bar: Sheet #29 Western Ave & Shuman Dr	Lump Sum
643.21 Non-Invasive Detection - Stop Bar: Sheet #30 Western Ave & U-Haul	Lump Sum
643.21 Non-Invasive Detection - Stop Bar: Sheet #31 Western Ave & Whitten Rd	Lump Sum
643.21 Non-Invasive Detection - Stop Bar: Sheet #32 Route 3 & Medical Center Pkwy	Lump Sum
643.21 Non-Invasive Detection - Stop Bar: Sheet #33 Route 3 & Route 27	Lump Sum
643.21 Non-Invasive Detection - Stop Bar: Sheet #34 State St & Winthrop St	Lump Sum
643.21 Non-Invasive Detection - Stop Bar: Sheet #35 State St & Bridge St	Lump Sum
643.21 Non-Invasive Detection - Stop Bar: Sheet #36 Water St & Bridge St	Lump Sum

643.21	Non-Invasive Detection - Stop Bar: Sheet #37 Cony St & City Center Dr	Lump Sum
643.21	Non-Invasive Detection - Stop Bar: Sheet #38 Bangor St & Quimby St	Lump Sum
643.21	Non-Invasive Detection - Stop Bar: Sheet #39 Bangor St & N Belfast Ave	Lump Sum
643.21	Non-Invasive Detection - Stop Bar: Sheet #40 Whitten Rd & Hannaford Dr	Lump Sum
643.21	Non-Invasive Detection - Stop Bar: Sheet #41 Route 3 & Hatley Rd	Lump Sum
643.21	Non-Invasive Detection - Stop Bar: Sheet #43 Main St & High St	Lump Sum
643.21	Non-Invasive Detection - Stop Bar: Sheet #44 Route 1 & Route 52	Lump Sum
643.21	Non-Invasive Detection - Stop Bar: Sheet #46 Route 201 & Bridge St	Lump Sum
643.21	Non-Invasive Detection - Stop Bar: Sheet #47 Route 201 & KVCOG	Lump Sum
643.21	Non-Invasive Detection - Stop Bar: Sheet #48 Route 4 & Broadway	Lump Sum
643.21	Non-Invasive Detection - Stop Bar: Sheet #49 Route 4 & Route 2/27	Lump Sum
643.21	Non-Invasive Detection - Stop Bar: Sheet #50 Route 4 & Bridge St	Lump Sum
643.21	Non-Invasive Detection - Stop Bar: Sheet #51 Route 4 & Hannaford Dr	Lump Sum
643.21	Non-Invasive Detection - Stop Bar: Sheet #52 Route 4 & Walmart Dr	Lump Sum
643.21	Non-Invasive Detection - Stop Bar: Sheet #53 Route 4 & Hospital St	Lump Sum
643.21	Non-Invasive Detection - Stop Bar: Sheet #54 Bridge St & Maine Ave	Lump Sum
643.21	Non-Invasive Detection - Stop Bar: Sheet #55 Bridge St & Water St	Lump Sum
643.21	Non-Invasive Detection - Stop Bar: Sheet #56 Main St & Perkins St	Lump Sum
643.21	Non-Invasive Detection - Stop Bar: Sheet #57 Main St & Fairfield St	Lump Sum
643.21	Non-Invasive Detection - Stop Bar: Sheet #58 Pleasant St & Oak St	Lump Sum
643.21	Non-Invasive Detection - Stop Bar: Sheet #59 Water St & Bridge St	Lump Sum
643.21	Non-Invasive Detection - Stop Bar: Sheet #60 Main St & Walmart Dr	Lump Sum
643.21	Non-Invasive Detection - Stop Bar: Sheet #62 Main St & Shaws Dr	Lump Sum
643.21	Non-Invasive Detection - Stop Bar: Sheet #63 Main St & Westview St	Lump Sum
643.21	Non-Invasive Detection - Stop Bar: Sheet #66 Main St & Washington St	Lump Sum
643.21	Non-Invasive Detection - Stop Bar: Sheet #67 Main St & Route 202	Lump Sum
643.21	Non-Invasive Detection - Stop Bar: Sheet #68 Main St & Route 224	Lump Sum
643.21	Non-Invasive Detection - Stop Bar: Sheet #69 Route 4A/202 & River St	Lump Sum
643.21	Non-Invasive Detection - Stop Bar: Sheet #70 Route 4 & Grammar Rd	Lump Sum
643.21	Non-Invasive Detection - Stop Bar: Sheet #71 Route 224 & River St	Lump Sum
643.21	Non-Invasive Detection - Stop Bar: Sheet #72 Route 4A/202 & Route 224	Lump Sum
643.21	Non-Invasive Detection - Stop Bar: Sheet #73 Route 202 & Route 32	Lump Sum
643.21	Non-Invasive Detection - Stop Bar: Sheet #74 KMD & First Park Dr	Lump Sum
643.21	Non-Invasive Detection - Stop Bar: Sheet #75 KMD & I-95 SB	Lump Sum
643.21	Non-Invasive Detection - Stop Bar: Sheet #76 KMD & I-95 NB	Lump Sum
643.21	Non-Invasive Detection - Stop Bar: Sheet #77 KMD & Washington St	Lump Sum
643.21	Non-Invasive Detection - Stop Bar: Sheet #78 KMD & Shaws Dr	Lump Sum
643.21	Non-Invasive Detection - Stop Bar: Sheet #79 KMD & 1st Rangeway	Lump Sum
643.21	Non-Invasive Detection - Stop Bar: Sheet #80 KMD & Hannaford Dr	Lump Sum
643.21	Non-Invasive Detection - Stop Bar: Sheet #81 KMD & Cool St	Lump Sum
643.21	Non-Invasive Detection - Stop Bar: Sheet #82 KMD & West River Rd	Lump Sum
643.21	Non-Invasive Detection - Stop Bar: Sheet #83 KMD & CMD	Lump Sum
643.21	Non-Invasive Detection - Stop Bar: Sheet #84 Silver St & Elm St	Lump Sum
643.21	Non-Invasive Detection - Stop Bar: Sheet #85 Elm St & Western Ave	Lump Sum
643.21	Non-Invasive Detection - Stop Bar: Sheet #86 Elm St & Park St	Lump Sum
643.21	Non-Invasive Detection - Stop Bar: Sheet #87 Spring St & Main St	Lump Sum
643.21	Non-Invasive Detection - Stop Bar: Sheet #88 Spring St & Silver St	Lump Sum
643.21	Non-Invasive Detection - Stop Bar: Sheet #89 Spring St & Elm St	Lump Sum
643.21	Non-Invasive Detection - Stop Bar: Sheet #90 Main St & Temple St	Lump Sum
643.21	Non-Invasive Detection - Stop Bar: Sheet #91 Main St & Elm St	Lump Sum

643.21	Non-Invasive Detection - Stop Bar: Sheet #92 Main St & Eustis Pkwy	Lump Sum
643.21	Non-Invasive Detection - Stop Bar: Sheet #93 Main St & Armory St	Lump Sum
643.21	Non-Invasive Detection - Stop Bar: Sheet #94 Main St & Waterville Commons	Lump Sum
643.21	Non-Invasive Detection - Stop Bar: Sheet #95 Main St & I-95 NB	Lump Sum
643.21	Non-Invasive Detection - Stop Bar: Sheet #96 Main St & I-95 SB	Lump Sum
643.21	Non-Invasive Detection - Stop Bar: Sheet #97 College Ave & Hazelwood Ave	Lump Sum
643.21	Non-Invasive Detection - Stop Bar: Sheet #99 CMD & Cushman Rd	Lump Sum
643.21	Non-Invasive Detection - Stop Bar: Sheet #100 China Rd & Cushman Rd	Lump Sum
643.21	Non-Invasive Detection - Stop Bar: Sheet #101 Route 201 & Clinton Ave	Lump Sum
643.21	Non-Invasive Detection - Stop Bar: Sheet #102 Route 201 & Halifax St	Lump Sum
643.21	Non-Invasive Detection - Stop Bar: Sheet #103 Route 201 & China Rd	Lump Sum
643.21	Non-Invasive Detection - Stop Bar: Sheet #104 Route 201 & CMD	Lump Sum

SPECIAL PROVISION
SECTION 643
TRAFFIC SIGNALS
(Non-Invasive Detection - Advance)

Description. This item shall consist of furnishing and installing a non-invasive advance vehicle detection system including all necessary fittings, mounting hardware and appurtenances necessary to provide for a fully operational system at the locations shown on the plans or as indicated by the Maine Department of Transportation (MaineDOT).

Materials. The non-invasive advance vehicle detection system shall include a stand-alone, radar-based detector and an integrated machine processor, Microsoft Windows based configuration software that provides for configuring the non-invasive advance vehicle detection system. The Non-Invasive Detection – Advance shall include equipment meeting the following and all the requirements as defined under item 718.13. The use of a hybrid/combination unit to meet the following specifications shall not be allowed. A hybrid/combination unit is defined as a device designed to function using multiple detection technologies. The interface provided shall provide for the viewing of real time detection data and updating the memory of the non-invasive advance vehicle detection system. All mounting hardware, Ethernet communications interface panel, Advanced Transportation Controller Cabinet (ATCC) detector interface panel, detector cabling, all associated equipment, software and licenses and miscellaneous fittings, cabinet wiring, and all labor, materials and equipment required to complete the installation shall be included. The non-invasive detection system shall be integrated into the ATCC cabinet and made fully functional. No additional hardware, software items and/or subscription fees/costs shall be needed/allowed to satisfy the requirements as defined in these specifications. The non-invasive advanced vehicle detector shall be the Wavetronix Smart Sensor Advance.

All non-invasive advance vehicle detection system components shall be current production equipment produced by the same manufacturer as otherwise noted herein or approved in advance by MaineDOT. The non-invasive advance vehicle detection system hardware shall operate without degradation over a temperature range of -40 to 165 degrees Fahrenheit at a relative humidity up to 95% non-condensing.

The non-invasive advance vehicle detection system must meet the National Electrical Manufacturers Association (NEMA) 250 Standards for the enclosure, be able to detect vehicles at a minimum of 600 ft distance from the detector and the ability to simultaneously detect and track multiple vehicles. The non-invasive advance vehicle detection system's hardware and software used to setup, configure and communicate must be compatible with the vehicle detection's operating system.

Construction Requirements. The Contractor shall be responsible for furnishing all training, labor, materials, cables, connectors, tools, equipment, shipping and incidental items necessary to complete the installation and make the non-invasive advance vehicle detection system fully operational.

Installation of the non-invasive advance vehicle detection system shall include the installation of any and all associated equipment including, but not limited to, the following:

- a. Detector assembly with integrated machine vision processor. The Contractor shall furnish one assembly per designated approach as indicated in the plans.
- b. Detector Ethernet communications interface panel. The Contractor shall furnish one detector communications interface panel per cabinet.
- c. ATCC detector interface panel. The Contractor shall furnish one detector ATCC detector interface panel per cabinet.
- d. Detector Cable. The Contractor shall furnish the specified cable type, all connectors, sealing tape and incidental work necessary to complete the installation of the connector cable between the detector assembly and the interface panel.
- e. Mounting Brackets and Ancillary Equipment and Labor. The Contractor shall furnish detector mounting brackets and all associated equipment labor, materials and incidental work necessary to attach the detector assemblies to a mast arm or extension bracket, complete the installation and make the non-invasive advance vehicle detection system fully operational.

The Contractor shall install the Non-Invasive Detection - Advance processor system software on the cloud-based Central Management System (CMS). In addition, the Contractor shall install and configure the Non-Invasive Detection – Advance system software on ten (10) computers/systems as required by MaineDOT to allow for visual confirmation of the detection zones as shown on the plans.

All equipment shall be installed and wired in a neat and orderly manner in conformance with the manufacturer's instructions. The detector assembly(s) shall be installed attached to a support structure in accordance with the manufacturer's instructions to provide the optimal field of detection as directed by MaineDOT and/or the Engineer.

The non-invasive advance vehicle detection zones shown on the plans are for illustrative purposes only. Final detection zones shall be located in the field and approved by MaineDOT and/or Engineer.

The installation will be considered complete when the Contractor shows that the non-invasive advance detection system has successfully and consistently placed a call to the Advanced Transportation Controller (ATC). The call shall be placed when a vehicle has been detected in the dilemma zone as shown on the plans. In addition, the completed installation shall provide remote access to the Non-Invasive Detection - Advance system via MaineDOT control and or the cloud-based CMS/ACST.

Method of Measurement. The non-invasive advance vehicle detection system will be measured for payment as a lump sum for a fully installed and operational Non-Invasive Detection – Advance system. All items, equipment, labor, incidentals and testing required to create a fully functional system will be considered incidental to the cost of this item. The item shall be unconditionally warranted for at least 3 years from installation and certified to comply with the product’s published specification by an independent laboratory.

Basis of Payment. Payment will be full compensation for furnishing, transporting, handling, and installing the materials and equipment specified and for furnishing all labor, tools, equipment, and incidentals necessary to complete the work.

<u>Pay Item</u>	<u>Pay Unit</u>
643.22 Non-Invasive Detection - Advance: Sheet #3 CCD & Darin Dr	Lump Sum
643.22 Non-Invasive Detection - Advance: Sheet #4 CCD & I-95 NB	Lump Sum
643.22 Non-Invasive Detection - Advance: Sheet #5 CCD & I-95 SB	Lump Sum
643.22 Non-Invasive Detection - Advance: Sheet #6 CCD & Leighton Rd	Lump Sum
643.22 Non-Invasive Detection - Advance: Sheet #7 CCD & University Dr	Lump Sum
643.22 Non-Invasive Detection - Advance: Sheet #8 CCD & Townsend Rd	Lump Sum
643.22 Non-Invasive Detection - Advance: Sheet #9 Eastern Ave & Cony Rd	Lump Sum
643.22 Non-Invasive Detection - Advance: Sheet #10 Eastern Ave & Stone St	Lump Sum
643.22 Non-Invasive Detection - Advance: Sheet #11 Eastern Ave & Spring St/Togus Rd	Lump Sum
643.22 Non-Invasive Detection - Advance: Sheet #12 Hospital St & Piggery Rd/Tyson Dr	Lump Sum
643.22 Non-Invasive Detection - Advance: Sheet #13 Route 3 & Church Hill Rd	Lump Sum
643.22 Non-Invasive Detection - Advance: Sheet #14 Route 3 & N Belfast Ave	Lump Sum
643.22 Non-Invasive Detection - Advance: Sheet #15 Route 3 & Riverside Dr	Lump Sum
643.22 Non-Invasive Detection - Advance: Sheet #16 Route 3 & Route 104	Lump Sum
643.22 Non-Invasive Detection - Advance: Sheet #18 S Belfast Ave & Cony Rd	Lump Sum
643.22 Non-Invasive Detection - Advance: Sheet #23 Western Ave & Armory St	Lump Sum
643.22 Non-Invasive Detection - Advance: Sheet #24 Western Ave & Augusta Xing	Lump Sum
643.22 Non-Invasive Detection - Advance: Sheet #25 Western Ave & Edison Dr	Lump Sum
643.22 Non-Invasive Detection - Advance: Sheet #26 Western Ave & Orchard St	Lump Sum
643.22 Non-Invasive Detection - Advance: Sheet #27 Western Ave & Senator Way	Lump Sum
643.22 Non-Invasive Detection - Advance: Sheet #29 Western Ave & Shuman Dr	Lump Sum
643.22 Non-Invasive Detection - Advance: Sheet #31 Western Ave & Whitten Rd	Lump Sum
643.22 Non-Invasive Detection - Advance: Sheet #40 Whitten Rd & Hannaford Dr	Lump Sum
643.22 Non-Invasive Detection - Advance: Sheet #41 Route 3 & Hatley Rd	Lump Sum
643.22 Non-Invasive Detection - Advance: Sheet #42 Main St & Hannaford Dr	Lump Sum
643.22 Non-Invasive Detection - Advance: Sheet #44 Route 1 & Route 52	Lump Sum
643.22 Non-Invasive Detection - Advance: Sheet #47 Route 201 & KVCOG	Lump Sum
643.22 Non-Invasive Detection - Advance: Sheet #49 Route 4 & Route 2/27	Lump Sum
643.22 Non-Invasive Detection - Advance: Sheet #51 Route 4 & Hannaford Dr	Lump Sum
643.22 Non-Invasive Detection - Advance: Sheet #52 Route 4 & Walmart Dr	Lump Sum
643.22 Non-Invasive Detection - Advance: Sheet #53 Route 4 & Hospital St	Lump Sum
643.22 Non-Invasive Detection - Advance: Sheet #54 Bridge St & Maine Ave	Lump Sum
643.22 Non-Invasive Detection - Advance: Sheet #57 Main St & Fairfield St	Lump Sum
643.22 Non-Invasive Detection - Advance: Sheet #60 Main St & Walmart Dr	Lump Sum

643.22	Non-Invasive Detection - Advance: Sheet #61 Main St & Jagger Mill R	Lump Sum
643.22	Non-Invasive Detection - Advance: Sheet #62 Main St & Shaws Dr	Lump Sum
643.22	Non-Invasive Detection - Advance: Sheet #63 Main St & Westview St	Lump Sum
643.22	Non-Invasive Detection - Advance: Sheet #64 Main St & Alumni Dr/ Old Mill Rd	Lump Sum
643.22	Non-Invasive Detection - Advance: Sheet #70 Route 4 & Grammar Rd/New Dam	Lump Sum
643.22	Non-Invasive Detection - Advance: Sheet #71 Route 224 & River St	Lump Sum
643.22	Non-Invasive Detection - Advance: Sheet #72 Route 4A/202 & Route 224	Lump Sum
643.22	Non-Invasive Detection - Advance: Sheet #73 Route 202 & Route 32	Lump Sum
643.22	Non-Invasive Detection - Advance: Sheet #74 KMD & First Park Dr	Lump Sum
643.22	Non-Invasive Detection - Advance: Sheet #75 KMD & I-95 SB	Lump Sum
643.22	Non-Invasive Detection - Advance: Sheet #76 KMD & I-95 NB	Lump Sum
643.22	Non-Invasive Detection - Advance: Sheet #77 KMD & Washington St	Lump Sum
643.22	Non-Invasive Detection - Advance: Sheet #78 KMD & Shaws Dr	Lump Sum
643.22	Non-Invasive Detection - Advance: Sheet #79 KMD & 1st Rangeway	Lump Sum
643.22	Non-Invasive Detection - Advance: Sheet #80 KMD & Hannaford Dr	Lump Sum
643.22	Non-Invasive Detection - Advance: Sheet #81 KMD & Cool St	Lump Sum
643.22	Non-Invasive Detection - Advance: Sheet #82 KMD & West River Rd	Lump Sum
643.22	Non-Invasive Detection - Advance: Sheet #83 KMD & CMD	Lump Sum
643.22	Non-Invasive Detection - Advance: Sheet #93 Main St & Armory St	Lump Sum
643.22	Non-Invasive Detection - Advance: Sheet #94 Main St & Waterville Commons	Lump Sum
643.22	Non-Invasive Detection - Advance: Sheet #95 Main St & I-95 NB	Lump Sum
643.22	Non-Invasive Detection - Advance: Sheet #96 Main St & I-95 SB	Lump Sum
643.22	Non-Invasive Detection - Advance: Sheet #97 College Ave & Hazelwood Ave	Lump Sum
643.22	Non-Invasive Detection - Advance: Sheet #98 KMD & Airport Rd	Lump Sum
643.22	Non-Invasive Detection - Advance: Sheet #99 CMD & Cushman Rd	Lump Sum
643.22	Non-Invasive Detection - Advance: Sheet #104 Route 201 & CMD	Lump Sum

SPECIAL PROVISION
SECTION 643
TRAFFIC SIGNALS

The provisions of Section 643 of the Standard Specifications shall apply with the following additions and modifications:

643.01 Description The project will result in the modernization of traffic control signals and pedestrian crossing facilities in the cities of Augusta, Belfast, Gardiner, Sanford, and Waterville and towns of Benton, Fairfield, Farmington, Norridgewock, Oakland, Randolph, South China, and Winslow. Equipment includes, but is not limited to Advanced Transportation Controller Cabinets (ATCC) with rack mounted Advanced Transportation Controllers (ATC), new wood pole with guy anchors and span wire, mast arm poles, strain poles, pedestal poles, vehicular and pedestrian signal heads with countdown timers, new light-emitting diode (LED) indications, retroreflective backplates on vehicle signal heads, wiring, signal cable, overhead mast arm and span wire mounted signs, non-invasive stop bar vehicle detection, non-invasive advance vehicle detection, emergency vehicle preemption, accessible pedestrian signals (APS), passive pedestrian detection (1 location, see corner B on plan sheet 54), and all appurtenances and incidentals required for complete functioning installations. In addition, the project will provide the means for remote communications to the traffic signal control cabinet equipment by field monitoring unit (FMU) with a cloud-based central management system (CMS) via a secure Virtual Private Network (VPN) tunnel and/or a City/Town existing or proposed fiber intranet connection.

Pedestrian equipment is to be installed under the guidelines of the Americans with Disabilities Act (ADA) having work integrated with curb ramp and detectable warning field improvements also being provided with this project.

Backplates will be provided for all new vehicle signal heads. The backplates shall be a minimum of 5-inches with 3-inch fluorescent yellow retroreflective strips. New backplates shall provide louvers for one-way, three-, four-section, and five-section 12-inch signal heads.

All traffic signal controller timing parameters shall be programmed to provide free and coordinated operations. Where shown in the plans, 31 intersections along 4 corridors (2-Augusta and 2-Waterville) shall be provided with Adaptive Signal Control Technology (ASCT). See Special Provision 654 and 718.13 for ASCT specifications.

This project will also provide dual mode Dedicated Short Range Communications (DSRC)/4GLTE-5G On Board Units (OBU's) and Road Side Unit (RSU) integrated into the ATCC. See Special Provision 654 for RSU and OBU specifications.

643.211 Additional Materials Materials shall also meet the requirements in the following Special Provision to Section of Division 700 - Materials:

Traffic Control System	718.13
Field Monitoring Unit	718.14
Messenger Wire	718.15

Emergency Vehicle Preemption System	718.16
Single Mode Fiber Optic Cable	718.17
Twelve (12) Position Fiber Optic Patch Panel	718.18
Ethernet Switch with Fiber Optic Interfaces	718.19
Wireless Interconnect System	718.20
Pedestrian Crossing System	718.21

643.9 Service Connection Add the following:

A total of 4, 10' service ground rods shall be installed and properly connected together in the cabinet foundation.

The Contractor shall be responsible for grounding the system to 5 ohms or less tested without an electrical connection to the utility neutral or ground conductor. The grounding shall be performed using a ground meter with reference grounds. In the event that a 5-ohm reading is not achieved, the Contractor shall install a chem-rod grounding electrode in close proximity to the cabinet. The chem-rod shall be properly connected to the four rod, grounding system in the cabinet. The chem-rod shall consist of a 10' copper rod (vertical or horizontal orientation) filled with common salt and desiccant, back filled with natural earth bentonite clay ground enhancement material. The chem-rod shall be installed per manufacturer's instructions. The location and orientation for the chem-rod installation shall be approved by the Resident. All testing shall be done in the presence of the Resident.

643.12 Painting Unless otherwise directed by MaineDOT or through the Resident Engineer, all exterior parts of the listed equipment shall be delivered to the project finished as follows:

City of Augusta (Capitol Complex Historic District, Locations 1, 19, 20, and 34)

- Vehicular Signal Heads – all parts **bronze**.
- Pedestrian Signal Heads – all parts **bronze**.
- Accessible Pedestrian Signals (APS) – **black**.
- Signal Backplates – **bronze** and louvered w/ fluorescent yellow retroreflective strip.
- Controller Cabinets – **bronze painted** / aluminum.
- Mast Arms, Uprights, and Bases – **bronze painted** / galvanized steel.
- Pedestal Posts and Bases – **bronze painted** / aluminum.

City of Augusta (Locations, 2-11, 13-18 and 21-37, 29-33, 35, 38-40), City of Belfast (Locations 41, 42, and 44), City of Gardiner, Town of Fairfield (Location 47), Town of Farmington (Locations 49-53), Town of Randolph, and Town of Norridgewock

- Vehicular Signal Heads – all parts **black**.
- Pedestrian Signal Heads – all parts **black**.
- Accessible Pedestrian Signals (APS) – **black**.
- Signal Backplates – **black** and louvered w/ fluorescent yellow retroreflective strip.
- Controller Cabinets – **bare metal** / aluminum.
- Mast Arms, Uprights, and Bases – **bare metal** / galvanized steel.
- Pedestal Posts and Bases – **bare metal** / aluminum.

City of Augusta (Locations 12, 28, and 36-37), City of Belfast (Downtown Location 43),
Town of Fairfield (Location 46), Town of Farmington (Downtown Location 48), and
City of Sanford

Vehicular Signal Heads – all parts **black**.

Pedestrian Signal Heads – all parts **black**.

Accessible Pedestrian Signals (APS) – **black**.

Signal Backplates – **black** and louvered w/ fluorescent yellow retroreflective strip.

Controller Cabinets – **black** / aluminum.

Mast Arms, Uprights, and Bases – **black** / galvanized steel.

Pedestal Posts and Bases – **black** / aluminum.

City of Waterville (Locations 74-83, 85, 87-88, 90-98), Town of South China,
Town of Winslow, and Town of Oakland

Vehicular Signal Heads – all parts **federal yellow**.

Pedestrian Signal Heads – all parts **federal yellow**.

Accessible Pedestrian Signals (APS) – **federal yellow**.

Signal Backplates – **black** and louvered w/ fluorescent yellow retroreflective strip.

Controller Cabinets – **bare metal** / aluminum.

Mast Arms, Uprights, and Bases – **bare metal** / galvanized steel.

Pedestal Posts and Bases – **bare metal** / aluminum.

City of Waterville (Locations 84, 86, and 89),

Vehicular Signal Heads – all parts **federal yellow**.

Pedestrian Signal Heads – all parts **federal yellow**.

Accessible Pedestrian Signals (APS) – **federal yellow**.

Signal Backplates – **black** and louvered w/ fluorescent yellow retroreflective strip.

Controller Cabinets – **black** / aluminum.

Mast Arms, Uprights, and Bases – **black** / galvanized steel.

Pedestal Posts and Bases – **black** / aluminum.

643.19 Basis of Payment Traffic signal modifications (Item 643.71) will be paid for at the contract lump sum price for the intersection, which payment will be full compensation for furnishing and installing all materials, including, but not limited to ATCC complete with rack mount ATC controllers, FMU, generator transfer switch, span wire and tether cable, risers, vehicular signal heads, retroreflective backplates, aerial disconnects, signal cable, light emitting diode (LED) lamps, emergency vehicle preemption and all appurtenances and incidentals required for complete functioning installations and for furnishing all tools and labor necessary for completing the installations.

The on-street, IR light-based emergency vehicle pre-emption system (see Special Provision 718.16 of Division 700 – Materials for more information) will be paid for under pay items 643.71, which price will be full compensation for furnishing and installing all materials, appurtenances, and incidentals required for a complete functioning installation and for furnishing all tools and labor necessary for completing the installation.

Temporary Traffic Signals (Item 643.72) will be paid for at the contract lump sum price for the intersection, which payment will be full compensation for furnishing and installing all materials, tools and labor necessary for completing the temporary installation. Payment for temporary traffic signals shall include compensation for the removal of the system upon completion of the permanent signal installation.

The traffic signal control system (Item 643.81) will be paid for at the contract lump sum price, which payment will be full compensation for furnishing and installing all materials, including, but not limited to cloud-based CMS with integration of ASCT/CV/SPM system, installation and upgrades, training, and all appurtenances and incidentals required for a complete functioning installation with secure VPN remote access. Payment for signal system start-up, system loading and acceptance testing shall be considered incidental to the traffic signal control system.

The accepted quantity for 12-strand interconnect wire (Item 643.90) will be paid for at the contract lump sum price, which payment will be full compensation for furnishing and placing all materials between the termination points and within the controller cabinets at the locations shown on the plans including mounting hardware, performing and testing splices, splice enclosures, and incidentals including fiber optic related messenger wire required for a complete function installation. See Special Provision 718.17 to 718.19 of Division 700 – Materials for more information. The cost for risers on utility poles shall be incidental to the cost of the interconnect wire for 12-strand cable.

The accepted quantity for interconnect wireless system (Item 643.90) will be paid for at the contract lump sum price, which price shall be full compensation for furnishing and placing all materials including pole risers, antennas, antenna cables, media converters, control equipment, solar powered equipment (where applicable), frequency surveys, path analyses, signal strength testing, and all appurtenances and incidentals required for a complete functioning wireless interconnect system. See Special Provision 718.20 of Division 700 – Materials for more information.

Mast Arms (Item 643.91) will be paid for at the contract unit price each which payment shall be full compensation for furnishing and installing all mast arms, uprights, bases, anchor bolts to be supplied by the manufacturer of the mast arm poles, ancillary materials, tools and labor necessary to erect and install the structures.

Pedestal poles (Item 643.92) will be paid for at the contract unit price each which payment shall be full compensation for furnishing and installing all pedestal posts, bases, anchor bolts, ancillary materials, tools and labor necessary to erect and install the structures.

Strain Poles (Item 643.93) will be paid for at the contract unit price each which payment shall be full compensation for furnishing and installing all strain poles, bases, anchor bolts to be supplied by the manufacturer of the strain poles, ancillary materials, tools and labor necessary to erect and install the structures.

Dual Purpose Poles (Item 643.94) will be paid for at the contract unit price each which payment shall be full compensation for furnishing and installing all mast arms, uprights with overhead extensions for lighting to match existing pole lighting heights, providing or resetting existing luminaires, bases, anchor bolts to be supplied by the manufacturer of the mast arm poles, ancillary materials, tools and labor necessary to erect and install the structures.

Wood pole with guys (Item 643.97) will be paid for at the contract unit price each which payment will be full compensation for furnishing and installing all materials, including, but not limited to wood pole with guy wires and anchors, and all appurtenances and incidentals required to erect and guy anchor the pole.

Payment will be made under the following:

<u>Pay Item</u>	<u>Pay Unit</u>
643.71 Traffic Signal Modification: Sheet #1 Capitol St & Sewall St	Lump Sum
643.71 Traffic Signal Modification: Sheet #2 CCD & Commerce Dr	Lump Sum
643.71 Traffic Signal Modification: Sheet #3 CCD & Darin Dr	Lump Sum
643.71 Traffic Signal Modification: Sheet #4 CCD & I-95 NB	Lump Sum
643.71 Traffic Signal Modification: Sheet #5 CCD & I-95 SB	Lump Sum
643.71 Traffic Signal Modification: Sheet #6 CCD & Leighton Rd	Lump Sum
643.71 Traffic Signal Modification: Sheet #7 CCD & University Dr	Lump Sum
643.71 Traffic Signal Modification: Sheet #8 CCD & Townsend Rd	Lump Sum
643.71 Traffic Signal Modification: Sheet #9 Eastern Ave & Cony Rd	Lump Sum
643.71 Traffic Signal Modification: Sheet #10 Eastern Ave & Stone St	Lump Sum
643.71 Traffic Signal Modification: Sheet #11 Eastern Ave & Togus Rd	Lump Sum
643.71 Traffic Signal Modification: Sheet #12 Hospital St & Piggery Rd	Lump Sum
643.71 Traffic Signal Modification: Sheet #13 Route 3 & Church Hill Rd	Lump Sum
643.71 Traffic Signal Modification: Sheet #14 Route 3 & N Belfast Ave	Lump Sum
643.71 Traffic Signal Modification: Sheet #15 Route 3 & Riverside Dr	Lump Sum
643.71 Traffic Signal Modification: Sheet #16 Route 3 & Route 104	Lump Sum
643.71 Traffic Signal Modification: Sheet #17 Senator Way & Crossing Way	Lump Sum
643.71 Traffic Signal Modification: Sheet #18 S Belfast Ave & Cony Rd	Lump Sum
643.71 Traffic Signal Modification: Sheet #19 State St & Capitol St	Lump Sum
643.71 Traffic Signal Modification: Sheet #20 State St & Union St	Lump Sum
643.71 Traffic Signal Modification: Sheet #21 Stone St & Hannaford Dr	Lump Sum
643.71 Traffic Signal Modification: Sheet #22 Western Ave & Airport Rd	Lump Sum
643.71 Traffic Signal Modification: Sheet #23 Western Ave & Armory St	Lump Sum
643.71 Traffic Signal Modification: Sheet #24 Western Ave & Crossing Way	Lump Sum
643.71 Traffic Signal Modification: Sheet #25 Western Ave & Edison Dr	Lump Sum
643.71 Traffic Signal Modification: Sheet #26 Western Ave & Orchard St/Meadow Rd	Lump Sum
643.71 Traffic Signal Modification: Sheet #27 Western Ave & Senator Way	Lump Sum
643.71 Traffic Signal Modification: Sheet #28 Western Ave & Sewall St	Lump Sum
643.71 Traffic Signal Modification: Sheet #29 Western Ave & Shuman Dr	Lump Sum
643.71 Traffic Signal Modification: Sheet #30 Western Ave & U-Haul Dr	Lump Sum
643.71 Traffic Signal Modification: Sheet #31 Western Ave & Whitten Rd	Lump Sum
643.71 Traffic Signal Modification: Sheet #32 Route 3 & Medical Center Pkwy	Lump Sum
643.71 Traffic Signal Modification: Sheet #33 Route 3/Wilson St & Route 27	Lump Sum
643.71 Traffic Signal Modification: Sheet #34 State St & Winthrop St	Lump Sum

643.71	Traffic Signal Modification: Sheet #35 State St & Bridge St	Lump Sum
643.71	Traffic Signal Modification: Sheet #36 Water St & Bridge St	Lump Sum
643.71	Traffic Signal Modification: Sheet #37 Cony St & Willow St/ City Center Dr	Lump Sum
643.71	Traffic Signal Modification: Sheet #38 Bangor St & Linden St /Quimby St	Lump Sum
643.71	Traffic Signal Modification: Sheet #39 Bangor St & N Belfast Ave/Locke St	Lump Sum
643.71	Traffic Signal Modification: Sheet #40 Whitten Rd & Hannaford Dr	Lump Sum
643.71	Traffic Signal Modification: Sheet #41 Route 3 & Hatley Rd	Lump Sum
643.71	Traffic Signal Modification: Sheet #42 Main St & Hannaford Dr	Lump Sum
643.71	Traffic Signal Modification: Sheet #43 Main St & High St	Lump Sum
643.71	Traffic Signal Modification: Sheet #44 Route 1 & Route 52	Lump Sum
643.71	Traffic Signal Modification: Sheet #45 Bridge St & Benton Ave	Lump Sum
643.71	Traffic Signal Modification: Sheet #46 Route 201 & Bridge St	Lump Sum
643.71	Traffic Signal Modification: Sheet #47 Route 201 & KVCOG	Lump Sum
643.71	Traffic Signal Modification: Sheet #48 Route 4 & Broadway	Lump Sum
643.71	Traffic Signal Modification: Sheet #49 Route 4 & Route 2/27	Lump Sum
643.71	Traffic Signal Modification: Sheet #50 Route 4 & Bridge St	Lump Sum
643.71	Traffic Signal Modification: Sheet #51 Route 4 & Hannaford Dr	Lump Sum
643.71	Traffic Signal Modification: Sheet #52 Route 4 & Walmart Dr	Lump Sum
643.71	Traffic Signal Modification: Sheet #53 Route 4 & Hospital St	Lump Sum
643.71	Traffic Signal Modification: Sheet #54 Bridge St & Maine Ave	Lump Sum
643.71	Traffic Signal Modification: Sheet #55 Bridge St & Water St	Lump Sum
643.71	Traffic Signal Modification: Sheet #56 Main St & Perkins St	Lump Sum
643.71	Traffic Signal Modification: Sheet #57 Main St & Fairfield St	Lump Sum
643.71	Traffic Signal Modification: Sheet #58 Pleasant St & Oak St	Lump Sum
643.71	Traffic Signal Modification: Sheet #59 Water St & Bridge St	Lump Sum
643.71	Traffic Signal Modification: Sheet #60 Main St & Walmart Dr	Lump Sum
643.71	Traffic Signal Modification: Sheet #61 Main St & Jagger Mill Rd	Lump Sum
643.71	Traffic Signal Modification: Sheet #62 Main St & Shaws Dr	Lump Sum
643.71	Traffic Signal Modification: Sheet #63 Main St & Westview Dr	Lump Sum
643.71	Traffic Signal Modification: Sheet #64 Main St & Alumni Dr/ Old Mill Rd	Lump Sum
643.71	Traffic Signal Modification: Sheet #65 Main St & Emery St	Lump Sum
643.71	Traffic Signal Modification: Sheet #66 Main St & Washington St	Lump Sum
643.71	Traffic Signal Modification: Sheet #67 Main St & Route 202	Lump Sum
643.71	Traffic Signal Modification: Sheet #68 Main St & Route 224	Lump Sum
643.71	Traffic Signal Modification: Sheet #69 Route 4A/202 & River St	Lump Sum
643.71	Traffic Signal Modification: Sheet #70 Route 4 & Grammar Rd/New Dam Rd	Lump Sum
643.71	Traffic Signal Modification: Sheet #71 Route 224 & River St	Lump Sum
643.71	Traffic Signal Modification: Sheet #72 Route 4A/202 & Route 224	Lump Sum
643.71	Traffic Signal Modification: Sheet #73 Route 3 & Route 32	Lump Sum
643.71	Traffic Signal Modification: Sheet #74 KMD & First Park Dr	Lump Sum
643.71	Traffic Signal Modification: Sheet #75 KMD & I-95 SB	Lump Sum
643.71	Traffic Signal Modification: Sheet #76 KMD & I-95 NB	Lump Sum
643.71	Traffic Signal Modification: Sheet #77 KMD & Washington St	Lump Sum
643.71	Traffic Signal Modification: Sheet #78 KMD & Shaws Dr	Lump Sum
643.71	Traffic Signal Modification: Sheet #79 KMD & 1st Rangeway	Lump Sum
643.71	Traffic Signal Modification: Sheet #80 KMD & Hannaford Dr	Lump Sum
643.71	Traffic Signal Modification: Sheet #81 KMD & Cool St	Lump Sum
643.71	Traffic Signal Modification: Sheet #82 KMD & West River Rd	Lump Sum
643.71	Traffic Signal Modification: Sheet #83 KMD & First Park Dr	Lump Sum

643.71	Traffic Signal Modification: Sheet #84 Silver St & Elm St	Lump Sum
643.71	Traffic Signal Modification: Sheet #85 Elm St & Western Ave	Lump Sum
643.71	Traffic Signal Modification: Sheet #86 Elm St & Park St	Lump Sum
643.71	Traffic Signal Modification: Sheet #87 Spring St & Main St	Lump Sum
643.71	Traffic Signal Modification: Sheet #88 Spring St & Silver St	Lump Sum
643.71	Traffic Signal Modification: Sheet #89 Spring St & Elm St	Lump Sum
643.71	Traffic Signal Modification: Sheet #90 Main St & Temple St	Lump Sum
643.71	Traffic Signal Modification: Sheet #91 Main St & Elm St	Lump Sum
643.71	Traffic Signal Modification: Sheet #92 Main St & Eustis Pkwy	Lump Sum
643.71	Traffic Signal Modification: Sheet #93 Main St & Armory St	Lump Sum
643.71	Traffic Signal Modification: Sheet #94 Main St & Waterville Commons Dr	Lump Sum
643.71	Traffic Signal Modification: Sheet #95 Main St & I-95 NB	Lump Sum
643.71	Traffic Signal Modification: Sheet #96 Main St & I-95 SB	Lump Sum
643.71	Traffic Signal Modification: Sheet #97 College Ave & Hazelwood Ave	Lump Sum
643.71	Traffic Signal Modification: Sheet #98 KMD & Airport Rd	Lump Sum
643.71	Traffic Signal Modification: Sheet #99 CMD & Cushman Rd	Lump Sum
643.71	Traffic Signal Modification: Sheet #100 China Rd & Cushman Rd	Lump Sum
643.71	Traffic Signal Modification: Sheet #101 Route 201 & Clinton Ave	Lump Sum
643.71	Traffic Signal Modification: Sheet #102 Route 201 & Halifax St	Lump Sum
643.71	Traffic Signal Modification: Sheet #103 Route 201 & China Rd	Lump Sum
643.71	Traffic Signal Modification: Sheet #104 Route 201 & CMD	Lump Sum
643.72	Temporary Traffic Signal: Sheet #36 Water St & Bridge St	Lump Sum
643.72	Temporary Traffic Signal: Sheet #43 Main St & High St	Lump Sum
643.72	Temporary Traffic Signal: Sheet #59 Water St & Bridge St	Lump Sum
643.72	Temporary Traffic Signal: Sheet #68 Main St & Route 224	Lump Sum
643.72	Temporary Traffic Signal: Sheet #101 Route 201 & Clinton Ave	Lump Sum
643.81	Traffic Control System	Lump Sum
643.90	Interconnect Wire: 12-Strand (7,000 LF)	Lump Sum
643.90	Interconnect Wireless System: Sheet #66 Main St and Washington St	Lump Sum
643.90	Interconnect Wireless System: Sheet #67 Main St and Route 202	Lump Sum
643.90	Interconnect Wireless System: Sheet #68 Main St and Route 224	Lump Sum
643.91	Mast Arm Pole, w/20' Arm & 30' Arm	Each
643.91	Mast Arm Pole, w/25' Arm	Each
643.91	Mast Arm Pole, w/30' Arm	Each
643.91	Mast Arm Pole, w/30' Arm & 35' Arm	Each
643.91	Mast Arm Pole, w/35' Arm	Each
643.91	Mast Arm Pole, w/35' Arm & 45' Arm	Each
643.91	Mast Arm Pole, w/40' Arm	Each
643.91	Mast Arm Pole, w/50' Arm	Each
643.91	Mast Arm Pole, w/55' Arm	Each
643.92	Pedestal Pole	Each
643.93	Strain Pole	Each
643.94	Dual Purpose Pole, w/20' Arm w/luminaire	Each
643.94	Dual Purpose Pole, w/25' Arm w/luminaire	Each
643.94	Dual Purpose Pole, w/28' Arm w/luminaire	Each
643.94	Dual Purpose Pole, w/35' Arm w/luminaire	Each
643.94	Dual Purpose Pole, w/40' Arm w/luminaire	Each
643.97	Wood Pole with Guys	Each

SPECIAL PROVISION
SECTION 652
MAINTENANCE OF TRAFFIC

Approaches. Approach signing shall include the following signs at a minimum. Field conditions may warrant the use of additional signs as determined by the Resident.

Road Work Next X* Miles
Road Work 500 Feet (Ahead)
End Road Work

Work Areas. At each work site, signs and channelizing devices shall be used as directed by the Resident.

Signs include:

Road Work xxxx¹.
One Lane Road Ahead
Flagger Sign

Other typical signs include:

Be Prepared to Stop
Low Shoulder
Bump
Pavement Ends

The above lists of Approach signs and Work Area signs are representative of the contract requirements. Other sign legends may be required.

Unless otherwise defined in Special Provision 105/107 or submitted and approved in the Traffic Control Plan, the following shall apply:

- The Contractor shall conduct their operations in such a manner that the roadway will not be restricted to one lane for more than 2,500 feet at each work area and no more than 4,000 feet for paving and milling work areas.
- Where more than one work area restricts traffic to one lane operation, these work areas shall be separated by at least 1 mile of two-way operation.

Temporary Centerline A temporary centerline shall be placed each day on all new pavement to be used by traffic. The temporary centerline, when specified of reflectorized traffic paint, shall conform to the standard marking patterns used for permanent markings. Failure to apply a temporary centerline daily will result in a Traffic Control Violation and suspension of paving operations until temporary markers are applied to all previously placed pavement.

¹ “Road Work Ahead” to be used in short duration operations and “Road Work xx feet” to be used in stationary operations as directed by the Resident.

SPECIAL PROVISION
SECTION 654
INTELLIGENT TRANSPORTATION SYSTEMS
(Adaptive Signal Control Technology System)

Description. This item shall consist of furnishing and installing and Adaptive Signal Control Technology (ASCT) System at the locations shown on the plans.

Materials. The ASCT shall include equipment meeting the following all the requirements as defined under item 718.13. No additional hardware, software items and/or subscription fees/costs shall be needed/allowed to satisfy the requirements as defined in these specifications.

Construction Requirements. The Contractor shall be responsible for furnishing all training, labor, materials, cables, connectors, tools, equipment, shipping and incidental items necessary to complete the installation and make the ASCT system fully operational.

Installation of the ASCT system shall include the installation of any and all associated equipment including, but not limited to, the following:

- a. Creation of a redundant cloud-based system, that shall allow for secure remote Virtual Private Network (VPN) access.
- b. Configuration of all network/data links between the Advanced Transportation Controller Cabinet (ATCC), existing City/Town networks and/or Field Monitoring Unit (FMU).
- c. Configuration of all ASCT system parameters including but not limited to signal phasing, vehicle detector inputs, system/subsystem maps and intersection geometry.
- d. CMS/ASCT shall provide for a single point alarm platform that shall integrate all sub-systems including Non-Invasive Stop Bar Detection, Non-Invasive Advance Detection, Connected Vehicle Systems, SPM systems.

Method of Measurement. The ASCT applications will be measured by lump sum price per corridor furnished and installed. All equipment, labor and incidentals required to create a fully functional system will be considered incidental to the cost of this item.

Basis of Payment. Payment will be full compensation for furnishing, transporting, handling, installing and testing the materials and equipment specified. The Contractor shall furnish all labor, tools, equipment, and incidentals necessary to complete the work.

Payment will be made under the following:

<u>Pay Item</u>	<u>Pay Unit</u>
654.05 Adaptive Signal Control Technology System: Western Avenue	Lump Sum
654.05 Adaptive Signal Control Technology System: Civic Center Drive	Lump Sum
654.05 Adaptive Signal Control Technology System: Kennedy Memorial Drive	Lump Sum
654.05 Adaptive Signal Control Technology System: Main Street	Lump Sum

SPECIAL PROVISION
SECTION 654
INTELLIGENT TRANSPORTATION SYSTEMS
(Fiber Optic Manhole)

Description. This item shall consist of furnishing and installing fiber optic manhole as detailed in the plans and specifications or as indicated by MaineDOT.

Materials. In addition to the requirements shown on the plans, the manhole frame and cover shall be in accordance with the minimum requirements specified in section 604, Manholes, Inlets, and Catch Basins of the MaineDOT Standard Specifications.

- a. The manhole, frame and cover shall have sufficient mechanical strength to withstand the impact of repeated HS-20 vehicle live loads without damage.
- b. The cover of the manhole shall have "FIBER" embossed on it. Additional embossing is required as shown on the plans.
- c. At least two (2) hex bolts shall be used to lock the cover in place.

Construction Requirements. The Contractor shall be responsible for furnishing all labor, materials, cables, connectors, tools, equipment, shipping and incidental items necessary to complete the installation as shown in the plans. Any holes for conduit and cable entry shall be carefully drilled or punched into the side of the manhole.

- a. Where ducts terminate at the manhole, the Contractor shall break into the manhole and seal the opening between the ducts and manhole with a watertight sealer approved by the Resident Engineer.
- b. Soil in the vicinity of the manhole shall be vibrated and thoroughly compacted around the entire manhole up to grade.
- c. The top of the cover shall be set at grade. A concrete lock-in feature shall be provided around the top of the manhole.
- d. The Contractor shall coil 100' of fiber optic cable in each manhole. Contractor shall coil 50' of spare fiber optic cable on each side of a splice enclosure in each manhole containing splice enclosures.
 - a) If indicated on the plans or directed by the Engineer, a fiber optic cable splice enclosure shall be installed in the manhole. The fiber optic splices and splice enclosures shall be installed in accordance with Special Provision 718.

Method of Measurement. The fiber optic manhole will be measured by each unit furnished and installed but will not be deducted from the length of conduit. Fiber optic splices and splice enclosures shall be paid for as indicated in the plans.

Basis of Payment. Payment will be full compensation for furnishing and installing the materials and equipment specified and for furnishing all labor, tools, equipment, and incidentals necessary to complete the work. All concrete, frames, covers, reinforcing steel, crushed stone or gravel, extensions, saw cutting, excavation, backfill and restoration of adjacent surfaces shall be included in the cost of this item.

Payment will be made under the following:

<u>Pay Item</u>	<u>Pay Unit</u>
654.3335 Fiber Optic Manhole	Each

SPECIAL PROVISION
SECTION 654
INTELLIGENT TRANSPORTATION SYSTEMS
(Connected Roadside Unit)

Description. This item shall consist of furnishing and installing for connected vehicle (CV) roadside unit(s) (RSU) including all necessary fittings and mounting hardware at the locations shown on the plans or as indicated by MaineDOT.

Materials. The RSU system shall include equipment meeting the following General, CV Device Interoperability, Wireless Communication, RSU Configuration and Management, Device Interfaces, Systems Communications, Ports and Connectors, Mechanical, Electrical, Environment, Operating System, and Federal Communications Commission (FCC) requirements:

- a. General. CV equipment includes all hardware and materials, software, and any necessary ancillary equipment for a complete assembly necessary to enable wireless vehicle-to-infrastructure (V2I) and vehicle-to-vehicle (V2V) communication. The CV equipment shall also fully support Dual Mode C-V2X at the same time as fully supporting DSRC V2X operations. Only new equipment and materials, except as specified in the contract shall be allowed. The CV equipment shall integrate into the ATC traffic signal controller and provide connected vehicle applications to mobile devices through a hybrid system using cellular vehicle-to-everything (C-V2X) and dedicated short-range radio communications (DSRC).

CV equipment must be compatible with existing traffic controller assemblies unless otherwise shown on the Plans. The CV equipment must create a system that provides the minimum required functions and applications as shown on the Plans.

Ensure the CV equipment is permanently and legibly marked with a serial number, date of manufacture, and part number.

Connected vehicle equipment and systems must support the project goals and applications described in the contract.

CV equipment must be compatible with a Security Credential Management System for V2V, V2I and C-V2X communication and meet the applicable industry standards listed in Table 1.

CV equipment must be capable of remote firmware updates. Device manufacturers must make firmware updates available to the Department and maintaining agency at no cost.

Table 1
CV Roadside Unit (RSU) Requirements and Standards

Document Identifier	Description
USDOT RSU, Version 4.1	DSRC Roadside Unit (RSU) Specifications Document
SAE J2735, released 2016.03.30	Dedicated Short Range Communications (DSRC) Message Set Dictionary
SAE J2945, released 2017.12.07	On-Board System Requirements for V2V Safety Communications
C-V2X 3GPP Rel.14	LTE support for V2x services, eLAA, 4 band Carrier Aggregation, inter-band Carrier Aggregation
IEEE 802.11p	IEEE Standard for Information Technology– Telecommunications and information exchange between systems local and metropolitan area networks – Specific Requirements Part 11: Wireless LAN Medium Access Control (MAC) and Physical Layer (PHY) Specifications
IEEE 1609.0	IEEE Guide for Wireless Access in Vehicular Environments (WAVE) - Architecture
IEEE 1609.2	IEEE Standard for WAVE – Security Services for Applications and Management Messages
IEEE 1609.3	IEEE Standard for WAVE – Networking Services
IEEE 1609.4	IEEE Standard for WAVE – Multi-Channel Operation
IEEE 1609.12	IEEE Standard for WAVE – Identifier Allocations
IEEE 802.3at	Standard for Power over Ethernet
ASTM E2213-03	Standard Specification for Telecommunications and Information Exchange Between Roadside and Vehicle Systems — 5-GHz Band Dedicated Short-Range Communications (DSRC), Medium Access Control (MAC), and Physical Layer (PHY) Specifications
Federal Communications Commission (FCC) Title 47, Parts 0, 1, 2, 15, 90, and 95	FCC Code of Federal Regulations

- b. CV Device Interoperability. Provide standards-based CV devices that are interoperable with CV devices from other manufacturers. Ensure that RSUs and Onboard Units (OBUs) are compatible and interoperable. All proposed CV equipment, consisting of a complete engineered solution meeting the contract requirements must be provided to the Department, at no additional cost, within 45 days of contract execution for testing.
- c. Wireless Communications. Ensure wireless communications are secure and compatible with the carrier used by the agency responsible for system operation and maintenance.
- d. Roadside Unit (RSU). The RSU must be a commercially available product that provides information and supports public safety operations in a V2I/V2V and

C-V2X communication environment. RSUs must be successfully demonstrated to the Department and shown to support the functional features and CV applications identified in the contract.

The RSU must be preconfigured by the manufacturer or an authorized manufacturer's representative so that it is ready for installation and operation at the site(s) shown on the Plans. The Department will provide on-site data, such as MAP data. Upon receipt of the RSU(s), the Department will validate the configuration of the unit. The contractor will provide all required support, throughout the configuration process until approved by the Department. The RSU must include antennas for all radio frequency connectors, surge protection device(s) (SPDs), mounting hardware, all associated cabling, and any other equipment required for a fully functional and complete installation.

The RSU must automatically recover from a power failure once power is restored. The Contractor shall verify and document that all programmable settings are restored to their previous configurations and that the system resumes proper operation. Documentation shall be submitted to MaineDOT and the Engineer.

- e. Configuration and Management. RSU must be provided with all hardware, software, configuration tools and software licenses required for local and remote configuration, operation, and management including access to all user-programmable features as well as health and status monitoring, event logging, and diagnostic utilities. Configuration and management functions must be password protected. Access to all user-programmable features, alarm monitoring, configuration parameters, event logging and diagnostic utilities must be through a vendor provided Graphical User Interface (GUI). The RSU must be provided with an open application programming interface (API) and software development kit available to the Department at no additional cost. This vendor provided GUI must be able to create Transportation Information Messages and send them to the RSU.

Alarm monitoring must include communication failure, power failure, GPS deviations, and time source lost. The RSU must include an event log that includes the date and time of the event(s). The RSU must be capable of storing a minimum of 500 events as defined by USDOT RSU specification.

All major components of the RSU shall be of a modular design to facilitate future CV frequency changes as set forth by the FCC.

- f. Device Interfaces. The RSU must include wired (Ethernet) and wireless interfaces specified in the USDOT RSU specification. The RSU must provide cellular interfaces for system communication, as shown on the Plans. The Contractor shall verify and document that all interfaces are protected by a configurable firewall with a default to be to inactive.

- a) DSRC Interface. The RSU must include a commercial-grade radio that transmits and receives DSRC messages within the 5.855 – 5.925 GHz band per the USDOT RSU specification.
- b) C-V2X. The RSU must include a commercial-grade radio that transmits and receives messages over C-V2X within the 5.855 – 5.925 GHz band.
- c) Antennas. The RSU must use antennas that were tested with the device to obtain the FCC Grant of Equipment Authorization (or similar antennas with equal gain). Antennas must be removable to allow for the antennas to be installed at a distance from the RSU unit or replaced as needed. The Contractor shall not co-locate or operate RSU antennas with any other antenna or transmitter, except in accordance with the FCC multi-transmitter policy.
 - i. DSRC radio characteristics:
 - 1. Protocol: IEEE 802.11p
 - 2. Freq. band: 5.855 – 5.925 GHz (LTE B47)
 - 3. 10 MHz channel spacing
 - 4. Output power: 20 dBm (power class 3)
 - 5. Sensitivity: typ. -95 dB
 - ii. C-V2X radio characteristics:
 - 1. Protocol: 3GPP C-V2X Rel.14
 - 2. Freq. band: 5.855 – 5.925 GHz (LTE B47)
 - 3. 10 MHz channel spacing, PC5 side link
 - 4. Output power: 20 dBm (power class 3)
 - 5. Sensitivity: typ. -95 dB
- g. Systems Communications. All Contractor supplied equipment, including connected vehicle equipment and roadside devices (ATC, ATCC, FMU, Detection systems and Fiber Ethernet Switch), shall be compatible and interoperable. In addition, all IP based network equipment supplied by the Contractor shall be fully compatible with all existing MaineDOT and local agency data networks.
- h. Ports and Connectors. The RSU must include all necessary ports and connectors for a complete assembly. All ports and connectors must be weather proof and inhibit the ingress of water, dirt, sand and other foreign materials from entering the enclosure. All ports must be legibly and permanently marked designating their intended use. All labels must be weather resistant.
 - a) Copper Ports. The RSU must include a minimum of one Type RJ-45 Ethernet port. The Type RJ-45 port must be capable of auto-negotiating speed (i.e., 10/100 Base) and duplex (i.e. full or half). All 10/100 Base TX connections must be compliant with the IEEE 802.3 standard pinouts.

- b) Radio Frequency (RF) Connectors. The RSU must include at least three Type N weatherproof female RF ports.
- c) Power over Ethernet (POE). The RSU must include at least one POE connector. The POE connector must be compliant with the Outdoor IP 66 rating.
- i. Mechanical Specification. Ensure equipment is permanently marked with manufacturer name or trademark, part number, date of manufacture and serial number. All parts must be made of corrosion-resistant materials.
- j. Electrical Specification. Ensure that all wiring complies with the latest edition of the National Electrical Code (NEC), National Electrical Safety Code (NESC), any local jurisdictional requirements, and IEEE 802.3.

Ensure that the RSU operates at a nominal voltage between 37 and 57 Voltage Direct Current (VDC).

Ensure that the POE injector used to power the RSU operates using a nominal input voltage of 120 Voltage Alternating Current (VAC). If any system device requires operating voltages other than 120 VAC, supply a voltage converter.

- k. Environmental Specification. Ensure that the RSU complies with all environmental requirements of the latest edition of the Dedicated Short-Range Communications Roadside Unit Specifications published by the USDOT. Must be compliant with section 2 of the NEMA TS2 standard.
- l. Operating System. The RSU's processor must run the latest version of the Linux operating system, at time of bid, and all applications must be written as Linux based applications. Additionally, the RSU must meet the minimum requirements for processing, memory, and storage as required in the USDOT RSU specification.
- m. Applications. The RSU shall include software and business logic to support the following applications:
 - a) Signal Phase and Timing (SPaT),
 - b) Traveler Information Messages (TIM),
 - c) Work Zone Alert,
 - d) Emergency Vehicle Preemption (EVP),
 - e) Snowplow Signal Priority,
 - f) Freight Signal Priority,
 - g) Pedestrian Warning (PedSafe),
 - h) Queue Warning, and
 - i) Curve Speed Warning.
 - j) Data Pass Through

- n. FCC License. Compile all information required to register RSU devices and locations with the FCC and provide this information to the Department for review in accordance with Section 7-2. Support the permitting effort until complete. The Contractor shall procure all FCC licenses on MaineDOT behalf. All fees associated with procuring the FCC licenses shall be included as part of the bid price.
- o. Connected Vehicle Management Software. The Contractor shall provide, configure and install a Connected Vehicle Management Software (CVMS) system on the cloud-based server that contains the CMS/ASCT systems. The CVMS shall provide for local and remote configuration of the RSU, diagnostics, alarms, retrieval and storage of data. The CVMS shall function locally as well as remotely over an Ethernet network using the FMU or existing City owned network connections. All fees associated with procuring the CVMS licenses shall be included as part of the bid price.
- p. Storage, Logs, and Routing. The RSU must store and transmit periodic status messages, capture System Status Logs and Communication Message Logs as well as route and forward IPv6 traffic for connected mobile units.

Construction Requirements. The Contractor shall be responsible for furnishing all training, labor, materials, cables, connectors, tools, equipment, shipping and incidental items necessary to complete the installation and make the RSU system fully operational.

Installation of the RSU system shall include the installation of any and all associated equipment including, but not limited to, the following:

- a. RSU Installation. Install RSUs on existing poles or sign structures, or on new poles, as shown on the Plans. The RSU, mounting hardware, and any other related material that is exposed to the environment must be designed for 150 mph wind speeds and meet the requirements of the Department's Structures Manual. Submit electronic configuration file backups to the Department following field testing. Backup files must include communication settings, firmware, and all other files and settings required to restore current operation and program a new replacement RSU.
- b. Cabling. Ensure that all device cabling is free from defects. Provide sufficient cabling slack within existing cabinets and pull boxes to facilitate future re-terminations and any required adjustments needed to shift the RSU along the mounting structure. Neatly bundle and coil all slack within storage areas and prior to entering the RSU. Provide weatherproof cable tags at all storage points and at cable termination ends. All unshielded and shielded twisted pair Ethernet gel filled cabling shall be compliant with the EIA/TIA-568-B-2-1, CSA and ISO/IEC 11801 standards. Neatly coil and band all cable slack together using heavy duty cable locking ties. The use of standard zip-ties will not be permitted.

- c. Testing. The following testing requirements shall be met.
- a) General. CV equipment to field acceptance tests (FAT). The Department reserves the right to witness all FATs. Meet the requirements of T612.
 - b) Field Testing. Once the CV equipment has been installed, conduct local FATs at each field site according to the test plan(s). Perform the following:
 - 1. Verify that physical construction has been completed as detailed on the Plans.
 - 2. Inspect the installation of the CV Equipment and its associated cabling for a secure installation.
 - 3. Inspect the quality and tightness of ground and surge protector connections.
 - 4. Verify proper voltages for all power supplies and related power circuits.
 - 5. Connect devices to the power sources.
 - 6. Verify all connections, including correct installation of communication and power cables.
 - 7. Verify all wire and cable connections are correct and secure.
 - 8. Verify the configuration of CV device network interfaces.
 - 9. Verify that the CV equipment can be accessed and manipulated using the secured Shell from the remote computer.
 - 10. Verify over the air that the RSU broadcasts using an approved multi-channel test tool (MCTT).
 - i. Ensure data logging is active on all units under test and that data logs are sent to data repository per contract documents.
 - ii. Test the DSRC with security on and off. With mismatched security certificates, ensure that messages are logged but payload is not decoded.
 - iii. Scan all DSRC channels and document sources of potential interference.
 - d. Warranty. Ensure that CV equipment has a manufacturer's warranty covering defects for a minimum of 5 years from the date of final acceptance by the Department.

Ensure the warranty includes providing replacements within 10 calendar days of notification for defective parts and equipment during the warranty period at no cost to the Department.

Method of Measurement. The RSU for CV applications will be measured by each unit furnished and installed. All equipment, labor, training and incidentals required to create a fully functional system will be included in the bid price of this item.

Basis of Payment. Payment will be full compensation for furnishing, transporting, handling, and installing the materials and equipment specified and for furnishing all labor, tools, equipment, and incidentals necessary to complete the work.

Payment will be made under the following:

<u>Pay Item</u>	<u>Pay Unit</u>
654.351 Connected Roadside Unit (RSU)	Each

SPECIAL PROVISION
SECTION 654
INTELLIGENT TRANSPORTATION SYSTEMS
(On Board Unit Vehicle Equipment / OBU)

Description. This item shall consist of furnishing and installing connected vehicle (CV) on board unit(s) (OBU) including all necessary fittings and mounting hardware on vehicles detailed in the plans and specifications or as indicated by MaineDOT.

Materials. The OBU shall include, at a minimum, the following components: a physical computing unit; a single, external multi-band antenna; and all cabling and mounting hardware necessary for a fully-functional system. A compatible OBU software development kit (SDK) shall also be provided. The OBU shall also fully support wireless communications both using cellular vehicle-to-everything Dual Mode (C-V2X) and dedicated short-range radio communications (DSRC) to the roadside unit (RSU).

The following defines the minimum technical specifications and functional requirements for OBU's.

- a. General.
 - a) OBU shall broadcast messages for vehicle-to-vehicle (V2V) and vehicle-to-infrastructure (V2I) applications, in accordance with the SAE Standard J2935 and J2945 Family.
 - b) The OBU shall also fully support wireless communications either using C-V2X or DSRC to the RSU.
 - i. OBUs that support C-V2X shall:
 1. have a PC5 interface,
 2. fully support the 3GPP C-V2X Rel.14 protocol,
 - ii. OBUs that support DSRC shall:
 1. OBU shall be compliant with the following Institute of Electrical and Electronics Engineers (IEEE) standards:
 - a. IEEE 802.11-2016 (or later), as defined within SAE J2945/1, Section 6.1.1
 - b. IEEE 1609.0-2013 (or later)
 - c. IEEE 1609.2-2016 (or later)
 - d. IEEE 1609.3-2016 (or later)
 - e. IEEE 1609.4-2016 (or later)
 - f. IEEE 1609.12-2016 (or later)
 - g. IEEE WAVE 2016 standard set
 2. OBU shall comply with Federal Communications Commission (FCC) 47 Code of Federal Regulations (CFR) Parts 0, 1, 2, and 95 Amendments for Dedicated Short Range Communications (DSRC), mask/class type C (ASTM E2213-03).

3. OBU shall be compatible with RSUs, as described in USDOT Dedicated Short-Range Communications Roadside Unit Specifications, dated April 28, 2017.
 4. OBU shall receive and process WAVE Service Advertisements (WSA).
- iii. OBU shall be configured for the following DSRC channel utilization and radio configuration:

Table 1
DSRC and C-V2X Channel and Radio Configuration

Radio	Channel	Size	Timeslot [0/1/B]	Message	Reasoning
0	172	10	0, 1	BSM, MAP, SPAT	Operate radio 0 in continuous mode on safety channel 172.
1	176	10	-, 1	PSM, SCMS, IPv6, SRM, SSM	Use 176 for PSM as recommended by J2945/0. Move PVD, SRM, and SSM message to 176 as well. SRM, SSM would have limited range due to max EIRP of 20 for this channel.
1	178	10	0, -	WSA, TIM	Standard control channel usage.

- c) OBU shall provide the ability to configure settings for each individual classification of vehicles including standard, heavy-duty, emergency, and transit vehicles. Configurable settings shall allow the Department to allow or limit the broadcast of specific message types to certain vehicle classifications (e.g., signal request messages limited to emergency and transit vehicle classifications).
- d) OBU shall be capable of being reset and reconfigured such that the same unit can be installed into another vehicle of the same or different classification type (e.g., standard, heavy-duty).
- e) OBU shall acquire time from the Location and Time Service (LTS) interface, in accordance with SAE J2945/1, Section 6.2.1.
- f) OBU shall acquire time from the Location and Time Service (LTS) interface, in accordance with SAE J2945/1, Section 6.2.4.
- g) OBU shall implement a download protocol that permits resumption of incomplete downloads instead of requiring an incomplete download to be restarted.
- h) OBU shall implement an interface to allow for over the air updates of firmware via DSRC.
- i) OBU shall support physical access to users to perform maintenance activities.
- j) OBU shall support role-based authentication to enable physical access.
- k) OBU shall provide a minimum reserve (processor, dynamic storage, persistent storage) capacity of 50% at time of deployment in order to provide the capacity to install and run future firmware image updates.

- l) OBU shall provide a minimum of 500 MB RAM, and 500 MHz Central Processing Unit (CPU) speed.
- b. System Power Requirements.
 - a) Device State Definitions – OBU shall include three (3) unique states: “System off, System On”, and “Sleep”.
 - i. “System Off” – Loss of power (e.g., disconnected or dead battery).
Expected Behavior: None
 - ii. “System On” – Fully operational state of OBU.
Expected Behavior: All hardware and software components are fully operational according to present specification.
 - iii. “Sleep” – Vehicle ignition key is off and OBU receiving power.
.Expected Behavior: System appears off from outside perspective; aids in quick boots.
 - b) Operating Voltage – OBU shall be powered from a vehicle power sources and shall operate at a range of + 9 volts to + 30 volts direct current (DC) nominal.
 - c) Power Consumption – OBU shall be powered from vehicle power source and shall not exceed an average of 2.0 amp in the “System On” mode. OBU shall not exceed 50 mA in “Sleep” mode.
 - d) Loss of Vehicle Power – OBU operation shall not be adversely affected by sudden loss of power and/or significant operating voltage variations, as these voltage events are expected. Upon power loss and restoration, OBU shall perform a secure boot, checking the integrity and authenticity of the installed software prior to execution. Note: OBU may have provisions for an optional battery backup.
 - e) System Device Startup – OBU shall become fully operational with two (2) seconds of GPS lock which should occur no later than 40 seconds from power off state under clear and open sky conditions. OBU shall begin transmission of BSMs in accordance with SAE J2945/1.
- c. Mechanical Requirements.
 - a) Mounting – OBU shall be capable of being mounted in any orientation and provide a method for secure physical attachment or fastening to the host vehicle.
- d. Environmental Requirements.
 - a) Must be compliant with section 2 of the NEMA TS2 standard.
- e. Functional Requirements of Message Types.
 - a) Basic Safety Message (BSM):
 - i. OBU shall generate and transmit BSM over the DSRC radio interface or C-V2X interface ten times a second at 10 Hz, unless

otherwise configured, as defined in SAE J2945/1.

- ii. OBU shall conform to SAE J2735:2016-03, Section 5.2 – Basic Safety Message (BSM): Dedicated Short-Range Communications (DSRC) Message Set Dictionary, including relevant specifications outlined in Annex A, ASN Source Code.
- b) MAP Message:
- i. OBU shall receive and process the Map Data Message (MAP), as defined in SAE J2735:2016-03, implementing ASN1 format with UPER encoding, as specified in SAE J2735:2016-03.
- c) Signal Phase and Timing (SPAT) Message:
- i. OBU shall receive and process the Signal Phase and Timing (SPAT) Message, as defined in SAE J2735:2016-03, implementing ASN.1 format with UPER encoding, as specified in SAE J2735:2016-03.
- Note: Future information will be available in SAE J2945/10; however, the standard is currently a work in progress (WIP).
- d) Traveler Information Message (TIM):
- i. OBU shall receive and process the Traveler Information Message (TIM), as defined in SAE J2735:2016-03, implementing ASN.1 format with UPER encoding, as specified in SAE J2735:2016-03.
- e) Personal Safety Message (PSM):
- i. OBU shall receive and process the Personal Safety Message (PSM), as defined in SAE J2735:2016-03, implementing ASN.1 format with UPER encoding, as specified in SAE J2735:2016-03.
 - ii. OBU shall utilize the information enclosed in SAE J2945/9:2017-03 for PSM.
- f) Signal Request Message (SRM):
- i. OBU shall generate and transmit the Signal Request Message (SRM), as Defined in SAE J2735:2016-03, implementing ASN.1 format with UPER encoding, as specified in SAE J2735:2016-03.
 - ii. OBU shall generate and transmit SRM containing the intersection ID provided in the MAP message for the preemption/priority requested signalized intersection.
- Note: Future information will be available in SAE J2945/11; however, the standard is currently a work in progress (WIP).
- g) Signal Status Message (SSM):
- i. OBU shall receive and process the Signal Status Message (SSM), as defined in SAE J2735:2016-03, implementing ASN.1 format

with UPER encoding, as specified in SAE J2735:2016-03.

Note: Future information will be available in SAE J2945/11;
however, the standard is currently a work in progress (WIP).

- f. Security Credential Management System (SCMS).
- a) OBU shall, at a minimum, comply with the United States Department of Transportation (USDOT) Security Credential Management System (SCMS) Proof- of Concept (POC).
 - b) After the initial installation of the SCMS certificate onto the OBU, the OBU must be able to receive updated SCMC certificates automatically.
 - c) OBU software shall receive and use certificates and meet the following high-level software functional requirements:
 - i. Software associated with signing, authenticating, encrypting, and decrypting messages shall be in accordance with IEEE 1609.2.
 - ii. Software to generate public-private key pairs and create the requests for the SCMS to generate enrollment, pseudonym, application, and identification certificates shall be used by the first software block.
- g. Human-Machine Interface (HMI) Specifications. HMI assemblies inclusive of all devices, cabling, mounting hardware, and additional components necessary for a fully-functional system shall be provided as follows.
- a) General Requirements: The following requirements define the minimum technical specifications for proposed HMI hardware.
 - i. HMI shall provide both an audio and visual interface for delivery of warnings, alerts, notifications, information, and/or messages to the vehicle operator.
 - ii. All components of the HMI shall comply with the requirements of the Americans with Disabilities Act (ADA) and Section 508 of the Rehabilitation Act of 1973.
 - iii. HMI shall present an alert to the vehicle operator in a succinct manner while the individual is engaged in the driving task to minimize the “eyes off of the road” time.
 - iv. HMI shall produce an audible output (e.g., waveform audio, text-to-speech, warning tone, beep, etc.) at a minimum, when providing an alert, warning, notification, or information to the vehicle operator.
 - v. HMI shall contain speakers capable of producing an audible output.
 - vi. Audio component(s) of the HMI shall provide adjustable volume levels, configurable by the vehicle operator.
 - vii. Audio component(s) of the HMI shall be matched with each application to convey the type of warning and/or message provided

to the vehicle operator in conjunction with the associated visual component.

- viii. Auditory signals of the HMI shall be loud enough to overcome typical ambient masking noises from roadway noise, the cabinet environment, and other equipment.
- ix. Visual component(s) of the HMI shall display text-based messages no longer than 120 characters.
- x. Visual component(s) of the HMI incorporating graphics shall include graphics based on a minimum 16X9 image aspect ratio with minimum image dimensions of 2.07”(vertical) X 3.65”(horizontal).
- xi. Visual components(s) of the HMI shall utilize iconography consistent with ISO 2575:2010 and the Manual on Uniform Traffic Control Devices (MUTCD).
- xii. Visual component(s) of the HMI shall be visible by the vehicle operator in all lighting conditions.
- xiii. Visual components of the HMI shall include screen default image background that are RGB [0,0,0] black in order to minimize the displays background light output for nighttime viewing.
- xiv. HMI shall provide a visual output similar in appearance and feel (i.e., similar in size, consistent color schema in icons and graphics, similar styles of icons and graphics) for various CV applications when presenting visual information to motorists.
- xv. HMI shall be customizable for the following options: brightness (if inclusive of screen), text size (if screen is used), display contrast (if screen is used), and mounting eye position (if screen is used).
- xvi. HMI shall not allow the vehicle operator to adjust visual or audio settings while the vehicle is in motion.
- xvii. HMI shall notify the vehicle operator of applications availability (e.g., failed, operating, disabled).
- xviii. HMI shall notify the vehicle operator of pending updates for the HMI and/or OBU systems (e.g., applications, firmware, operating system).
- xix. HMI shall provide a visible and/or audible notification when the vehicle is started to indicate to the vehicle operator that the CV system is functional.
- xx. HMI shall prioritize alerts, warning, and notifications provided to the vehicle operator, in accordance with SAE J2395-2002.

- xxi. HMI shall be mounted or installed in a location such that it does not obstruct the line of sight of the vehicle operator nor distract from the primary task of driving.
 - xxii. HMI shall be positioned in a location such that visual outputs to the vehicle operator can be read from the driver's normal seated position.
- b) Functional Requirements: The OBU shall support the following CV applications and include the following HMI functionality:
- i. Signal Phase and Timing (SPAT):
 - 1. HMI shall provide the current traffic signal status, including phase indications (red, flashing red, yellow, flashing yellow, or green), to motorists for a signalized intersection.
 - 2. HMI shall provide the motorists a countdown to the next phase or notification of when the next expected phase occurs.
 - ii. Emergency Vehicle Preemption (EVP):
 - 1. HMI shall provide the motorist with acknowledgement that the preemption request has been successfully broadcast to the signalized intersection.
 - 2. HMI shall alert the motorist to whether or not the preemption request was granted or whether the request timed out or been denied.
 - iii. Transit, Snowplow, and Freight Signal Priority:
 - 1. HMI shall provide the motorist with acknowledgement that the priority request has been successfully broadcast to the signalized intersection.
 - 2. HMI shall alert the motorist to whether or not the preemption request was granted or whether the request timed out or been denied.
 - iv. Advanced Traveler Information System (ATIS):
 - 1. HMI shall provide the motorist with information derived from the Compass Software including, but not limited to, the following:
 - a. Travel Times
 - b. Congestion
 - c. Expected Delays
 - d. Lanes Blocked (Temporary Duration)
 - e. Lanes Closed (Long Duration)
 - f. Highway/Ramp/Roadway Closed
 - g. Adverse Roadway Conditions

- h. Adverse Weather Conditions (Dense Fog, Flooding, Icy Roadways)
 - i. Optional Detour
 - j. Required Detour
 - k. Adverse Weather Conditions (Dense Fog, Flooding, Icy Roadways)
 - l. Planned Construction Activity (Lane Closures, Detours, Change in Lane Patterns, Speed Control Measures)
 - m. Planned Maintenance Activity (Mobile Work, Lane Closures)
 - n. Public Safety Announcement
2. HMI shall provide the motorist with the appropriate message, warning, alert, or general notification based on the appropriate geo-referenced area for that information, referred to as the “presentation region”.
- v. Queue Warning:
- 1. HMI shall provide the motorist with warning(s) for vehicles approaching developed queues in advance of queued traffic providing messages and information to the driver to minimize the likelihood of needing to assert crash avoidance or mitigation actions later.
- vi. Reduced Speed Zone Warning / Lane Closure:
- 1. HMI shall provide the motorist with warning(s) for vehicles approaching reduced speed zones, providing posted speed limit information and/or the configuration of the roadway has been altered (e.g., lane closures, lane shifts). Reduced speed zones include, but are not limited to, construction/work zones, school zones, and mid-block pedestrian crossing areas.
- vii. Pedestrian in Signalized Crosswalk:
- 1. HMI shall provide the motorist with warning(s) for vehicles approaching a signalized intersection with the possible presence of pedestrians in a crosswalk.
- viii. Curve Speed Warning:
- 1. HMI shall provide the motorists with warning(s) for vehicles approaching a curve at speeds higher than the posted speed limit, advising motorists to enact specific actions or providing the recommended vehicle speed.

Construction Requirements. The Contractor shall be responsible for furnishing all training, labor, materials, cables, connectors, tools, equipment, shipping and incidental items necessary to complete the vehicle installation and make the OBU system fully operational.

The OBU system installation shall including, but not limited to, the following:

- a. Warranty. Ensure that OBU equipment has a manufacturer’s warranty covering defects for a minimum of 5 years from the date of final acceptance by the Department.

Ensure the warranty includes providing replacements within 10 calendar days of notification for defective parts and equipment during the warranty period at no cost to the Department.

Method of Measurement. The OBU for CV applications will be measured by each unit furnished and installed in each vehicle. All equipment, labor and incidentals required to create a fully functional system will be considered incidental to the cost of this item.

Basis of Payment. Payment will be full compensation for furnishing, transporting, handling, and installing the materials and equipment specified and for furnishing all labor, tools, equipment, and incidentals necessary to complete the work.

Payment will be made under the following:

<u>Pay Item</u>	<u>Pay Unit</u>
654.352 On Board Unit (OBU) Vehicle Equipment	Each

SPECIAL PROVISION
SECTION 718
TRAFFIC SIGNAL MATERIAL
(Compliance with Functional Requirements
Post-Bid, Pre-Award Qualifications)

Amend Section 718 of the Standard Specifications by adding the following:

The Department is willing to consider ATC, ATCC, CMS, ASCT, CV and SPM and systems equipment that do not strictly conform to the requirements identified in Special Provisions 643, 654, and 718. The Bidder shall identify the manufacturer, model and version of the proposed ATC, ATCC, CMS, ASCT, CV and SPM system and both complete and submit the Functional Requirements Compliance Matrix included at the end of this Special Provision. The Bidder shall verify their proposed equipment or system compliance for every system requirement in one of the following ways:

1. Bidder shall certify that the equipment or system fully complies with the numbered system requirement by marking Y in the System Complies column.
2. Bidder shall indicate that the equipment or system does not fully comply with the numbered system requirement by marking N in the System Complies column AND shall provide a written explanation why the Bidder has proposed the equipment or system that does not comply with the requirement or how the Bidder's proposed equipment or system may be considered a reasonable equivalent alternative.
3. Bidder shall indicate that the equipment or system does not fully comply with the numbered system requirement but can be modified/altered in order to comply with the requirement by marking Y in the Modified to Comply column AND shall describe in writing how the equipment or system will be/can be modified/altered in order to comply with the requirement, with the understanding that the Bidder shall be fully responsible for making the modification/alteration to their proposed equipment. If the modification/alteration is required to an existing MaineDOT equipment or system, the Bidder shall describe in writing how the equipment or system needs to be modified by MaineDOT to make the Bidder's equipment or system fully compliant.

For each system requirement where the Bidder has indicated #2 or #3 (as defined above) in the Functional Requirements Compliance Matrix, the Bidder will also be required to provide three references (owner's name, point of contact name, phone number, email address, and physical address) that can certify that the Bidders product(s) and/or material(s) have been in use elsewhere in the United States providing equivalent functionality. References may be repeated for multiple system requirements.

Compliance with Functional Requirements Manufacturer List

Advanced Transportation Controller (ATC)	_____
Advanced Transportation Controller Cabinet (ATCC)	_____
Central Management System (CMS)	_____
Signal Performance Measures (if not through CMS)	_____
Dual Mode DSRC/C-V2X Connected Vehicle System	_____
Adaptive Signal Control Technology / ASCT (Western Avenue)	_____
ASCT - Civic Center Drive (if different than Western Avenue)	_____
ASCT - Kennedy Memorial Drive (if different than above)	_____
ASCT - Outer Main Street (if different than above)	_____

Compliance with Functional Requirements Matrix

Requirement Number	System Requirement	Existing System Complies with Requirement (Yes/No)	Existing System to be Modified to Comply with Requirement (Yes/No)	Explanation for Non-Compliance or Description of Proposed Modification
CONNECTED VEHICLE SYSTEM REQUIREMENTS				
Group 1: Manage Interface to SPaT Sources				
Requirements describing the functions of the SPaT Infrastructure System to interface with sources of SPaT data.				
3.1.1.	The SPaT Infrastructure System shall interface with the Traffic Signal Controller.			
3.1.1.1.	The SPaT Infrastructure System shall receive traffic signal data from the Traffic Signal Controller that is compliant with the standard NTCIP 1202 v3.			
3.1.1.2.	In locations where the SPaT Infrastructure System supports signal priority applications, the System shall receive Signal Control and Priority data compliant with the standard NTCIP 1211 v2.			
3.1.1.3.	In locations supporting Connected Vehicle enabled Pedestrian in Signalized Crosswalk Warning and/or Mobile Accessible Pedestrian Signal Systems (PED-SIG) applications, the SPaT Infrastructure System shall send or provide detector calls to the Traffic Signal System interface compliant with the standard NTCIP 1202 v3.			
3.1.1.4.	In locations where the SPaT Infrastructure System supports Signal Preemption, the SPaT Infrastructure System shall receive preemption status from the Traffic Signal System compliant with the standard NTCIP 1202 v3 as defined in Exhibit A, the applicable Protocol Requirement List.			
3.1.1.5.	In locations where the SPaT Infrastructure System supports Signal Priority or Preemption, the SPaT Infrastructure System shall send or provide priority/preemption requests to the Traffic Signal System.			
3.1.1.6.	The SPaT Infrastructure System shall receive an updated data set from the Traffic Signal Controller on a schedule to be defined by the NTCIP 1202 v3 standard. At a minimum, the entire set of NTCIP objects shall be received each time there is a state change, and may be received as frequently as 10 Hz, regardless of whether there is a state change.			

Requirement Number	System Requirement	Existing System Complies with Requirement (Yes/No)	Existing System to be Modified to Comply with Requirement (Yes/No)	Explanation for Non-Compliance or Description of Proposed Modification
3.1.1.7.	In locations where the SPaT Infrastructure System aggregates BSM or PVD data, the SPaT Infrastructure System shall send detection reports to the Traffic Signal System compliant with the standard NTCIP 1202 v3.			
3.1.2.	The SPaT Infrastructure System shall interface with Central Signal Control System (CSCS).			
Group 2: Manage SPaT				
Requirements describing the functions of the SPaT Infrastructure to assemble the SPaT data into standard SPaT messages				
3.2.1.	The SPaT Infrastructure System shall assemble the content needed for standard SPaT messages.			
3.2.1.1.	The SPaT Infrastructure System shall process the message containing SPaT data obtained from the Traffic Signal System and generate a SPaT message.			
3.2.1.2.	The SPaT Infrastructure System shall combine the data received from the SPaT Data Source with additional data to complete the SPaT messages.			
3.2.1.3.	The SPaT Infrastructure System shall synchronize an internal system clock with Coordinated Universal Time (UTC) and be accurate within 10 milliseconds (ms) of UTC at all times.			
3.2.1.4.	The SPaT Infrastructure System shall convert all times obtained from the Traffic Signal Systems to UTC time and be accurate within 10 milliseconds in SPaT messages. The time sync reference shall be provided by the Dual Mode DSRC.			
3.2.1.5.	The SPaT Infrastructure System shall generate SPaT messages each time Traffic Signal System Data is received from the SPaT source.			
3.2.1.6.	The SPaT Infrastructure System shall have a maximum latency of 10 ms in generating SPaT messages from the time the System obtains Traffic Signal System data.			
3.2.1.7.	The SPaT Infrastructure System shall increment the Message Count whenever any data element in the message except the time stamp changes.			

Requirement Number	System Requirement	Existing System Complies with Requirement (Yes/No)	Existing System to be Modified to Comply with Requirement (Yes/No)	Explanation for Non-Compliance or Description of Proposed Modification
3.2.1.8.	The SPaT Infrastructure System 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.			
3.2.1.9.	Each SPaT message shall contain a current time stamp that is accurate to within 100 ms of UTC time (represented as minute of the year and milliseconds within the minute).			
3.2.1.10.	Each SPaT message shall contain the Intersection Status.			
3.2.1.10.1.	Each SPaT message shall uniquely identify the intersection for which it applies.			
3.2.1.10.2.	Intersection status shall include whether the intersection is operated as fixed time or actuated control.			
3.2.1.10.3.	Intersection status shall include whether the intersection is currently operating in preemption or priority.			
3.2.1.10.4.	Intersection status shall include whether the intersection is operating in failure flash.			
3.2.1.10.5.	Intersection status shall include which revocable lanes are currently enabled (if the MAP message has revocable lanes).			
3.2.1.11.	Each 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.			
3.2.1.11.1.	The Movement State shall describe the current interval for each movement.			
3.2.1.11.2.	The Movement State shall indicate when the current interval will end for each movement.			
3.2.1.11.3.	The Movement State shall indicate when that movement is estimated to next be green if it is not currently green.			
3.2.1.12.	Each SPaT message shall include a minimum end time defined to be the earliest time mark when the current phase will end (assuming no preemption or priority calls).			
3.2.1.13.	Each SPaT message shall contain a maximum end time defined to be the latest time mark when the current phase will end (assuming no preemption or priority calls).			

Requirement Number	System Requirement	Existing System Complies with Requirement (Yes/No)	Existing System to be Modified to Comply with Requirement (Yes/No)	Explanation for Non-Compliance or Description of Proposed Modification
3.2.1.14.	Each SPaT message shall contain a likely end time that is the most likely end time of the current phase.			
3.2.1.15.	When the maximum end time and likely end time are included in the data obtained from the Traffic Signal System, The SPaT Infrastructure System shall include these in the SPaT Message.			
3.2.1.16.	For fixed signal time, 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.			
3.2.1.17.	Each SPaT message shall contain enabled lane data.			
3.2.1.18.	For locations where the ECO Departure application is implemented, each SPaT message shall include maneuver assist data.			
3.2.2.	The SPaT Infrastructure System shall assemble SPaT messages that conform to the SAE J2735 standard format.			
3.2.2.1.	The SPaT Infrastructure System shall use the SPaT data to create SPaT messages that conform to the SAE J2735 March 2016 standard format.			
3.2.3.	The SPaT Infrastructure System shall assemble SPaT messages that comply with other message formats in addition to SAE J2735.			
Group 3: Manage User Interface				
Requirements describing the functions of the SPaT Infrastructure System User Interface to manage functions of the SPaT Infrastructure System broadcast				
3.3.1.	The SPaT Infrastructure System shall include an interface for users to manage the SPaT Infrastructure System and its data.			
3.3.1.1.	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.			
3.3.1.1.1.	The SPaT Infrastructure System User Interface shall be accessible via workstations on the agency network.			

Requirement Number	System Requirement	Existing System Complies with Requirement (Yes/No)	Existing System to be Modified to Comply with Requirement (Yes/No)	Explanation for Non-Compliance or Description of Proposed Modification
3.3.1.1.2.	The SPaT Infrastructure System User Interface shall be accessible via remote portable devices through the Internet.			
3.3.1.2.	The SPaT Infrastructure System shall comply with the agency's security policy for remote access.			
3.3.2.	The SPaT Infrastructure System User Interface shall include security compliant with agency policy to limit user access.			
3.3.2.1.	The SPaT Infrastructure System User Interface shall only be accessible to authorized users.			
3.3.2.2.	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.			
3.3.3.	The SPaT Infrastructure System User Interface shall display information to users.			
3.3.3.1.	The SPaT Infrastructure System shall provide a GIS-based digital map to geographically view the System and manage data.			
3.3.3.2.	The SPaT Infrastructure System User Interface shall display information to users on the operation, configuration and diagnostics of the System.			
3.3.3.3.	The SPaT Infrastructure System User Interface shall provide information to users in text and graphical formats as appropriate.			
3.3.3.4.	The SPaT Infrastructure System User Interface shall notify users of system alerts as defined in Group 12.			
Group 4: Manage Maps				
Requirements describing the functions of the SPaT Infrastructure to manage MAP data, use the correct MAP data for conditions and assemble standard MAP messages. <i>Product</i>				
3.4.1.	The SPaT Infrastructure System shall manage a MAP database.			
3.4.1.1.	The SPaT Infrastructure System shall include a database to store MAP data.			
3.4.1.2.	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.			

Special Provision 718 Traffic Signal Material Compliance with Functional Requirements

Requirement Number	System Requirement	Existing System Complies with Requirement (Yes/No)	Existing System to be Modified to Comply with Requirement (Yes/No)	Explanation for Non-Compliance or Description of Proposed Modification
3.4.1.3.	The SPaT Infrastructure System shall store a unique MAP message for each SPaT intersection.			
3.4.2.	The SPaT Infrastructure System shall manage MAP dynamic features.			
3.4.2.1.	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.			
3.4.2.1.1.	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.			
3.4.2.1.2.	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.			
3.4.3.	The SPaT Infrastructure System shall assemble the content for standard MAP messages.			
3.4.3.1.	The Intersection Geometry shall be changed if and only if the map information is updated.			
3.4.3.2.	Each MAP message shall uniquely identify the intersection for which it applies.			
3.4.3.3.	The SPaT Infrastructure System shall increment the MAP message count whenever any data element in the message except the time stamp changes.			
3.4.3.4.	Each Map message shall identify each lane approaching and departing from the intersection and shall provide an intersection unique ID for the lane.			
3.4.3.5.	Each MAP message shall provide the directionality of each lane.			
3.4.3.6.	Each MAP messages shall identify all ingress and egress lanes.			
3.4.3.6.1.	Each ingress and egress lane shall be described by at least two node points that depict the center of the lane.			

Requirement Number	System Requirement	Existing System Complies with Requirement (Yes/No)	Existing System to be Modified to Comply with Requirement (Yes/No)	Explanation for Non-Compliance or Description of Proposed Modification
3.4.3.6.2.	Each MAP message shall separately identify each possible connection between ingress and egress lanes and provide an intersection unique ID for the connection.			
3.4.3.6.3.	Each MAP message shall include, for each connection, the lane, maneuver and signal group associated with the connection.			
3.4.3.6.4.	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.			
3.4.3.6.5.	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.			
3.4.3.7.	In locations where PED-SIG or Pedestrian Warning applications are deployed, MAP messages shall include crosswalk lane types.			
3.4.3.8.	MAP message shall define ingress lanes from the stop bar to a minimum of 300 meters before the stop bar.			
3.4.3.9.	When connecting to another intersection, each MAP message shall identify the remote intersection to be connected.			
3.4.4.	The SPaT Infrastructure System shall assemble MAP messages that conform to the SAE J2735 standard message format.			
3.4.4.1.	The SPaT Infrastructure System shall assemble the MAP messages that adhere to the SAE J2735 March 2016 standard.			
3.4.5.	The SPaT Infrastructure System shall assemble other standardized MAP messages, as needed.			
Group 5: Manage Position Correction Requirements describing the functions of the SPaT Infrastructure to obtain GPS correction data, configure the source of correction data and assemble standard GPS correction messages.				
3.5.1.	The SPaT Infrastructure System shall obtain position correction data.			

Requirement Number	System Requirement	Existing System Complies with Requirement (Yes/No)	Existing System to be Modified to Comply with Requirement (Yes/No)	Explanation for Non-Compliance or Description of Proposed Modification
3.5.1.1.	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.			
3.5.1.2.	The SPaT Infrastructure System shall either generate or obtain the coordinates of the antenna reference point in the RTCM 10403 Message Type 1005 format.			
3.5.2.	The SPaT Infrastructure System shall assemble standard RTCM correction messages.			
3.5.2.1.	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.			
3.5.2.2.	The SPaT Infrastructure System shall generate new RTCM Correction messages with the most current correction data at a minimum frequency of 5 Hz.			
3.5.2.3.	The SPaT Infrastructure System shall assemble RTCM correction messages that conform to the SAE J2735 standard message format.			
3.5.2.4.	The SPaT Infrastructure System shall assemble position correction messages that comply with additional standards, as needed.			
Group 6: Manage SPaT Vehicle System Interface				
Requirements describing the functions of the SPaT Infrastructure to broadcast and receive standard messages to/from SPaT Vehicle Systems.				
3.6.1.	The SPaT Infrastructure System shall broadcast standard 5.9 GHz DSRC messages.			
3.6.1.1.	The SPaT Infrastructure System broadcast of data shall be compliant with the USDOT's RSU Specification "DSRC Roadside Unit (RSU) Specification Document v4.1."			
3.6.1.2.	The SPaT Infrastructure System shall broadcast SPaT, MAP, and RTCM messages using Dedicated Short Range Communications (DSRC) on channel 172.			
3.6.1.3.	The SPaT Infrastructure shall broadcast the SPaT messages with a minimum frequency of 10 Hz.			

Requirement Number	System Requirement	Existing System Complies with Requirement (Yes/No)	Existing System to be Modified to Comply with Requirement (Yes/No)	Explanation for Non-Compliance or Description of Proposed Modification
3.6.1.4.	The SPaT Infrastructure system shall broadcast MAP messages with a minimum frequency of 1 Hz.			
3.6.1.5.	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.			
3.6.1.6.	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.			
3.6.1.7.	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.			
3.6.1.8.	The SPaT Infrastructure System shall broadcast messages such that they can be received by DSRC on-board units in each lane approaching the intersection.			
3.6.1.9.	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.			
3.6.1.10.	The SPaT Infrastructure System shall sign outgoing broadcast messages with a valid security key.			
3.6.2.	The SPaT Infrastructure System shall validate received messages based on signed certificate associated with the messages.			
3.6.2.1.	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.			
3.6.2.2.	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.			
3.6.2.3.	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.			

Requirement Number	System Requirement	Existing System Complies with Requirement (Yes/No)	Existing System to be Modified to Comply with Requirement (Yes/No)	Explanation for Non-Compliance or Description of Proposed Modification
3.6.2.4.	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.			
3.6.2.5.	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.			
3.6.3.	The SPaT Infrastructure System shall publish data over alternate communication mediums.			
3.6.4.	The SPaT Infrastructure System shall receive data over alternate communication mediums.			
Group 7: Manage Preemption / Priority Requirements describing the functions of the SPaT Infrastructure to monitor requests for preemption and priority, manage conflicting requests, generate requests from and responses to SPaT Vehicle Systems.				
3.7.1.	The SPaT Infrastructure System shall monitor for signal preemption and priority requests.			
3.7.1.1.	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.			
3.7.1.2.	The SPaT Infrastructure System shall process preemption/priority request cancellations received from SPaT Vehicle Systems.			
3.7.2.	The SPaT Infrastructure System shall request preemption and priority.			
3.7.2.1.	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.			
Group 8: Manage Vehicle & PID Data Requirements describing the functions of the SPaT Infrastructure to manage data received from vehicles and PIDs				
3.8.1.	The SPaT Infrastructure System shall monitor BSM, PVD, and PSM.			

Requirement Number	System Requirement	Existing System Complies with Requirement (Yes/No)	Existing System to be Modified to Comply with Requirement (Yes/No)	Explanation for Non-Compliance or Description of Proposed Modification
3.8.1.1.	The SPaT Infrastructure System shall receive BSM from vehicles.			
3.8.1.2.	The SPaT Infrastructure System shall receive PVD from vehicles.			
3.8.1.3.	The SPaT Infrastructure System shall receive PSM from Personal Information Devices (PIDs).			
3.8.2.	The SPaT Infrastructure System shall convert BSM and PSM to detector calls.			
3.8.2.1.	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.			
3.8.2.2.	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.			
3.8.2.3.	The SPaT Infrastructure System shall convert the BSM and PSM messages received into detector calls for their corresponding detection zones.			
3.8.2.3.1.	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.			
3.8.2.3.2.	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.			
3.8.2.4.	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.			
3.8.2.4.1.	The SPaT Infrastructure System shall assemble pedestrian crossing detector calls to include the relevant crosswalk the pedestrian is requesting to access.			

Requirement Number	System Requirement	Existing System Complies with Requirement (Yes/No)	Existing System to be Modified to Comply with Requirement (Yes/No)	Explanation for Non-Compliance or Description of Proposed Modification
3.8.2.4.2.	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.			
3.8.2.5.	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.			
3.8.3.	In locations where BSM and PVD data is collected, the SPaT Infrastructure System shall aggregate BSM and PVD data.			
Group 9: Manage Traffic Data System Interface				
Requirements describing the functions of the SPaT Infrastructure System to exchange data with the Traffic Data System.				
3.9.1.	The SPaT Infrastructure System shall exchange data with the Traffic Data System.			
3.9.1.1.	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.			
3.9.1.1.1.	The SPaT Infrastructure System shall exchange aggregated BSM data.			
3.9.1.1.2.	The SPaT Infrastructure System shall exchange aggregated PVD data.			
Group 10: Manage Security				
Requirements describing the functions of the SPaT Infrastructure to obtain and send security credentials, verify the credentials received and use that information to manage network access.				
3.10.1.	The SPaT Infrastructure System shall obtain valid security credentials.			
3.10.1.1.	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.			
3.10.1.1.1.	The SPaT Infrastructure System certification shall include all of the security credentials necessary to support each application.			

Requirement Number	System Requirement	Existing System Complies with Requirement (Yes/No)	Existing System to be Modified to Comply with Requirement (Yes/No)	Explanation for Non-Compliance or Description of Proposed Modification
3.10.1.2.	The SPaT Infrastructure System shall have a mechanism for receiving updated security credential certification from the Security Back End System.			
3.10.1.3.	The SPaT Infrastructure System shall store security credential certifications for use in broadcasting messages to SPaT Vehicle Systems for their validation purposes.			
3.10.1.4.	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.			
3.10.1.5.	The SPaT Infrastructure System shall receive updates from the Security Back End System regarding revoked security credentials.			
3.10.1.6.	The SPaT Infrastructure System shall store data regarding revoked security credentials.			
3.10.1.6.1.	The SPaT Infrastructure System shall ignore data received from SPaT Vehicle Systems whose security credentials have been revoked.			
3.10.1.6.2.	The SPaT Infrastructure System shall send data to the Security Back End System regarding invalid security credentials received from SPaT Vehicle Systems.			
3.10.2.	The SPaT Infrastructure System shall verify the credentials it receives.			
3.10.2.1.	The SPaT Infrastructure System shall have a mechanism for validating the security credentials received from SPaT Vehicle Systems.			
3.10.2.1.1.	The SPaT Infrastructure System shall check the security credentials of messages that include security credential data received from SPaT Vehicle Systems.			
3.10.2.1.2.	The SPaT Infrastructure System shall validate the security credentials of messages received from SPaT Vehicle Systems with valid credentials.			
3.10.2.1.3.	The SPaT Infrastructure System shall identify as revoked the security credentials of messages received from SPaT Vehicle Systems that match a revoked security credential.			

Requirement Number	System Requirement	Existing System Complies with Requirement (Yes/No)	Existing System to be Modified to Comply with Requirement (Yes/No)	Explanation for Non-Compliance or Description of Proposed Modification
3.10.2.1.4.	The SPaT Infrastructure System shall ignore messages received from SPaT Vehicle Systems without a valid security credential.			
3.10.3.	The SPaT Infrastructure System shall apply security credentials to broadcasts.			
3.10.3.1.	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.			
3.10.3.2.	The SPaT Infrastructure System shall sign and validate DSRC messages using the IEEE 1609.2 security standard.			
3.10.4.	The SPaT Infrastructure System shall manage access to the system network.			
3.10.4.1.	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.			
Group 11: Manage Security Back End Interface				
Requirements describing the functions of the SPaT Infrastructure to enable Traffic Engineering staff to configure the security interface				
3.11.1.	The SPaT Infrastructure System to provide a mechanism for users to configure data exchanges.			
3.11.1.1.	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.			
3.11.1.2.	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.			
Group 12: Provide Support				
Requirements describing the functions of the SPaT Infrastructure to provide support to users to monitor status, activity and configure the system.				
3.12.1.	The SPaT Infrastructure System shall have a mechanism for managing logs of system activity.			

Requirement Number	System Requirement	Existing System Complies with Requirement (Yes/No)	Existing System to be Modified to Comply with Requirement (Yes/No)	Explanation for Non-Compliance or Description of Proposed Modification
3.12.1.1.	<p>The SPaT Infrastructure System shall log and store records of data obtained by the System, including:</p> <ul style="list-style-type: none"> - Traffic Signal System data. - GPS correction data. - MAP data. - Messages from SPaT Vehicle Systems and PIDs, including BSM, PVD, PSM and SRM. 			
3.12.1.2.	<p>The SPaT Infrastructure System shall log and store the messages assembled by the System, including the content, time of generation and time of broadcast.</p>			
3.12.1.2.1.	<p>The SPaT Infrastructure System shall log and store the SPaT messages assembled by the System.</p>			
3.12.1.2.2.	<p>The SPaT Infrastructure System shall log and store the MAP messages assembled by the System.</p>			
3.12.1.2.3.	<p>The SPaT Infrastructure System shall log and store the RCTM messages assembled by the System.</p>			
3.12.1.2.4.	<p>The SPaT Infrastructure System shall log and store the SSM messages assembled by the System.</p>			
3.12.1.3.	<p>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.</p>			
3.12.1.4.	<p>The SPaT Infrastructure shall log and store user-initiated changes in System configuration, including the user, date and time, and configuration change.</p>			
3.12.1.5.	<p>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.</p>			
3.12.1.6.	<p>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.</p>			
3.12.1.7.	<p>The SPaT Infrastructure System shall have a mechanism for selecting stored data for deletion and then deleting that data.</p>			

Requirement Number	System Requirement	Existing System Complies with Requirement (Yes/No)	Existing System to be Modified to Comply with Requirement (Yes/No)	Explanation for Non-Compliance or Description of Proposed Modification
3.12.1.8.	<p>The SPaT Infrastructure System shall have a mechanism for configuring multiple logs to reflect:</p> <ul style="list-style-type: none"> - log start and end times. - Data types and activities to be included in log. - Locations and/or devices to be included in log. 			
3.12.2.	The SPaT Infrastructure System shall provide a mechanism for users to configure the messages broadcast by the System.			
3.12.2.1.	The SPaT Infrastructure System shall provide a mechanism for users to select the appropriate standardized format(s) for messages to be broadcast.			
3.12.2.2.	<p>The SPaT Infrastructure System shall have a mechanism for users to configure the data elements to include in:</p> <ul style="list-style-type: none"> - SPaT Messages - MAP Messages - RTCM Messages - SSM - PSM 			
3.12.2.3.	<p>The SPaT Infrastructure System shall have a mechanism for users to configure the frequency of broadcast for:</p> <ul style="list-style-type: none"> - SPaT Messages - MAP Messages - RTCM Messages - SSM - PSM 			
3.12.3.	The SPaT Infrastructure System shall have a mechanism for managing MAP data.			
3.12.3.1.	<p>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:</p> <ul style="list-style-type: none"> - XML - <to be defined> 			
3.12.3.2.	The SPaT Infrastructure System shall have a mechanism for the user to submit MAP data.			
3.12.3.2.1.	The SPaT Infrastructure System shall notify the user of successful MAP data submissions.			

Requirement Number	System Requirement	Existing System Complies with Requirement (Yes/No)	Existing System to be Modified to Comply with Requirement (Yes/No)	Explanation for Non-Compliance or Description of Proposed Modification
3.12.3.2.2.	The SPaT Infrastructure System shall provide a mechanism for graphically displaying the location and layout of submitted MAP data.			
3.12.3.2.3.	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.			
3.12.3.3.	The SPaT Infrastructure System shall have a mechanism for the user to create MAP data within the interface.			
3.12.3.3.1.	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.			
3.12.3.3.2.	The SPaT Infrastructure System shall have a mechanism for graphically displaying the location and layout of entered MAP data.			
3.12.3.3.3.	The SPaT Infrastructure System shall allow the user to name, copy, modify and delete MAP data of one or more configurations for each intersection.			
3.12.4.	The SPaT Infrastructure System shall have a mechanism for users to configure GPS correction.			
3.12.4.1.	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).			
3.12.4.2.	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.			
3.12.5.	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.			

Requirement Number	System Requirement	Existing System Complies with Requirement (Yes/No)	Existing System to be Modified to Comply with Requirement (Yes/No)	Explanation for Non-Compliance or Description of Proposed Modification
3.12.5.1.	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.			
3.12.5.2.	The SPaT Infrastructure System shall have a mechanism for the user to graphically define detection zones within a digital map environment.			
3.12.5.3.	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.			
CMS / ASCT SYSTEM REQUIREMENTS				
4.1. Adaptive Strategies				
4.1.1.	The ASCT system shall alter the timing of signal controllers, when current measured traffic conditions meet user-specified criteria, providing adequate capacity to meet demand.			
4.1.2.	The ASCT system shall alter the timing of signal controllers, when current measured traffic conditions meet user-specified criteria, preventing queues from exceeding the storage capacity between intersections at specified locations.			
4.1.3.	The ASCT system shall alter the timing of signal controllers, when current measured traffic conditions meet user-specified criteria, providing equitable distribution of green times.			
4.1.4.	The ASCT system shall alter the timing of signal controllers, when current measured traffic conditions meet user-specified criteria, providing two-way progression on coordinated route(s).			
4.1.5.	The ASCT system shall alter the state of signal controllers, when current measured traffic conditions meet user-specified criteria, provide for non-coordinated operation (free) at one or more system locations.			
4.1.6.	The ASCT system shall respond in real time when user defined levels of traffic demand are detected by the system.			

Requirement Number	System Requirement	Existing System Complies with Requirement (Yes/No)	Existing System to be Modified to Comply with Requirement (Yes/No)	Explanation for Non-Compliance or Description of Proposed Modification
4.1.7.	The ASCT system shall limit the change in consecutive cycle lengths to be less than a user defined value.			
4.1.8.	The ASCT system shall limit the change in phase times between consecutive cycles to be less than a user defined value.			
4.1.9.	The ASCT system shall limit the frequency of change in coordinated phase(s) based on a user defined value.			
4.1.10.	The ASCT system shall support Connected Autonomous Vehicle (CAV) operations.			
4.1.11.	The ASCT system shall operate non-adaptively in accordance with a user-defined time of day schedule to accommodate scheduled special events. During these times, pre-defined traffic coordination patterns will be active providing signal coordination for designated routes to facilitate radial outbound flow from area traffic generators.			
4.1.12.	The ASCT system shall operate non-adaptively when the system operator manually commands the system to cease adaptive operation.			
4.1.13.	The ASCT system shall provide user-settable maximum and minimum phase times. Multiple maximum times shall be available by Time of Day or via manual selection.			
4.1.14.	The ASCT system shall not prevent the signal controller from servicing the next sequential phase when there is vehicle or pedestrian demand for that phase.			
4.1.15.	The ASCT system shall provide a user-defined maximum value for each phase at each controller.			
4.1.16.	The ASCT system shall not provide a phase length longer than a user-defined maximum value.			
4.1.17.	The ASCT system shall not allow a phase length shorter than the minimum allowed from the summation of fixed interval settings (vehicle and pedestrian fixed interval timings).			
4.1.18.	The ASCT system shall provide coordination along user defined routes.			
4.1.19.	The ASCT system shall determine the coordinated route(s) based on traffic conditions.			

Requirement Number	System Requirement	Existing System Complies with Requirement (Yes/No)	Existing System to be Modified to Comply with Requirement (Yes/No)	Explanation for Non-Compliance or Description of Proposed Modification
4.1.20.	The ASCT system shall determine the coordinated route(s) based on a user-defined schedule.			
4.1.21.	The ASCT system shall select a stored coordinated route(s) based on a user-defined schedule.			
4.1.22.	The ASCT system shall be capable of implementing a stored coordinated route(s) by operator command.			
4.1.23.	The ASCT system shall support FYA and FRA operation.			
4.1.24.	The ASCT system shall not omit phases containing a valid vehicle or pedestrian call.			
4.1.25.	<p>The ASCT system shall assign unused time from preceding phases that terminate early to a user-specified phase as follows:</p> <ul style="list-style-type: none"> ▪ Next phase ▪ Next coordinated phase ▪ User specified non-coordinated phase 			
4.1.26.	The ASCT system shall be capable of selecting a cycle length range based on a time of day schedule.			
4.1.27.	The ASCT system shall be capable of dynamically calculating a phase length (split) for all phases at each location based on the current coordination strategy and system detector data.			
4.1.28.	The ASCT system shall calculate offsets to suit the current coordination strategy along a coordinated route(s) within the system.			
4.1.29.	The ASCT system shall calculate a cycle length for each cycle based on user-defined optimization objectives and system detector data.			
4.1.30.	The ASCT system shall detect the presence of queues at pre-defined locations.			
4.1.31.	When user-defined levels of change in traffic conditions are detected; the ASCT system shall respond in real time.			
4.1.32.	The ASCT system shall not alter the order of phases at any location. Phases without active detection may be skipped.			

Requirement Number	System Requirement	Existing System Complies with Requirement (Yes/No)	Existing System to be Modified to Comply with Requirement (Yes/No)	Explanation for Non-Compliance or Description of Proposed Modification
4.1.33.	When queues are detected at pre-defined locations, the ASCT system shall automatically adjust signal timings at signalized locations in proximity to the queuing condition, execute a user-defined timing plan or user-defined operational mode.			
4.1.34.	The ASCT system shall allow the operator to specify which phase, or phases, receives unused time from a preceding phase.			
4.1.35.	The ASCT system shall allow flexible timing of non-coordinated phases while maintaining coordination.			
4.1.36.	The ASCT shall provide coordination provisions to fully support existing signal sequencing and operations. This includes supporting the number of phases, overlaps, and rings currently in place at all existing project locations.			
4.1.37.	The ASCT system shall allow any phase(s) to be designated as the coordinated phase(s), changeable by time of day or coordination pattern. This feature shall only be in effect during adaptive control.			
4.1.38.	The system shall be capable of supporting new technologies as they become available.			
4.1.39.	The CMS/ATCS system shall have the ability to communicate with traffic signal controllers from different manufacturers.			
4.2. Network Characteristics				
4.2.1.	The CMS system shall be capable of supporting a minimum of 1000 signalized intersections.			
4.2.2.	The Cloud based infrastructure system shall contain the CMS software, the ASCT system control software, and the SPM management software.			
4.2.3.	The CMS/ASCT system shall log user accesses to system controller units including, but not limited to, username, date and time.			
4.2.4.	The CMS/ASCT system shall be capable of being accessed from any web enabled device, including computers, tablets, and smart phones as limited based on security requirements.			

Requirement Number	System Requirement	Existing System Complies with Requirement (Yes/No)	Existing System to be Modified to Comply with Requirement (Yes/No)	Explanation for Non-Compliance or Description of Proposed Modification
4.2.5.	The CMS/ASCT system shall be capable of uploading the entire controller database and download user selectable parameters such as controller timing data.			
4.2.6.	The CMS/ASCT system shall be capable of providing a means for labeling traffic controller alarms and displaying the user defined name when the alarm is active.			
4.2.7.	The CMS/ASCT system shall be capable of providing a system-wide map to support common GIS map navigation, ability to incorporate standard ESRI vector/image files and support user selectable levels.			
4.2.8.	The CMS/ASCT system shall be capable of displaying the operational and alarm status of each system controller, system link and/or detector status as well as displaying intersection name, and operational status. It shall also be possible for the system-wide failure status map to be displayed on both user workstations and on a map to be displayed on the existing MaineDOT video wall.			
4.2.9.	The CMS/ ASCT system shall be capable of displaying real time status of system traffic controllers including phase output status, pedestrian status and overlap status.			
4.2.10.	The CMS/ASCT system shall be capable of displaying time space diagrams, in real time, including green band progression and design speed.			
4.2.11.	The CMS/ASCT system shall be capable of supporting system reports and event logging functions. Reports shall be recorded to disk, viewable on workstations or printed as selected by the user.			
4.2.12.	The CMS/ASCT system shall be capable of supporting central scheduler functions including traffic controller/group time operations, device log collection, collection of traffic data, email notifications and reports, date/time broadcast to all controllers and timing parameter audit reports.			
4.2.13.	The CMS/ASCT system shall be capable of providing system security functions including username and password for each user and access level restrictions settable by the system administrator. The CMS/ASCT shall allow for unlimited simultaneous user logins to the system with no impact to ops.			

Requirement Number	System Requirement	Existing System Complies with Requirement (Yes/No)	Existing System to be Modified to Comply with Requirement (Yes/No)	Explanation for Non-Compliance or Description of Proposed Modification
4.2.14.	The CMS/ASCT system shall be a full production, fully tested and certified product (certified to be compliant with all standards with which it is required to be compliant), with a minimum of 25 identical production units in continuous operation, running intersections within the United States.			
4.2.15.	The CMS/ASCT system shall be supplied and installed with adaptive control software contained in user programmable configuration database format. Adaptive control software supplied with script only level software will not be accepted.			
4.2.16.	The CMS/ASCT system shall allow the operators to configure groups of intersections that operate in a coordinated manner.			
4.2.17.	The CMS/ASCT system shall provide database upload and download capability to all intersection controller units under its control. The controller shall remain on stop and go during upload/download operations.			
4.2.18.	The CMS/ASCT system shall have a graphical user interface that is consistent with the Windows™ operating system. The system software shall be designed so that additional signalized locations may be added to the map display by agency personnel.			
4.2.19.	The CMS/ASCT system shall provide real time intersection maps for each intersection in the system.			
4.2.20.	The CMS/ASCT system shall be programmed such that all intersection related documentation is loaded into the cloud-based system and available for remote user access. This includes cabinet wiring diagrams, a digital photo of each cabinet and as-built plans for each intersection.			
4.2.21.	The ASCT system shall include a user programmable scheduler that shall allow scheduled operations to take place, including but not limited to controller unit operations and device log retrieval.			
4.2.22.	The ASCT system shall provide multi-level user authentication that prevents unauthorized users from logging on to the cloud-based system software.			

Requirement Number	System Requirement	Existing System Complies with Requirement (Yes/No)	Existing System to be Modified to Comply with Requirement (Yes/No)	Explanation for Non-Compliance or Description of Proposed Modification
4.2.23.	The ASCT system shall log all user accesses, including but not limited to username, date, and time.			
4.2.24.	The video detection system portion of the ASCT system shall have the capability of remotely displaying live video streams from all video detection units installed at intersections. The setup of video detection zones shall be available via remote access including from the TMC. The system shall log which user made any changes to the detection zone configurations.			
4.2.25.	The Detection system shall be connected to the Ethernet Switch and/or the FMU in each Controller Cabinet.			
4.2.26.	It shall be possible to view live streaming MPEG-4/H.264video from proposed video detection cameras at the TMC or any web enabled device from every camera assembly in project.			
4.2.27.	The ASCT system shall be capable of viewing live streaming video from proposed video detection cameras up to the maximum system capacity of 1000 intersections.			
4.2.28.	The ATSC system shall be capable of simultaneous viewing of live streaming video from all proposed video detection cameras.			
4.2.29	Shall be supplied and installed with the ability of being accessed from any web enabled device, including computers, tablets, and smart phones as limited based on security requirements.			
4.3. Security				
4.3.1.	The Controller Unit shall include configurable security features that limit local and remote access to authorized users only.			
4.3.2.	The ASCT system shall manage/restrict remote access to the system, i.e., any user access from locations other than the MaineDOT TMC, shall be via secure VPN only.			
4.3.3.	The configurable security features shall be changeable by the System Administrator at any time, including complete denial of system access.			

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Requirement Number	System Requirement	Existing System Complies with Requirement (Yes/No)	Existing System to be Modified to Comply with Requirement (Yes/No)	Explanation for Non-Compliance or Description of Proposed Modification
4.3.4.	The configurable security features shall provide different levels of access to the system and its components for different types of users.			
4.3.5.	The communications system shall be a secured point to point VPN between the intersections and the cloud-based system. All remote connections to the cloud-based system shall require two factor authentications.			
4.3.6.	The ASCT system shall comply with all existing security policies and requirements of MaineDOT.			
4.4. Pedestrians				
4.4.1.	<p>The CMS/ASCT system shall accommodate the following custom pedestrian features:</p> <ul style="list-style-type: none"> ▪ Exclusive pedestrian operation ▪ Concurrent pedestrian operation ▪ Overlapping phase pedestrian operation ▪ Leading pedestrian interval (LPI) operation ▪ Pedestrian APS systems ▪ Support passive pedestrian detection technology 			
4.5. Bicycles				
4.5.1.	The CMS/ASCT system shall be provided with the ability to fully support MaineDOT's policies regarding bicycle accommodation at signalized intersections.			
4.6. Freight and Snowplow Operations				
4.6.1.	The CMS/ASCT shall be provided with the ability to configure local and system level controls to facilitate freight and snowplow movement through the intersections.			
4.7. Non-Adaptive Situations				
4.7.1.	The CMS/ASCT system shall revert to a central monitoring and control system when the adaptive control portion of the system is no longer operating.			

Requirement Number	System Requirement	Existing System Complies with Requirement (Yes/No)	Existing System to be Modified to Comply with Requirement (Yes/No)	Explanation for Non-Compliance or Description of Proposed Modification
4.7.2.	The CMS/ASCT system shall automatically revert to a time-based coordination system under the conditions when ASCT system operation is active.			
4.7.3.	The CMS/ASCT shall be provided with the ability to allow the system operator to manually override adaptive operation control system-wide or on an individual intersection basis, or by user defined intersection groupings.			
4.8. System Responsiveness				
4.8.1.	The ASCT system shall be provided with the ability for the system operator to adjust the level of responsiveness.			
4.8.2.	The ASCT system shall be provided with the ability to limit the frequency of cycle changes and provide limits for minimum and maximum cycle lengths based on time of day/day of week and seasonal programming.			
4.8.3.	The ASCT system shall monitor traffic conditions in the areas adjacent to the project and adjust signal timings to minimize queuing and congestion. Reports shall be available which track daily AM/PM peak congestion levels by corridor and can automatically generate weekday, weekend and monthly averages for these corridors and ASCT systemwide.			
4.8.4.	The ASCT system shall be programable to provide user selectable strategies to support one or two-way progression, cross arterial coordination, queue management and critical intersection accommodation based on manual override or automatically based on real time traffic conditions.			
4.9. Complex Coordination and Controller Features				
4.9.1.	The Controller Cabinet supplied under this project shall be an Advanced Transportation Controller Cabinet (ATCC) compliant with ATC 5301 v02.			
4.9.2.	The Controller Unit supplied under this project shall be an Advanced Transportation Controller compliant with ATC 5201 v06.			
4.9.3.	The Controller Unit shall be a full production, fully tested and certified to be compliant with all applicable standards.			

Requirement Number	System Requirement	Existing System Complies with Requirement (Yes/No)	Existing System to be Modified to Comply with Requirement (Yes/No)	Explanation for Non-Compliance or Description of Proposed Modification
4.9.4.	<p>The Controller Unit shall be designed to operate in the following environmental conditions:</p> <ul style="list-style-type: none"> ▪ -40°C to 74°C operating temperature range ▪ -40°C to 85°C storage temperature range ▪ 10% to 95% relative humidity (non-condensing) ▪ 89 VAC to 135 VAC, 60 Hz 			
4.9.5.	The Controller Unit shall include a Linux-based real-time operating system.			
4.9.6.	The controller unit shall have an expected useful product life of ten years, minimum.			
4.9.7.	The Controller Unit shall have connectors for all external input/output functions that are rigidly defined by the governing national standard.			
4.9.8.	The Controller Unit's connectors for external input/output functions shall be identical in quantity, size, type, configuration, and pinout for all manufacturer's units used in the system.			
4.9.9.	The Controller Unit shall include a minimum of two 10/100 BaseT Ethernet connector that provides system communications functions.			
4.9.10.	The Controller Unit shall take specific user specified actions when it detects the failure of system communications.			
4.9.11.	The Controller Unit software shall meet the functional requirements of the NEMA TS-2, 2016 Standard, including all amendments.			
4.9.12.	The Controller Unit shall support Connected Autonomous Vehicle (CAV) operations.			
4.9.13.	The Controller Unit shall include 2 USB 3.0 ports, at a minimum.			
4.9.14.	The Controller Unit shall contain real-time context sensitive HELP screens.			
4.9.15.	The Controller Unit shall include a time-of-day, day-of-week, week-of-year scheduler.			

Requirement Number	System Requirement	Existing System Complies with Requirement (Yes/No)	Existing System to be Modified to Comply with Requirement (Yes/No)	Explanation for Non-Compliance or Description of Proposed Modification
4.9.16.	The Controller Unit shall include dedicated phase detection inputs, pedestrian detection inputs, and system detection inputs.			
4.9.17.	The Controller Unit shall be capable of receiving database downloads and sending database uploads from/to a computer via USB or Ethernet cable.			
4.9.18.	The ATC controller and cabinet shall support Flashing Yellow Arrow (FYA) and Flashing Red Arrow (FRA) operation with the ability to provide a minimum of 6 flashing pairs.			
4.9.19.	It shall be possible to alter the controller unit's internal database using a built-in front panel keyboard, using a computer connected to the controller unit with a USB cable or an Ethernet cable, and remotely using the central management system application. In addition, a remote access system shall be provided using Telnet and/or HTTPS.			
4.9.20.	The Controller Unit shall be configured for controlling the operation of the traffic signals as indicated on the phase sequence and timing charts on the plans.			
4.9.21.	The controller unit shall include an internal database which stores all configurable parameters, including but not limited to phase timings, phase sequencing, overlaps, coordination parameters, preemption and priority parameters, time base parameters, communications parameters, detection parameters, flashing operation, and security parameters.			
4.9.22.	The Controller Cabinet shall be compliant with an existing, approved, national standard.			
4.9.23.	The Controller Cabinet shall be compliant with Advanced Transportation Controller Cabinet (ATCC) 5301 v02.			
4.9.24.	All equipment installed within the Controller cabinet shall be compliant with existing, approved, national standards.			
4.9.25.	All equipment installed within the control cabinet shall be designed to operate in the following environmental conditions: <ul style="list-style-type: none"> ▪ -40°C to 74°C operating temperature range ▪ -40°C to 85°C storage temperature range ▪ 10% to 95% relative humidity (non-condensing) 			

Requirement Number	System Requirement	Existing System Complies with Requirement (Yes/No)	Existing System to be Modified to Comply with Requirement (Yes/No)	Explanation for Non-Compliance or Description of Proposed Modification
4.9.26.	The controller cabinet shall be designed, constructed and installed with all the necessary provisions to comply with the NFPA 70E requirements. The controller cabinet shall include a bypass electric meter trough mounted on the exterior upper right-side wall of the cabinet. The type, model and wiring of the meter trough shall be in full compliance with all relevant MaineDOT and local electric utility requirements.			
4.9.27.	The Controller Cabinet shall include a communications interface device that is compatible with the communications network.			
4.9.28.	All Controller Cabinets shall be electrically bonded and grounded and meet existing MaineDOT, NEC and NESC requirements for cabinet grounding and bonding. The cabinet shall be NFPA-70E compliant.			
4.9.29.	Detection shall consist of IP based video detection equipment at all project intersections, as shown in the Plans.			
4.9.30.	Video detection shall consist of an IP camera assembly and a video detection system that allows for a per camera IP address.			
4.9.31.	The video detection system shall be connected to the in-cabinet high speed communications bus within the Controller Cabinet.			
4.9.32.	Detection data shall be passed to the Controller Unit via the in-cabinet high speed communications bus within the Controller Cabinet.			
4.9.33.	The traffic signal controller shall be supplied and installed to include user defined alarms and alerts.			
4.10. Monitoring and Control				
4.10.1.	The CMS/ACST system shall be resident on a cloud-based system and configured to allow for secure, remote monitoring and control of the system for operators and staff as designated by MaineDOT.			
4.10.2.	Monitoring and control capabilities of the CMS/ASCT system shall be limited only by virtue of the user privileges assigned to specific users by the System Administrator, not by location (i.e., TMC vs remote) of the users.			

Requirement Number	System Requirement	Existing System Complies with Requirement (Yes/No)	Existing System to be Modified to Comply with Requirement (Yes/No)	Explanation for Non-Compliance or Description of Proposed Modification
4.10.3.	The CMS/ASCT system shall be capable of being accessed from any web enabled device, including computers, tablets, and smart phones as limited based on security requirements.			
4.11. Performance Reporting				
4.11.1.	The controller unit shall be supplied and installed with the ability to collect, store, and report various measures of effectiveness (MOE's).			
4.11.2.	The controller unit shall collect and process all 255 high resolution enumerations as defined in the report "Indiana Traffic Signal Hi Resolution Data Enumerations" July 2019.			
4.11.3.	The CMS/ATCS shall collect high resolution data from each system controller unit and automatically download that data to the server based on a user defined schedule. The amount of data downloaded, and the level of data transmitted shall be user programmable.			
4.11.4.	The CMS/ASCT system shall store and report data used to calculate signal timings and have the data available for subsequent analysis.			
4.11.5.	The CMS/ASCT system shall store and report Automated Traffic Signal Performance Measures (ATSPM) data used to quantify system operation under adaptive control. This data shall be collected on separate cloud-based instance to be supplied as part of the project.			
4.11.6.	The CMS/ASCT system shall store all operational data and signal timing parameters calculated by the adaptive system and export selected data in an agency usable format.			
4.11.7.	The CMS/ASCT system shall report and display signal performance data in real time.			
4.11.8.	The CMS/ASCT system shall have the capability to generate historic and real-time reports that effectively support operations, maintenance and reporting of system performance and traffic conditions. These historic reports shall be available in 15 minute or hourly increments for user selected sensors and be available by the day, week or month.			

Requirement Number	System Requirement	Existing System Complies with Requirement (Yes/No)	Existing System to be Modified to Comply with Requirement (Yes/No)	Explanation for Non-Compliance or Description of Proposed Modification
4.12. Failure Notifications				
4.12.1.	The CMS/ASCT system shall immediately notify maintenance and operations staff of alarms and alerts. Alarms and alerts shall be user programmable by the system operator. User adjustable/programmable audible alarms shall be available to supplement visual displays for critical alarms such as conflict flash.			
4.12.2.	The CMS/ASCT system shall maintain a complete log of all alarms and failure alerts.			
4.12.3.	The CMS/ASCT system shall automatically pass alarms and alerts to the MaineDOT control center.			
4.13. Preemption and Priority				
4.13.1.	The Controller Unit shall be capable of twelve control inputs. Connections for these inputs shall be provided in the traffic cabinet.			
4.13.2.	The Controller Unit shall be capable of twelve emergency vehicle preemption inputs. Connections for these inputs shall be provided in the traffic cabinet.			
4.13.3.	The Controller Unit shall be capable of railroad preemption.			
4.13.4.	The CMS/ASCT system shall record and provide time/date stamped data on related priority activities including priority requests, cancellations, approvals, etc. This data shall be available to all of the agencies to be able to monitor priority operation and to aid in troubleshooting problems as they occur.			
4.13.5.	The CMS/ASCT system shall be provided with an ATC controller, user-programmable priority operation which will allow the system operator to configure each priority approach with specific control and timing parameters.			

Requirement Number	System Requirement	Existing System Complies with Requirement (Yes/No)	Existing System to be Modified to Comply with Requirement (Yes/No)	Explanation for Non-Compliance or Description of Proposed Modification
4.14. Failure and Failback				
4.14.1.	The ASCT system shall operate under CMS control when adaptive control equipment required to support system operation fails. If communication to the central system is unavailable, coordinated time base operation shall provide AM peak, PM peak and off-peak timings.			
4.14.2.	The ASCT system shall operate non-adaptively when a user specified system detector(s) fails.			
4.14.3.	The ASCT system shall operate non-adaptively when the number of failed system detectors exceeds a user-defined number.			
4.14.4.	The ASCT system shall operate non-adaptively when a user-defined communications link(s) fails.			
4.14.5.	The controller unit shall include detector failure algorithms that take user defined actions when certain user defined criteria are met.			
4.14.6.	The ASCT system shall have the ability to provide a fall back state that allows for signal coordination to continue in the event of a system level failure such as loss of communications or a malfunction at the central control station.			
4.14.7.	The ASCT system shall have the ability to provide a fall back state that allows for signal coordination to continue in the event of a cabinet level failure such as a defective vehicle/pedestrian detector.			
4.14.8.	Fall back operation will support system wide as well as user defined sub-grouping of coordination based on a common cycle length as well as supporting multiple cycles, splits and offsets suitable for use during AM peak, PM peak and off-peak periods.			
4.14.9.	The CMS/ASCT system shall have the ability to immediately notify designated staff of alarms and alerts. Alarms at MaineDOT's TMC shall include and audible option for selected alarms. The volume and tone type shall be user selectable. A single audible alarm shall be provided for an alarm which re-occurs within a user defined period.			

Requirement Number	System Requirement	Existing System Complies with Requirement (Yes/No)	Existing System to be Modified to Comply with Requirement (Yes/No)	Explanation for Non-Compliance or Description of Proposed Modification
4.14.10.	The ASCT system shall maintain adaptive coordination operation in the background at the controlling intersection during an active priority event. This will minimize the time needed for the controller to return to active operation at the conclusion of a priority event.			
4.14.11.	The Controller Unit alarms and alerts shall be user defined.			
4.15. Constraints				
4.15.1.	All proposed equipment to be supplied under this project must be compliant with ATC standards.			
4.16. Training and Support				
4.16.1	The manufacturer's representative or distributor shall be located within New England. References shall be supplied which will document the availability and expertise of local support for the traffic signal control equipment to be utilized.			
4.17. Communications				
4.17.1.	The Communications System shall be compliant with an existing, approved, national standard.			
4.17.2.	The communications system shall be a fiber optic infrastructure and cellular back haul communications network.			
4.17.2.1.	The Communications System shall consist of single mode fiber optic cable of the quantity, type, number of strands, and installation methods as shown in the Plans and Specifications as well as a cellular back haul communications network.			
4.17.2.2.	The Communications System shall include 1 Gbps Managed Layer 2 Ethernet switches in each Controller Cabinet, as shown in the Plans and Specifications.			
4.17.3.	The communications system shall include a secure Internet connection as detailed in the Specifications.			

Requirement Number	System Requirement	Existing System Complies with Requirement (Yes/No)	Existing System to be Modified to Comply with Requirement (Yes/No)	Explanation for Non-Compliance or Description of Proposed Modification
4.17.3.1.	The Internet connection shall be made to the cloud-based system via a secure VPN tunnel.			
4.17.3.2,	The Internet connection shall provide secure VPN connectivity to a cloud-based system, to the selected CMS/ASCT vendor's system.			
4.17.4.	The communications system shall support real time streaming video from each project cabinet. It shall provide sufficient bandwidth to transport all IP camera video streams from each project cabinet simultaneously, at 720p resolution, 15 frames per second, H.264 compression.			
4.17.5.	The communications system shall support the ability to monitor the status of all IP addressable devices within the entire system with tools such as network management systems.			
4.17.6.	The communications system shall connect to existing fiber optic cable as shown in the Plans for the connection to the cloud-based system.			
4.17.6.1.	The wireless communications links shall provide the requisite data capacity to meet all required functionality.			
4.17.6.2.	The wireless communications links shall provide TCP/IP communications to the project locations.			
4.18.	Maintenance			
4.18.1.	At any time that operating software updates are released by the Controller Unit 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 controller units without any assistance or supervision from any other agency, firm, or persons. The controller 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. The controller cabinet door open function shall be logged by the MaineDOT cloud-based software.			

Requirement Number	System Requirement	Existing System Complies with Requirement (Yes/No)	Existing System to be Modified to Comply with Requirement (Yes/No)	Explanation for Non-Compliance or Description of Proposed Modification
4.18.2.	At any time that operating software updates are released by the Controller Unit 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.			
4.18.3.	Software updates by the Controller Unit manufacturer shall be made available to the agencies for the operating life of the original Controller Unit product at no additional cost to the agencies, except as expressly identified in the Contract documents.			
4.18.4.	At any time that operating software updates are released by the manufacturer of the traffic signal system control software portion of the cloud-based Software, whether routine enhancement updates, releases to fix software issues, or a combination of both, it shall be possible for personnel from the agencies 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 agency personnel installing software updates.			
4.18.5.	At any time that operating software updates are released by the manufacturer of the traffic signal system control software portion of the cloud-based system, they shall be made available to MaineDOT immediately upon release to the distributor by the manufacturer, including the release notes of the new firmware.			
4.18.6.	Software updates by the manufacturer shall be made available to the agencies for the operating life of the original system product at no additional cost to the agencies, except as expressly identified in the Contract documents.			
4.18.7.	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 ASCT software to allow continued operation with a new windows version when the current Windows™ version no longer receives support from Microsoft.			

Requirement Number	System Requirement	Existing System Complies with Requirement (Yes/No)	Existing System to be Modified to Comply with Requirement (Yes/No)	Explanation for Non-Compliance or Description of Proposed Modification
4.18.8.	Prior to system acceptance the vendor shall be responsible for all system maintenance.			
4.18.9.	After system acceptance the manufacturer and supplier shall be responsible for all system operations and maintenance for a period of three years.			
4.18.10.	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 the Special Provisions.			
4.18.11.	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.			
4.18.12.	During this period the vendor shall provide a unit of the same type to make the intersection operational per the traffic signal timing plan.			
4.18.13.	Each piece of equipment shall carry its own individual warranty from the equipment manufacturer and the supplier.			
4.18.14.	Standard practices and standards compliance shall be adhered to as set forth in the contract documents.			
4.18.15.	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.			

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 traffic signal control system shall meet the following minimum performance standards:

a. General The Central Management System (CMS) and the Adaptive Signal Control Technology (ASCT) system 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. For those locations identified to be operating as part of the ASCT system, individual intersections within a group shall be able to be reassigned to a different operational group via adaptive system 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 CMS and ASCT system and the local controllers 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 controllers to the CMS and the ASCT shall be Ethernet based protocols, serial or FSK communications shall not be allowed.
4. The system and all system controllers shall be able to provide signal priority routing to support Snowplow CV Operations through different signal groups. A written description of compliance with this requirement is included.
5. The CMS and the ASCT shall be installed on a Contractor furnished, supplied and configured cloud-based system. This cloud-based system shall be sized for the "Build" project needs as well as 1000 intersections for future growth. The Contractor shall

supply all additional software and hardware accessories to provide a complete and functional cloud-based CMS and ASCT system.

6. The cloud-based CMS and ASCT system shall be configured to provide remote access to the “Build” intersections as well as system users as designated by MaineDOT and or the Engineer.
7. The cloud-based CMS and ASCT 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 Maine DOT internal network and the Contractor created cloud system for the CMS, ASCT, SPM and the Connected Vehicle (CV) system. This site to site connection shall be in conjunction with Maine DOT IT and follow all network security protocols, permissions and procedures.
9. All access to the cloud-based CMS and ASCT 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 cloud based CSM and ASCT the ability to remotely access, configure and view all detection systems installed within the “Build” project.
11. All client and device based remote access operations to the CMS and ASCT 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 CMS, ASCT, SPM and the Connected Vehicle (CV) system shall communicate directly to all ATC controllers, ATC cabinet assemblies and all in cabinet devices capable of supporting remote access; remote interface units are unacceptable. The system shall provide a continuous once per second, at a minimum, to all controllers and connected devices supplied under the “Build” project.

ADVANCED TRANSPORTATION CONTROLLER (ATC)

The work under this Item shall include the furnishing and installation of an Advanced Transportation Controller (ATC) at each project location as shown on the plans. The ATC controller shall be supplied and installed in Advanced Transportation Controller Cabinets (ATCC) supplied at each project intersection and specified elsewhere in this specification. 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 ATC supplied shall conform to the 2020 MaineDOT Standard Specifications sections 718.07 and as amended under the following requirements:

- The controller units shall include a temperature compensated, minimum 16 lines by 40-character LCD display (320x240 pixel) with LED backlight. The controller operating system (OS) shall be Linux and contain a Flash File System to allow for controller software upgrades.
- For those locations identified as being part of the initial ASCT system, those controller units shall be supplied and installed with controller software that provides for adaptive traffic signal operations based on the monitoring of traffic flow data. All controller units supplied under this project shall contain the appropriate version of the Linux operating system, Board Support Package (BSP), SPaT support and internal processing levels necessary to fully support CMS signal operation as described in these specifications.
- All controllers shall support 1/10th second high-resolution data event logging which provides detailed operational information allowing for the generation of enhanced performance metrics. This would include construction of Purdue Coordination Diagrams, time space diagrams and measures of effectiveness. The controller units shall allow log files to be retrieved remotely or a local connection. The controllers shall also be supplied with the ability to automatically back up log files to an external storage device such as a USB flash drive or SD card or transmitted to a remote server. Log files shall be retained within the controller's local memory for a minimum of 24 hours. Log files shall be provided in CSV format containing the event time stamp, event code and event parameter for each line. The controllers shall be supplied with the ability to automatically back-up the controller data base to an external storage device such as a USB flash drive or SD card after any programming change (either from the keyboard or remotely).
- All controller units supplied as part of the "Build" project, shall be the same as to make, model and firmware version to insure compatibility with both the CMS and ASCT system.

- At any time that ATC controller 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 the agencies to update the software in all its controller units without any assistance or supervision from any other agency, firm, or persons. At any time that operating software updates are released by the Controller Unit manufacturer, they shall be made available to MaineDOT within a reasonable time period. Software updates by the Controller Unit manufacturer shall be made available to MaineDOT for the operating life of the original Controller Unit product at no additional cost to the agencies, except as expressly identified in the Contract documents. A manufacturer or manufacturer's representative support engineer shall be identified as the technical point of contact for the resolution of specific field operational issues including controller, detection and communications related events that are encountered during the execution of this project. The controller unit 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.
- The Contractor shall supply to MaineDOT and the Engineer, in hardcopy and/or electronic version the ATC manufacturer, all release notes from the controller manufacturer of currently supplied and future firmware versions, when they become available. The required supply of release notes to MaineDOT and the Engineer from the manufacturer shall be in place for 10-years. In addition, the Contractor shall notify MaineDOT and the Engineer when the manufacturer releases new controller firmware versions. The Contractor shall remotely deliver to MaineDOT and the Engineer the manufacture released new firmware. The delivery of the firmware shall be via email or secure remote file transfer.
- As a minimum, all ATC controllers shall be supplied and installed to comply with the following requirements. No additional hardware, software items and/or subscription fees/costs shall be needed/allowed to satisfy the requirements as defined in these specifications:
 - Shall be supplied with programming documentation fully defining the coding (compiler and C libraries) used to create the ATC controller applications residing in the unit.
 - Shall be supplied with the source code used to produce and support the Linux kernel environment (Board Support Package).
 - Shall be supplied with a manufactures Software Development tool Kit (SDK) for supplied firmware version to allow for future system modifications/expansions.
 - Shall be designed to operate in the following environmental conditions:
 - -40°C to 74°C operating temperature range
 - -40°C to 85°C storage temperature range
 - 10% to 95% relative humidity (non-condensing)
 - 89 VAC to 135 VAC, 60 Hz

- Shall be supplied with an operating system with an expected useful product life of ten years, minimum.
- Shall have connectors for all external input/output functions that are rigidly defined by the ATC, NTCIP and national standards.
- Based on application, connectors for external input/output functions shall be identical in quantity, size, type, configuration, and pinout for all manufacturer's units used in the "Build" project.
- Shall include a minimum of two 100/1000BaseT Ethernet connectors that provides system communications functions.
- Shall take specific user specified actions when the ATC detects the failure of CMT/ASCT system communication.
- Shall be supplied with all necessary hardware and software elements needed to fully support Connected Autonomous Vehicle (CAV) operations utilizing dual mode DSRC/5G communications.
- Shall be supplied with all necessary ATC hardware, software elements and instruction procedures needed to facilitate the extraction and processing of the SPM data.
- Shall be supplied with 2 USB 2.0 ports, at a minimum.
- Shall be supplied with 2 SDLC ports, at a minimum.
 - The SDLC ports shall be fully functional and operate simultaneously with all other ports.
 - The SDLC ports shall support the following baud rates:
 - SDLC Port 1
 - Asynchronous Rates (bps) 1200 / 2400 / 4800 / 9600 / 19.2k / 38.4k / 57.6k / 115.2k / 230.4k
 - SDLC Port 2 (SIU)
 - Synchronous Rates (bps) 153.6k / 614.4k
- Shall contain real-time context sensitive HELP screens.
- Shall include a time-of-day, day-of-week, week-of-year scheduler.
- Shall include dedicated phase detection inputs, pedestrian detection inputs, and system detection inputs.
- Shall be supplied and installed with the ability of receiving database downloads and sending database uploads to/from a field computer using a locally installed CMS/ASCT client software via an Ethernet cable.
- Shall be supplied with the ability to provide 12 unique preemption inputs.

- Shall contain the ability to alter the controller unit's internal database using a built-in front panel keyboard, using a computer connected to the controller unit with a USB cable or an Ethernet cable, and remotely using the central management system application. In addition, a remote access system shall be provided using Telnet and/or HTTPS.
- Shall include an internal database which stores all configurable parameters, including but not limited to phase timings, phase sequencing, overlaps, coordination parameters, preemption and priority parameters, time base parameters, communications parameters, detection parameters, flashing operation parameters, and security parameters.
- Shall collect and process all high-resolution enumerations as defined in the report "Indiana Traffic Signal Hi Resolution Data Enumerations", dated 2019.
- Shall include detector failure algorithms that takes user defined actions when certain user defined criteria are met.
- Shall be supplied with the ability to generate user defined alarms and alerts.

ADVANCED TRANSPORTATION CONTROLLER CABINET (ATCC)

The work under this Item shall include furnishing and installation of an Advanced Transportation Controller Cabinet (ATCC) at each project location as shown on the plans. The ATCC shall be supplied and installed with the ability to support an ATC, specified elsewhere in this specification. 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 ATC supplied shall conform to the 2020 MaineDOT Standard Specifications sections 718.08 and as amended under the following requirements:

- The controller cabinet assemblies shall be side by side 19” rack mounted version of the Advanced Transportation Controller Cabinet (ATCC) compliant with ATC 5301 v02 as shown on the detail plans.
- The controller cabinets shall be made of aluminum and painted as required by Section 643 of the MaineDOT project requirements.
- The controller cabinets shall be installed and oriented as shown on the plans.
- All equipment installed within the controller cabinets shall be compliant with existing, approved, all applicable ATC, NTCIP and national standards as well as all applicable state and local requirements.
- All cabinets shall be electrically bonded and grounded to comply with Section 643, the National Electrical Code (NEC) and the National Electrical Safety Code (NESC), latest versions of each document.
- The cabinets shall be supplied with a generator panel. The generator panel shall consist of a manual transfer switch and a twist-lock connector for generator hookup. The manual generator transfer switch shall be Reliance Controls model CSR302 or approved equal. The transfer switch and twist-lock connector shall be located inside a generator access panel with a separate lockable door mounted on the lower left, exterior of the control side wall of the cabinet. The door shall be equipped with a tamper resistant hinge. The generator panel assembly shall be housed in a heavy-duty, vandal resistant, weatherproof, dustproof enclosure designed for exterior applications. The connection to an external generator shall be a waterproof, secure connection. The connection shall allow authorized personnel; to access, connect and secure an external electrical source to the cabinet for power restoration. The generator panel door shall be constructed with a weatherproof seal and supplied with a lock accessed with a Corbin (#2) key.
- The cabinets shall be supplied with detector test switch panel. This panel shall be rack mounted and located above the controller. There shall be a total of twenty-four (24) switches to allow for the manual placement of detector calls into the controller. Each switch shall be clearly labelled as to input channel. Each switch position shall correspond to the same controller input; switch one is for controller input channel one,

switch two is for controller input channel 2, etc. Each switch shall have a corresponding red LED light to indicate when the switch places a call to the controller in the “UP” (constant call) or “Down” (momentary call) position. The switch labels shall define the channels and switch position functions. The labels shall be factory installed by the cabinet manufacturer. The use of aftermarket printed, or handwritten labels shall not be allowed. Detector switches shall be three position and function as follows:

- Up Position = Provides a constant call
 - Center Position = Normal operation
 - Down Position = Provides a momentary call
-
- The Contractor shall supply and install four (4) ground rod electrode Cadwelded together with a ground conductor attached. The four (4) ground electrode shall be installed such that the top of each rod is twelve (12) inches below grade. The Contractor shall restore the ground surface to meet pre-installation conditions. The ground conductor shall be routed into the cabinet and connected to the cabinet electrical ground. The maximum earth to ground impedance shall be 5 ohms.
 - Each ATCC shall be supplied and installed with an activated Field Monitoring Unit (FMU) that is in compliance with this specification and the communications network required as part of this project.
 - The ATCC shall be designed, constructed and installed with all the necessary provisions to comply with the NFPA 70E requirements. The ATCC shall include a by-pass electric meter trough mounted on the exterior, upper right-side wall of the cabinet. The type, model and wiring of the meter trough shall be in full compliance with all relevant NEC, NESC, MaineDOT and local electric utility requirements. The Contractor shall provide a compliance certification stating that the cabinets supplied as part of this project meet NFPA 70E requirements.
 - All new ATCC shall be designed and manufactured to eliminate arc flash. All electrical equipment shall be dead front, no open terminals, busbars, breakers, or exposed terminal strips. The cabinet shall be designed, constructed and installed with all necessary provisions to comply with the latest NFPA 70E requirements. All electrically live parts over 50 volts shall be covered with Lexan or a suitable physical barrier to eliminate the possibility of arc flash.
 - Electrical filtering/surge protection shall be supplied and installed in each cabinet in accordance with ATCC 5301 v02 requirements and the manufacturer’s recommendations. At a minimum, surge suppression shall be provided for incoming electric utility power conductors, all signal control circuits, vehicle detection, pedestrian detection, communications and preemption system terminations. The use of a single fuse for surge suppression shall not be allowed.

- The CMU shall be configured such that when the “Datakey” is removed the signal shall revert into “Flash” operation. This requirement shall not be conditional based on the Opening/Closing of any cabinet door.
- The Contractor shall supply a full set of cabinet wiring diagrams. The wiring diagrams shall depict all of the as-built cabinet wiring routing and terminations. Each in cabinet device (switches, relays, connectors, surge protection devices, etc.) shall be labeled on the wiring diagram as to the function the device serves.
- The Contractor shall supply and install identification tags on all cables routed into the cabinet. This includes, but not limited to, communication cables, signal cables, vehicle detection cables, preemption receiver cables, Ethernet cables, and power cables. The tags shall be designed for outdoor applications and be an engraved type tag consisting of a two layer permanently bonded plastic. The tags shall be black with white lettering. The size/letter font of the tag shall be large enough to display a legible message without being too large that it would unnecessarily clutter the cable space at the bottom of the cabinet. A sample tag for each of the cable types shall be submitted to the Engineer for approval prior to installation. The tag message per cable shall be as follows:
 - Signal Cable – One tag per vehicle or pedestrian phase. For a three-circuit vehicle phase, one tag shall be installed for the three signal conductors. For a two-circuit pedestrian phase, one tag shall be installed for the two signal conductors. The tag shall contain phase/overlap designation as well as the intersection crossing.
 - Vehicle Detection – One tag per vehicle detector cable. Tag shall contain phase assignment, detector number and approach.
 - Communications Cable– One tag per cable. Tag shall contain the number of strands for the fiber optic cable. The tag shall also identify the location of the traffic signal control cabinet the cable is being routed from.
 - Preemption Receiver Cable – One tag per receiver. Tag shall contain the approach name and the preemption input channel number.
- All equipment installed within the controller cabinet shall be designed to operate in the following environmental conditions:
 - - 40°C to 74°C operating temperature range
 - - 40°C to 85°C storage temperature range
 - 10% to 95% relative humidity (non-condensing)

CENTRAL MANAGEMENT SYSTEM (CMS)

The work under this Item shall include the furnishing and installation of a Central Management System (CMS) required to interface with the local intersection controllers. As part of this project, the Contractor shall supply and include all software licenses, cloud-based costs, system testing, system training, and all other equipment, materials, appurtenances and incidental costs necessary to provide a complete, fully operational CMS as specific herein and as shown on the plans. The Contractor shall integrate the proposed CMS to be installed under this project on a Contractor created cloud-based system. The Contractor shall furnish and install the means whereby MaineDOT and others shall be able to monitor and control the system remotely, if allowed by the MaineDOT 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 CMS shall be the overall remote monitoring interface for all system operations and configurations, with the expectation of the functions supported by the Field Monitoring Units. The CMS, ASCT, SPM and the Connected Vehicle (CV) system shall operate within the same cloud-based hierarchy utilizing the same operating system to provide for the functionality required by these specifications.

The CMS, ASCT, SPM and the Connected Vehicle (CV) systems shall include a Data Base (DB) management tool that shall allow Maine DOT to perform queries on all collected device data. This DB management tool shall be integrated within the CMS, ASCT, SPM and the Connected Vehicle (CV) systems and shall provide user definable scenarios to allow for detailed database analysis based on MaineDOT requirements in relation to stored CMS, ASCT, SPM and the Connected Vehicle (CV) system data.

The CMS shall be supplied and configured with a high-level dashboard allowing MaineDOT to see the current status and conditions of all intersections included in the “Build” project.

For CMS intersections located within Augusta, Sanford, Waterville and Winslow, communications from the cloud-based system to the on-street traffic signal controllers shall be made through fiber optic interconnect cable connected back to existing city internet connections and or the Field Monitoring Unit (FMU) as shown on the plans (See sheet K of the plan set). The Contractor shall furnish and install all materials necessary for a complete and operational fiber optic interconnection to applicable project intersections as shown on the plans. All connections to the CMS cloud-based system shall be via a secure VPN network. All splices shall be watertight fusion splices. The Contractor shall coordinate all fiber optic connection with the towns IT departments as shown on the plans.

The CMS, ASCT, SPM and the Connected Vehicle (CV) systems shall support communications to all ATC intersection controllers. ATC intersection controllers shall be supplied with the ability of communicating with the system, at a minimum rate of once-per-second.

The CMS system clock shall utilize the per intersection internet network connection to provide for “Time Synchronization” to all ATCC devices. The CMS central clock shall be set to the

“National Institute of Standards and Technology” (NIST) and/or WorldTimeServer.com. The time sync to all ATC controllers shall occur once per day at 2:00 AM.

In addition to the requirements contained elsewhere within these specifications, the CMS shall be supplied and installed with the following functionality. No additional hardware or software items shall be needed to enable the operations listed:

- Shall be supplied and installed with the ability to remotely monitor and control all traffic signal intersection installed under this project.
- Shall be supplied and installed to support the latest nationally adopted versions of NTCIP 1201 and NTCIP 1202 to allow for the CMS to communicate and transmit data elements from different manufacturers ATC controllers in real-time.
- Shall be resident on a cloud-based system and configured to allow for secure, remote monitoring and control of the system for operators and staff as designated by MaineDOT.
- Shall allow for full monitoring and control capabilities of the system, limited only by virtue of the user privileges assigned to specific users by the System Administrator, not by location such as TMC vs. remote access.
- Shall be programmed with varying levels of access privileges for up to 20 initial users. MaineDOT will provide the user list and privileges that will be assigned to each user.
- Shall be capable of being accessed from any web enabled device, including computers, tablets, and smart phones as limited by security requirements.
- Shall be supplied and installed with the ability of supporting new technologies as they become available.
- Shall be supplied and installed with the ability of supporting a minimum of 1000 signalized intersection.
- The CMS shall log all user accesses to system controller units, including but not limited to username, date, and time.
- Shall be supplied and installed with the ability of being accessed from any web enabled device, including computers, tablets, and smart phones as limited based on security requirements.
- Shall be supplied and installed with the ability of uploading the entire controller database and download user selectable parameters such as controller timing data.
- Shall be supplied and installed with the ability for labeling traffic controller alarms and displaying the user defined name when the alarm is active.
- Shall be supplied and installed with a system-wide, real time status display map. This map shall support common GIS map navigation, Google based maps and have the ability to incorporate standard ESRI vector/image files and support user selectable levels.

- Shall be supplied and installed with the ability of displaying the operational and alarm status of each system controller, system link and/or detector status as well as displaying intersection name, and operational status. It shall also be possible for the system-wide status map to be displayed on user workstations. This system wide status map shall display alarms, reports, failures and other user defined operational parameters in real time. Contractor shall coordinate all work with MaineDOT OIT.
- Shall be supplied and installed with the ability of displaying real time status of all CMS system traffic controllers. This includes real time status of adaptive and non-adaptive operation. In addition to the requirements contained elsewhere within these specifications, the status display shall include the current state of phase output status and vehicle/pedestrian detection.
- Shall be supplied and installed with the ability of displaying time space diagrams, in real time, including green band progression and speed.
- Shall be supplied and installed with the ability of supporting system reports and event logging functions. Reports shall be recorded to disk, viewable on workstations, remote access clients or printed as selected by the user.
- Shall be supplied and installed with the ability of supporting central scheduler functions including traffic controller/group time operations, device log collection, collection of traffic data, email notifications and reports, date/time broadcast to all controllers and timing parameter audit reports.
- Shall be supplied and installed with the ability of providing system security functions including username and password for each user and access level restrictions settable by the system administrator. Contractor shall coordinate all work with MaineDOT IT and the Engineer in regard to network/system security.
- Shall be a full production, fully tested and certified product (certified to be compliant with all standards with which it is required to be compliant), with a minimum of 10 identical production systems in continuous operation, running intersections within the United States.
- Shall be supplied and installed with an integrated adaptive control software as part of the CMS contained in user programmable configuration database format. Adaptive control software supplied with a script only level software will not be accepted.
- Shall allow the system operator to manually configure groups of intersections that operate in a coordinated manner.
- Shall provide database upload and download capability to all intersection controller units under its control. The controller shall remain on stop and go during upload/download operations.
- Shall have a graphical user interface that is consistent with the Windows™ operating system. The system software shall be designed so that additional signalized locations may be added to the map display by agency personnel

- Shall provide multiple intersection maps showing current real time status for each intersection in the system.
- Shall include a user programmable scheduler that shall allow scheduled operations to take place, including but not limited to, controller unit operations and device log retrieval.
- Shall be configured to require multi-level user authentication that prevents unauthorized users from logging on to the cloud-based system (CMS/ASCT).
- Shall be supplied and installed with the ability to implement control strategies based on traffic conditions, including but not limited to, controller time-of-day operations and patterns.
- Shall manage/restrict remote access to the system. All access to the system shall be by encrypted VPN tunnels, no open connections shall be allowed.
- Shall have the ability to immediately notify designated staff of alarms and alerts. Alarms at MaineDOT's TMC shall include an audible option for selected alarms. The volume and tone type shall be user selectable. A single audible alarm shall be provided for an alarm which re-occurs within a user defined period.
- Shall be supplied with the ability to collect high resolution data from each ATC unit.
- Shall be supplied with the ability to store all operational data for the CMS/ASCT signal timing parameters calculated by the adaptive system and export selected data in an agency usable format.
- Shall be supplied with the ability to report and display all signal performance data for the CMS/ASCT in user defined sampling periods.
- Shall be programmed to generate historic and real-time reports that effectively support operations, maintenance and reporting of system performance and traffic conditions. These historic reports shall be available in 15 minute or hourly increments for user selected sensors and be available by the day, week or month.
- Shall be supplied with the ability for system wide, controller-based detector failure monitoring that will trigger user defined actions when user defined conditions are met.
- Shall be supplied with the ability to include user defined alarms and alerts. The following conditions shall trigger an immediate alarm report via on-screen, SMS and email notification;
 - Power On/Off
 - Cabinet Flash
 - Manual Control
 - Door Open
 - Detector Failure
 - Communications Failure

Split Monitor

The CMS shall include the capability to display, from stored data, a split monitor report for intersections operating non-adaptive, coordinated. This split monitor report shall consist of an online report, updated every cycle(s) or sample time defined by the user, that gives the operator a comparison of actual programmed split times, in seconds, versus the actual split times utilized by each phase, in seconds, during the defined sample time. Split monitor reports shall have the ability to store and retrieve the required information necessary to produce the Split Monitor report at a later date from the system stored data. In addition to the requirements contained elsewhere within these specifications, the split monitor report shall show the following:

- Location name/number
- Time and date the report was initiated
- Programmed split times for each phase (seconds)
- Coordination pattern in effect
- Actual split time used per phase, per cycle (seconds)

Active Time-Space Diagram

The CMS shall provide a real-time dynamic display showing all intersections within a user selected signal group. The Active Time Space Diagram display shall also graphically show:

- The relative position of each intersection in the signal group as compared to the adjacent intersections.
- The signal status of each signal (red or green).
- The system green band moving along the display updating at a minimum of once per second from real time field data.
- The impact of early main street green returns on the system.

Schedules

The CMS shall have the ability of creating/modifying a time schedule to control system commands. The time schedule shall be supplied with the ability to control various functions and operations for individual intersections and groups of intersections. scheduling capability shall include time-of-day/day-of-week/week-of-year schedules with a one-minute resolution. The CMS shall automatically assign the schedule for each day to its corresponding day of week. In addition, a calendar scheduler shall be used to define which day of the week or generic holiday schedule will be used in lieu of the normal day of the week schedule for a particular day of the year.

The CMS scheduling ability shall include two types of schedules:

- Permanent (repeating) schedules
- Temporary (one-time event) schedules

All CMS functions executed by the system shall be recorded in the system log. The system log shall identify the source of the executed function as initiated by the scheduler or an interactive user, including identification of whether it represents a permanent or temporarily scheduled function. Permanent schedules shall contain the schedule of events for each day of the week and several generic holidays. Functions shall be stored in the permanent schedule and remain unchanged after they have been executed. Temporary schedules shall provide the capability of scheduling one-time events in addition to the events scheduled for the current day. Commands stored in the temporary schedule shall be deleted following their execution. A one-time event shall be scheduled to execute any time in the future.

User Interface

All CMS traffic system reports, graphic displays, and dialogues shall be functions of the user interface software running on individual clients. Each client shall access data as needed from the CMS traffic control database system.

Programming Standards

All client user interface functions shall be implemented using window-based graphical user interface (GUI) concepts conforming to Microsoft Windows Standards. The GUI shall use a Microsoft Windows platform to manage the CMS client environment.

Object Library

The CMS user interface shall include an object library that contains dynamic icon objects for system control and monitoring devices. These objects shall include as a minimum traffic signals, pedestrian signals, CV elements, video detection locations and detection zones. The library shall also include an interactive editor for placing these objects within dynamic graphic screens. The system shall allow the user to hyper link dynamic graphics objects directly to system database elements without programming or recompilation. The library shall also include dynamic objects allowing the user to define directional roadway links using a simple vector drawing facility. Proper representation of directional status attributes shall be available at all zoom levels. The use of stock intersection layout drawings shall not be allowed.

Graphical User Interface (GUI)

All operators accessing the CMS and ASTC system shall have security access based on their login password as assigned by the system administrator. The GUI shall use icons and vectors, in conjunction with a pointing device to interact with and allow an operator to enter decisions, draw graphics, issue commands, and receive information from the system. The GUI shall include an intersection/link base map with windowed table reports and management input windows. The base map shall be GIS, Google and or CAD drawings. The GUI shall provide access to all monitoring and control options from a single user interface. As a result, all operator actions shall be immediately visible as graphical status changes and onscreen display windows. The GUI shall

provide interactive mechanisms to assist in creating, editing, and modifying dynamic graphic screens that are linked to system dynamic elements. These dynamic condition maps shall provide a simple mechanism for system navigation, presentation of status, and selections within the user interface.

The user interface available at each client shall simultaneously support the following operations by the operator:

- Generate and display in real-time intersection status screens, section level maps, and system level maps.
- Issue manual commands to the intersection controllers.
- Provide intersection controller database management as follows:
- Upload database from controllers.
- Edit database and save on disk.
- Download database to controllers.
- Compare field and central databases.
- Retrieve detector logs and event logs from local controllers.
- Print event reports from system SQL database.
- Print or plot system detector data from system SQL database.

Graphical Displays

The CMS shall allow the user to access functions using map-based graphical displays. The CMS shall use graphical icons on the graphical displays to represent system devices. The graphical icons shall provide access to traffic control data (signal timing, geometrics, etc.), real-time data (intersection, link status, etc.), the database, and graphical image files. Graphical symbols (icons) shall be employed to activate common functions. Graphics shall be used to provide added capabilities for portraying system status and soliciting input from operators.

The graphic map shall act as a system selection palate enabling the operator to make a selection by pointing to a particular system object installed within the ATCC that allows for remote monitoring and control. When that system object is selected, a more detailed status window shall be displayed. The CMS GUI shall provide an interactive mechanism to assist in creating, editing, and modifying dynamic graphic screens that are linked to system dynamic elements. These dynamic condition maps shall provide a simple mechanism for system navigation, presentation of status, and selections within the user interface. Multiple traffic condition views shall be supported simultaneously on the desktop including multiple detailed interactive views. The user shall be able to create a new window by clicking the appropriate button in the toolbar. Traffic condition graphics displays shall contain multiple levels of background images.

Background map images shall be capable of containing commercial vector images such as Google Maps, NavTech, Etak, Tiger and TIFF geographically accurate map scanned images. These images shall be compatible with standard graphical raster or vector image file types, common paint/drawing programs, and other packages that allow export of

drawings in vector and/or bitmap form. These images shall be used as the display layers of real-time graphics displays. Zooming and scrolling and automatic control layers of graphic presentation shall be included with the system.

Intersection Maps:

- Graphical representation of the intersection geometry including curb lines and approach/departure lane configurations (scaled maps are not required)
- Intersection ID
- Municipality
- Street Names
- System Name
- North Arrow
- Real Time Signal Display Status; Vehicle and Pedestrian
- Vehicle and System Detector Per Phase Call Status
- System Parameters Status (Cycle, Split, Offset)
- Intersection Operational Status (Flash, Coordinated, Free, On-line, Preemption)
- Controller Cabinet Location (static)
- Time/Date

System Map:

- Graphical representation of the system showing all intersections within the Subsystem (scaled maps are not required)
 - Municipality
 - Street Names
 - Subsystem Number, if applicable
 - North Arrow
 - Coordinated Phase Green at Each Location
 - System Parameters Status (Cycle, Split, Offset)
 - System Detector Status
 - Intersection Operational Status (Flash, Coordinated, Free, On-line, Preemption).
- Intersection status screens shall provide an exploded dynamic display of local intersection geometries showing, via color code and icon symbols, the status of each item of field hardware (controllers, detectors, on-line controller status, etc.). The Intersection Status display shall also display text fields providing current status data.
 - All text data shall be displayed in common traffic engineering terms. All information shall be shown simultaneously and continuously displayed until canceled by the operator. Displays shall not affect system operation. All displays shall have a maximum three-second resolution.

- Toolbar
 - The workspace session window shall display a toolbar.
 - The toolbar shall contain buttons for opening windows, setting session parameters, or invoking any other action or activity that affects the entire session.
 - The main workspace shall contain an action bar comprising menu selections for operator commands and actions.
 - Windows may also contain action bars and controls. Actions supported by and pertaining to a single window shall be invoked through that window's action bar menu or controls internal to the window itself.
 - All action bar menus shall support a set of keyboard equivalent accelerators and arrow key navigation of the menu bar and individual pull-down menus.
 - Menu and dialogue box options that are not appropriate in a particular context or not available to a given user shall be "grayed-out" and unavailable for selection.
 - It shall be possible to select an object by entering its identification number on a data entry line on the GUI.

Data Base Management

The CMS shall use a database management system to allow for the programming of the intersection controller databases. Each intersection controller shall have separate database programming pages. These pages shall contain all the programming options/settings unique to each intersection. All programming entries shall primarily consist of numerical values, YES/NO or ON/OFF entries. During program entry, the new data shall overwrite the old data. In the event that the data is out of range based on predefined data formats (NEMA, NTCIP, etc.), changes shall not be permitted and an error message on the display or a warning tone shall alert the user. Common traffic engineering terminology shall be used throughout the programming displays. Display organization and data entry approach shall allow system operators to operate the central office software without using reference cards or manuals.

All data stored within the CMS, ASCT, SPM and the Connected Vehicle (CV) system Data Base (DB) shall be archived utilizing individual timestamps.

The CMS, ASCT, SPM and the Connected Vehicle (CV) systems shall include a Data Base (DB) management tool that shall allow Maine DOT to perform queries on all collected device data. This DB management tool shall be integrated within the CMS, ASCT, SPM and the Connected Vehicle (CV) systems and shall provide user definable scenarios to allow for detailed database analysis based on MaineDOT requirements in relation to stored CMS, ASCT, SPM and the Connected Vehicle (CV) system data

Data Upload/Download

All devices shall use Ethernet based upload/download systems for database programming. The CMS shall provide for ability to upload/download the entire database, or user definable portions of the database, from/to the selected ATCC Ethernet enabled device. All upload/download data shall use block transfer techniques and be verified by block checksum method or equivalent means. Non-verified data shall cause termination of the upload/download with no data transfer taking place. Errors associated with improper transmission of data between the CMS and the ATCC devices shall not result in the intersection reverting to “Flash Operation”. In addition, upload techniques shall not cause the ATCC devices to go offline; traffic control operation shall remain intact in all respects. It shall not be possible to load erroneous interval and configuration information to the ATCC devices.

Following an upload, it shall be possible to compare the database of an intersection controller to the database on file. The compare function shall identify any differences between uploaded and file data.

Monitoring and Alarms

The CMS shall transmit alarms to any assigned users/devices based on user defined parameters. All alarms shall be recorded in the event log. Significant alarms, as defined by the system administrator, shall be brought to the immediate attention of users via a “heads-up” alarm feature, SMS message and/or email alert. Heads-up alarms shall be provided as pop-up alerts on client systems. Each alert shall contain a message that notifies a user of the alarm condition. For example, if a status message from a controller is returned that indicates a critical controller event, such as cabinet flash, a pop-up window will be displayed on the user’s workstation notifying them of the condition.

SIGNAL PERFORMANCE MEASURES (SPM)

The CMS/ASCT system shall be supplied with a dashboard to allow MaineDOT to be able to monitor traffic signal operations and traffic conditions, in real time, on arterial roadways and/or individual intersections. This dashboard shall have the ability to be accessed remotely via secure web page interface. This SPM dashboard shall be furnished, installed and configured by the Contractor with no additional recurring costs to MaineDOT. 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.

a. Dashboard

The default display setting of the dashboard shall be a split screen display, showing a statewide Google type street map that is populated with icons depicting all intersections included within the “Build” project. These per location icons shall be dynamically colored based on their current real-time status. In addition, a list of all intersections shall be shown on the screen simultaneously with the state-wide map. The intersection list shall be capable of being sorted by predefined methods (alphabetically, alarm status, fault status, etc.).

In addition to the default display setting, the dashboard shall be user adjustable to alter the layout and information that can be displayed. The information that shall be made available to the end user via hover over icon and/or drill down displays in the dashboard shall be as follows:

- 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

b. 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:

i. Planning

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

ii. Operations

1. Arrival on Green (AOG)
2. Arrival on Red (AOR)
3. Split Monitoring
4. Preempt Service Requests
5. Approach Delay
6. Split Failure

iii. Maintenance

1. Vehicle Detector Faults (Constant Call/No Call)
2. Pedestrian Detector Fault (Stuck Button)
3. Signal on Flash
4. Power Failure
5. Communications Failure
6. 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 local controllers. This work includes all intersection controllers, software licenses, cloud-based costs, system testing, system training, 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 Build” 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 Roadside Units (RSU) and On-Board Units (OBU). 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 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.
- In locations where the SPaT Infrastructure System supports Signal Preemption, the SPaT Infrastructure System shall receive preemption status from the Traffic Signal System.
- 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.
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- 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.
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- 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 each 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 were 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 programed 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 “Build” 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 programmed 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 all intersections as part of the “Build” project. The geo-fence zones shall initially be programmed 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 programmed 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 all intersections as part of the “Build” project. The geo-fence zones shall initially be programmed 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 system operation. 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. The Contractor shall supply Dual Mode C-V2X OBU for five (5) emergency vehicles. No additional hardware or software costs and/or subscription fees/costs shall be allowed to enable the EVP 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 detection zone at maximum broadcast distance at all intersections as part of the “Build” 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 “Build” project intersections. The Contractor shall configure all relevant ATCC 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 supply, install and interface a Dual Mode C-V2X OBU into five (5) existing MaineDOT snowplow vehicles. No additional hardware or software costs and/or subscription fees/costs shall be allowed to enable the snowplow operations as described. Any hardware, software and subscription fees shall be considered incidental and included as part of the bid price. At a minimum, the OBU shall be fully integrated by the Contractor to the following interfaces:

- Snowplow vehicle OBU2 port
- Snowplow blade control unit
- Snowplow spreader control unit

The Contractor shall define and create geo-fence detection zone at all intersections as part of the “Build” 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 “Build” project intersections. The Contractor shall configure all relevant ATCC 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 supply Dual Mode C-V2X OBU for five (5) freight vehicles. No additional hardware or software costs and/or subscription fees/costs shall be allowed to enable the freight operations 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 detection zone at all intersections as part of the “Build” 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 the OBU installed in the freight vehicle. The priority message shall be received by the DSRC/CV interface at each of the “Build” project intersections. The Contractor shall configure all relevant ATCC 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 all intersections as part of the “Build” 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 all intersections as part of the “Build” 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 programed 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 “Build” project. The geo-fence zones shall initially be programed 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 programed 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 “Build” project. The geo-fence zones shall initially be programed 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.

ADAPTIVE SIGNAL CONTROL TECHNOLOGY (ASCT) SYSTEM

The work under this Item shall include the furnishing and installation of an Adaptive Signal Control Technology (ASCT) system required to interface with the local intersection controllers. As part of this project, the Contractor shall supply and include all software licenses, cloud-based costs, system testing, system training, and all other equipment, materials, appurtenances and incidental costs necessary to provide a complete, fully operational adaptive traffic signal system as specific herein and as shown on the plans. The Contractor shall integrate the proposed adaptive system to be installed under this project on a Contractor created cloud-based adaptive system. The Contractor shall furnish and install the means whereby MaineDOT and others shall be able to monitor and control the system remotely, if 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 ASCT shall be from the same manufacture as the CMS; structured as a fully integrated system module. This requirement facilitates compatibility between adaptive and non-adaptive system operations. The supply and installation of an ASCT by a manufacture different from the CMS shall not be allowed. For example, if the ASCT system for whatever reason fails to function or generates a local error, the CMS system will be the notifying agent.

For ASCT intersections located within Augusta, Sanford, Waterville, Winslow, communications from the cloud-based ASCT system to the on-street traffic signal controllers shall be made through fiber optic interconnect cable connected back to existing city internet connections and or the Field Monitoring Unit (FMU) as shown on the plans (See sheet K of the plan set). The Contractor shall furnish and install all materials necessary for a complete and operational fiber optic interconnection to all project intersections as shown on the plans. All connections to the ASCT cloud-based system shall be via a secure VPN network. All splices shall be above ground consisting of watertight fusion or copper splices as directed by MaineDOT and or the Engineer. The Contractor shall coordinate all fiber optic connections with the applicable Town's IT departments, as shown on the plans.

The Contractor shall furnish, install, test and make fully operational a cloud-based ASCT system supplied as part of this project.

In addition to the requirements contained elsewhere within these specifications, the ASCT system shall be supplied and installed with the following functionality:

- Alter the timing of signal controllers when current measured traffic conditions meet user-defined criteria providing adequate capacity to meet demand.
- Alter the timing of signal controllers when current measured traffic conditions meet user-defined criteria preventing queues from exceeding the storage capacity between intersections at specified locations.
- Alter the timing of signal controllers when current measured traffic conditions meet user-defined criteria providing equitable distribution of green times.
- Alter the timing of signal controllers when current measured traffic conditions meet user-defined criteria providing two-way progression on coordinated routes.

- Alter the timing of signal controllers when current measured traffic conditions meet user-defined criteria providing for non-coordinated operation (free) at one or more system locations.
- Shall respond in real time when user defined levels of traffic demand are detected by the system.
- Shall be provided with the ability for the system operator to adjust the level of system responsiveness.
- Shall limit the change in consecutive cycle lengths to be less than a user defined value.
- Shall limit the change in phase times between consecutive cycles to be less than a user defined value.
- Shall limit the frequency of change in coordinated phase(s) based on a user defined value.
- Shall support Connected Autonomous Vehicle (CAV) operations.
- Shall operate non-adaptively in accordance with a user-defined time of day schedule to accommodate scheduled special events.
- Shall operate non-adaptively when the system operator manually commands the system to cease adaptive operation.
- Shall provide user-settable maximum and minimum phase times. Multiple maximum times shall be available by Time of Day scheduling and/or via manual selection.
- Shall not prevent the traffic signal controller from servicing the next sequential phase when there is vehicle or pedestrian demand for that phase.
- Shall provide a user-defined maximum value for each phase at each system controller.
- Shall not provide a phase length longer than a user-defined maximum value.
- Shall not allow a phase length shorter than the minimum allowed from the summation
- Shall determine the coordinated route(s) based on traffic conditions.
- Shall determine the coordinated routes based on a user defined schedule.
- Shall select a stored coordinated route(s) based on a user defined schedule.
- Shall be able to manually implement a stored coordinated route(s) by system operator command.
- Shall support FYA and FRA signal operations.
- Shall not omit phases containing a valid vehicle or pedestrian call.
- Shall assign unused time from preceding phases that terminate early to a user-specified phase as follows:
 - Next phase
 - Next coordinated phase
 - User specified non-coordinated phase
- Shall be supplied and installed with the ability of selecting a cycle length range based on a time of day schedule.

- Shall be supplied and installed with the ability of dynamically calculating a phase length (split) for all phases at each location based on the current coordination strategy and system detector data.
- Shall calculate offsets to suit the current coordination strategy along a coordinated route(s) within the system.
- Shall calculate a cycle length for each cycle based on user-defined optimization objectives and system detector data.
- Shall detect the presence of queues at pre-defined locations.
- Shall respond in real time when user-defined levels of change in traffic conditions are detected.
- Shall not alter the order of phases at any location. Phases without active detection may be skipped.
- When queues are detected at pre-defined locations, the ASCT system shall automatically adjust signal timings at signalized locations in proximity to the queueing condition, execute a user-defined timing plan or user-defined operational mode.
- Shall detect and automatically accommodate queues from traffic generators internal and at the boundaries of the ASCT system.
- Shall allow the operator to specify which phase, or phases, receives unused time from a preceding phase.
- Shall allow flexible timing of non-coordinated phases while maintaining coordination.
- Shall provide coordination provisions to fully support existing signal sequencing and operations. This includes supporting the number of phases, overlaps and rings currently in place at all existing project locations.
- Shall allow any phase(s) to be designated as the coordinated phase(s), changeable by time of day or coordination pattern. This feature shall only be in effect during adaptive control.
- Shall automatically operate under CMS control when adaptive equipment required to support system operation fails. If remote control from the CMS is unavailable due to hardware, software or communications failures, the local controller will revert to time-based coordination. The Contractor shall program each local intersection controller with time-based coordination plans and event time scheduling consistent with coordination and TOD/DOW/WOY scheduling.
- Shall be provided with the ability to allow the system operator to manually override adaptive operation control system-wide or on an individual intersection basis, or by user defined intersection groupings.
- Shall operate non-adaptively when a user specified system detector(s) fails.
- Shall operate non-adaptively when a user specified number of system detectors fail.
- Shall operate non-adaptively when a user specified communications link fails.
- Shall be supplied and installed with the ability to provide a fall back state that allows for signal coordination to continue in the event of a system level failure such as loss of communications or a malfunction at the MaineDOT TMC.

- Shall be supplied and installed with the ability to provide a fall back state that allows for signal coordination to continue in the event of a cabinet level failure such as a defective vehicle/pedestrian detector.
- Shall be supplied and installed with the ability to provide fall back operation which will support system wide, as well as user defined sub-grouping of coordination based on a common cycle length as well as supporting multiple cycles, splits and offsets suitable for use during AM peak, PM peak and off-peak periods.
- Shall maintain adaptive coordinated operation, operating in the controller background, during an active preemption event. This capability shall minimize the length of time required for the controller to revert back to a non-resynching, adaptive operation after a preemption event has occurred.
- Shall be supplied and installed with the ability to limit the frequency of cycle changes and provide limits for minimum and maximum cycle lengths based on time of day/day of week and seasonal programming.
- Shall be programable to provide user selectable strategies to support one or two-way progression, cross arterial coordination, queue management and critical intersection accommodation based on manual override or automatically based on real time traffic conditions.
- Shall accommodate the following custom pedestrian features:
 - Exclusive pedestrian operation
 - Concurrent pedestrian operation
 - Overlapping phase pedestrian operation
 - Leading pedestrian interval (LPI) operation
 - Pedestrian APS systems.
 - Passive pedestrian detection technology
- Shall be provided with the ability to facilitate bicycle travel through the signalized intersections.
- Shall be provided with the ability to configure local and system level controls to facilitate freight and snowplow movement through the signalized intersections.
- Shall provide coordination for movements between intersections based on traffic conditions.
- Shall detect and automatically accommodate queues from traffic generators internal to the within the boundaries of the ASCT system.
- Shall store and report data used to calculate signal timings and have the data available for subsequent analysis.
- Shall store all operational data and signal timing parameters calculated by the adaptive system and export selected data in an agency usable format.

Technical Support

Telephone technical support shall be provided to MaineDOT for ten (10) years by the ATC, ATCC, 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. The presence of existing local support will be a factor that will be considered by MaineDOT in system selection.

Remote technical support for the CMS/ASCT shall be provided to MaineDOT for ten (10) years by the manufacturer with 24/7 access with a response time of 2 hours. The cost for this remote technical support shall be included in the bid price for the project.

Start-up and System Loading

The system supplier shall initiate complete system operation including ATC, ATCC, CMS, ASCT, 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/ASCT 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.

System Training

Under this Item, the Contractor shall provide a minimum of 12 days of personnel training in the use of all hardware and software elements supplied as part of this project. The Contractor is to coordinate with MaineDOT as to the exact location and time of the training. It is the responsibility of the Contractor to provide training manuals, class notes, and other instructional materials for all attendees at the training session. Training shall be provided for twenty (20) participants.

No training shall begin unless and until the final inspection process indicates, in the opinion of the Resident and Design Engineers, that the adaptive system is sufficiently complete and operational such that training would be useful at the time.

The Contractor shall provide hardware and software training in the configuration, operation, troubleshooting, administration, calibration, and maintenance of the ATC, ATCC, CMS, ASCT, 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/ASCT operations.

The Contractor shall develop and supply all necessary manuals, displays, class notes, and visual aids, and other instructional materials furnished by equipment manufacturers. Instructional materials shall include all data sheets and manuals from manufacturers for all contract items supplied. The required manuals shall be provided in loose-leaf binder form to all participants. Where appropriate, training shall include hands-on training of supplied system elements. The Contractor shall also supply electronic copies of all handout materials.

The Contractor shall indicate on the Project schedule the calendar week in which they propose to begin this training program. The training shall be conducted in eight-hour segments spread over a maximum of six (6) months. A detailed training plan and resumes of the trainers shall be submitted for review and approval at least 30 days prior to the start of the proposed training. The training plan shall include copies of all presentations, handouts, manuals, and all other training materials that will be used during the actual training. The plan shall consist of training on every proposed hardware and software element of the system. Written approval of this training plan shall be required prior to the actual presentation of the training sessions and/or the production in quantity of any training materials. The Contractor shall be responsible for providing the training venue at the agreed location and time.

For the training program, a staff of engineers, technicians, maintenance, and IT personnel will be the training participants. Attendance will be determined by MaineDOT.

At a minimum, training shall be provided on the following topics. Each of the following topics shall include training on configuration, operation, troubleshooting, administration, calibration, and maintenance of the applicable systems.

Traffic Signal Control System – 5 days

- ATC unit hardware
- ATC unit firmware
- ATCC unit hardware
- ASCT system software
- ASCT system hardware
- FMU

- CV System
- System troubleshooting
- Preventative maintenance

Communication System – 1 day

- Fiber optic technology
- Fiber optic communications system architecture
- Ethernet Switch
- FMU/VPN
- Remote VPN
- VLANS

Connected Vehicle System – 2 days

- DSRC
- C-V2X
- 4G LTE/5G
- OBU
- Mobile Device Application (IOS, Android)
- Data Pass Through

Non-Invasive Detection System – 1 day

- Detection System Cloud-Based software
- Non-Invasive Stop Line Vehicle Detection System
- Non-Invasive Advanced Vehicle Detection System

Cloud-Based System– 1 day

- Hosting system
- CMS
- ASCT
- SPM/Dashboard
- System Administration
- System Calibration

Manuals and Documentation

Operating manuals shall be supplied for all equipment and components of the system. Hard copies of all training handouts and operational manuals shall also be supplied. 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 ATCC shall contain a door sticker with laminated chart showing intersection layout and detection information. All as-built documentation provided by the Contractor shall be accurate based on the day of acceptance conditions. A print of the as-built intersection plan would be acceptable. The cabinet shall additionally be provided with the following documentation:

- Operating and Maintenance manuals.
- ATC Database Printout
- Box prints.

System Maintenance

Under this Item the Contactor, through his Vendor, shall provide operations and maintenance services of the ATC, ATCC, CMS, ASCT, SPM, CV system, and all system related field elements including communications and all 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 CMS/ASCT/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/ASCT/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/ASCT/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/ASCT/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/ASCT/CV/SPM system as approved by MaineDOT.

Note: The Contractor shall staff and provide resources to ensure a maximum two (2) 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 warranted 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 CMS/ASCT/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.

Bench Testing Requirements

Prior to installation in the street, the Contractor shall perform bench testing of the proposed completed controller/cabinet assembly and the proposed controller unit in the presence of the Engineer at the Contractors facility prior to installation in the field. The Contractor shall develop and submit detailed test plans to the Engineer for review prior to testing. The test plans shall list all project requirements along with expected results for each individual test. Any issues identified during the testing shall be successfully mitigated by the Contractor prior to installation. In addition to the detailed testing of all project requirements, the following items shall be included in the test plans developed by the Contractor:

- Conflict Test Chart – A matrix identifying all green/yellow/walk conflicting movements and a space for acknowledging that each conflicting movement simultaneously activated as part of the testing has been performed. Conflict testing shall be performed on all signal field circuits.
- Emergency Vehicle Preemption Operation
- Controller Signal Phasing
- Controller Signal Timing
- Vehicle Detection
- Pedestrian Detection
- Field Monitoring Unit
- Cabinet Manual Control Switches
- Connected Vehicle dual mode C-V2X/DSRC and OBU

The actual testing of the assembly shall be performed by the Contractor in the presence of the Engineer. The Contractor shall provide this testing facility at the traffic signal distributor's facility or the Contractor's facility. In order for the facility to be acceptable for testing, it must be clean, air conditioned/heated, have signal displays, cell service of 4G LTE at a minimum and other equipment needed to properly test the controller assembly supplied as part of this project.

The Contractor shall set up the cabinet assembly/controller to operate test displays on all field signal circuits used for the signal sequence shown on the plans. The Contractor shall furnish a hard copy along with a digital copy supplied on a USB thumb drive of all programming data resident in each of the devices at the time of inspection. The services of a test engineer shall be made available by the Contractor during the entire test process at no additional cost.

The Contractor shall fully bench test all CV components including all intersection mounted radio equipment as well as all in vehicle components. The Contractor shall develop an operational testing procedure designed to fully exercise all of the features of the CV system. A test plan fully describing the CV operational test procedures shall be submitted as part of the test plan submission.

Tests shall be conducted to ensure that all items supplied meet all requirements described and required 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 for review and approval to the Engineer.

The Contractor shall propose the testing plans and submit the test plan(s) and procedures as detailed herein to the Engineer 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's 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 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 Engineer no less than fourteen (14) days prior to the beginning of any equipment or systems testing.

Testing shall include providing all documentation necessary to verify 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 successfully and verified by the Engineer.

If any deviations or changes to the approved Test Plans arise, it shall be resubmitted 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 Engineer has 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.

The Engineer reserves the right at any time 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 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 MaineDOT and the Engineer. The Contractor shall conduct all tests in the presence of the Engineer. Testing shall take place only on weekdays, which are official working days, unless the Engineer 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 Engineer at the end of each test. The signature of the Engineer implies only proof of presence. Test results shall be packaged and submitted to the Engineer within one week of test completion. No field test phase shall begin until all prior bench test phases have been completed, and test results have been approved by MaineDOT, or the Engineer.

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

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.

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

For all intersections as part of the “Build” project, communications from the cloud-based system to the on-street traffic signal controllers shall be made through fiber optic interconnect cable connected back to existing city internet connections and or the Field Monitoring Unit (FMU) as shown on the plans (See sheet K of the plan set). The Contractor shall furnish and install all materials necessary for a complete and operational fiber optic interconnection to all project intersections as shown on the plans. All connections to the CMS cloud-based system shall be via a secure VPN network. All splices shall be watertight fusion splices. The Contractor shall coordinate all fiber optic connection with the towns IT departments as shown on the plans.

The FMU shall be the only remote connection device used by isolated intersections to connect to the cloud-based CMS/ASCT/CV/SPM system. All connections shall be encrypted VPN tunnels. The Contractor shall coordinate all configuration settings with MaineDOT IT and the Engineer.

The FMU central web based interface shall be a separate element from the CMS/ASCT/CV /SPM.

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

1. The work under this item specifies the requirements for the FMU. The FMU shall operate independent of the brand/type of intersection controller deployed in the ATC traffic cabinet.
2. The FMU shall conform to the following requirements:
 - 2.1 The FMU shall function correctly between -34 degrees C and +74 degrees C.
 - 2.2 The FMU shall be provided with appropriately rated connectors that allows the FMU to be exchanged by unplugging connectors, without tools.
 - 2.3 The FMU shall monitor and log all ATC Controller and ATC cabinet faults and or alarms.
 - 2.4 The FMU shall be wired directly to the ATC cabinet.
 - 2.5 The FMU shall contain two individually switchable 120VAC outlets controlled via the cloud-based management software.
 - 2.5.1 The following two devices shall be plugged into the outlets:
 - 2.5.1.1 Non-Invasive detection system
 - 2.5.1.2 C-V2X/DSRC unit

- 2.6 The FMU shall have an internal cellular modem running at 4G LTE.
 - 2.6.1 The Cellular modem shall be designed to be replaced / upgraded to 5G service when available.
- 2.7 The FMU shall incorporate an integrated GPS and cell modem.
- 2.8 The configuration of the FMU shall be accomplished by accessing the internal web server with a browser. It shall be possible to configure the FMU without any special software.
- 2.9 The FMU shall be powered via a standard 120V input power.
- 2.10 The FMU shall allow for the routing of the controller configuration packets to and from the controller (either by Ethernet or serial communications) for any type of controller utilized by the MaineDOT. In this way it shall be possible to configure the controller and utilize the controller specific software to interrogate the controller, and the FMU shall provide the communications pipe which allows this to be accomplished.
- 2.11 The FMU shall, within the size limitations above, include a battery and battery charging/monitoring circuit, to allow the FMU to function correctly even when all power to the intersection has failed. The battery shall continue to power the FMU for a minimum of 5 hours after all power has failed to the intersection.
- 2.12 The FMU shall incorporate an integrated GPS which will allow the FMU to geo-locate itself on the FMU management software map, without configuration.
- 2.13 The FMU shall operate without requiring a static IP address. The only configuration required at the FMU is to enter the URL of where the FMU management software is hosted.
- 2.14 In the event that the cell service is interrupted or is not available, the FMU shall store any events that occur in internal memory and forward these events automatically to the FMU management software when the cell service is restored. In this way, a complete record of events at the device can be maintained even if cell service is interrupted for a period. The system will store 5000 events.
- 2.15 The FMU shall utilize HTTP and HTTPS protocols, and XML data structures, for communication with the FMU management software. In this way the data will be open for future expansion and competition. The use of secret proprietary protocols is not permitted.
- 2.16 The FMU shall include Ethernet communications via an Ethernet Port with RJ45 connector.
- 2.17 The FMU shall include weather proof antennas.

3. Map Display FMU Management Software

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

4. Intersection Detail Display FMU Management Software

- 4.1 It shall be possible to drill down, either from the map icon or from the list, to a device level detail for the intersection, which as a minimum shall display the following parameters:
 - 4.1.1 The alarm status, with priority indicated, and a text description of the alarm (if an alarm is present for this device).
 - 4.1.2 The time since the last communication with the device
 - 4.1.3 The following parameters (real time now values, minimum for the day values, maximum for the day values, and average for the day values)
 - 4.1.3.1 The AC mains voltage (value)
 - 4.1.3.2 The battery back-up voltage (value)
 - 4.1.3.3 The cabinet temperature (value)
 - 4.1.3.4 The cabinet humidity (value)
 - 4.1.3.5 The presence of AC power (OK or Fail)
 - 4.1.3.6 The flashing status of the intersection (OK or Flashing)

4.1.3.7 Stop Time status (OK or Stop Time Active)

4.1.3.8 The cabinet door status (Open or Closed)

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

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

4.1.4.1 The AC mains voltage

4.1.4.2 The battery back-up voltage

4.1.4.3 The cabinet temperature

4.1.4.4 The cabinet humidity

5. Diagnostics and Log Display FMU Management Software

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

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

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

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

6. Alarms FMU Management Software

6.1 The FMU management software shall have a comprehensive alarm generation capability

6.2 It shall be possible to configure alarms to be generated on any parameter becoming out of tolerance, including analog values, digital values and enumerated values.

6.3 Alarms shall be configurable to be of Low, High or Critical Priority.

6.4 The alarm priority shall be displayed throughout the FMU management software, on all displays, using color codes such as red-critical; yellow – high; and amber-low to indicate the priority of the alarm.

6.5 The current active alarms shall be accessible for view via an expandable window, to see which alarms are active and when the alarm occurred. The highest priority alarms shall rise to the top of the list.

7. Alerts FMU Management Software

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

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

- 8.1 The contractor shall supply the FMU with the FMU manufacturers 10 year options for Connectivity and Service, as part of the purchase price. The Connectivity and Service agreement shall include at a minimum:
 - 8.1.1 Cellular Connectivity
 - 8.1.2 No cellular overage charges
 - 8.1.3 Extended warranty on the hardware for the period of the Connectivity and Service Agreement
 - 8.1.4 Over-the-air software updates
 - 8.1.5 Over-the-air security updates
 - 8.1.6 Future Connected Vehicles Service

718.15 Messenger Wire This item of work shall conform to this specification. This item shall consist of furnishing and installing aerial fiber optic messenger wire, and appurtenances at the locations shown on the plans or as indicated by the Engineer.

MATERIALS: The aerial fiber optic messenger wire shall be manufactured for aerial installation of fiber optic cable and shall be double galvanized, seven-strand steel wire cable not less than 0.3 inches in diameter and 6,600 lbf breaking strength, Extra High Strength Grade (EHS).

INSTALLATION: Installation shall meet the following requirements:

1. The Contractor shall calculate the strain and sag for the specific aerial installation as shown on the plans and use the recommended tensions and messenger types per the fiber-optic cable and/or messenger wire manufacturer.
2. The Contractor shall install messenger wire with a sag matching that of existing adjacent cables. Messenger wire shall not sag into or near adjacent cables.
3. All utility relocations and required guying shall be completed prior to the installation of messenger wire.

718.16 Emergency Vehicle Preemption System The emergency vehicle preemption systems shall be installed in the same ATCC as the ATC.

The emergency vehicle preemption control systems shall consist of a data-encoded phase selector to be installed within the ATCC. Those units will serve to validate, identify, classify, and record the signal from the optical detectors located on support structures at the intersections. Upon receiving a valid signal from the detectors, the phase selectors shall generate a preempt call to the ATC initiating preemption operations as shown on the plans. The phase selectors shall have full ID and logging capabilities and be a rack-mounted plug-in four channel, dual priority devices. Programming the phase selectors shall be via a PC-based computer utilizing unit specific software as well as the cloud-based CMS. One copy of the software shall be supplied and licensed to MaineDOT. A hard copy of final programming data shall be left in the control cabinets. The Contractor shall supply a complete set of interface cables for phase selector to laptop connection in each controller cabinet. The phase selectors shall be connected to the Ethernet Switch and/or the FMU in each ATCC, as shown in the Plans, such that the phase selector event/system logs and unit/device configuration can be remotely accessed through the secure communications system. The Contractor shall supply and install any required converters, cables, device servers or other devices, to interface the phase selector to the Ethernet switch in each cabinet. No additional hardware, software items and/or subscription fees/costs shall be needed/allowed to satisfy the requirements as defined in these specifications.

The optical detectors shall be single input, single output units used to control one approach. All traffic signal installations shall be supplied with a single optical detector for each approach to the intersection unless otherwise noted in the major items list or as shown on the plans.

The Contractor shall install the quantity of confirmation strobes at each traffic signal location as shown in the plans or as directed by the Engineer. The confirmation strobe shall serve to validate to the driver of the emergency vehicle that the traffic signal has recognized the preemption call and will initiate the proper preemption sequence. The confirmation strobe shall be illuminated whenever any emergency vehicle preemption green is on. The confirmation strobe shall be a red lens Whelan model 1500 or approved equivalent.

The Contractor shall be responsible for the proper programming 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 proposed traffic signal control system and allow CMS based remote access to the phase selectors via 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).

718.17 Single Mode Fiber Optic Cable This item of work shall conform to this specification, and with IMSA General Specification 70 for Single and Multi-Mode Fiber Optic Cable. This item shall consist of furnishing and installing 12 strand, single mode fiber optic cable, necessary splices, and appurtenances.

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

1. **General Requirements:** All of the fiber optic cable for this project shall be from the same manufacturer and shall be 12 strand, single-mode. The Fiber Optic Cable shall meet the following requirements:
 - 1.1. The fiber optic cable shall be designed for both aerial and underground installations, and shall be recommended for these applications by the manufacturer.
 - 1.2. The fiber optic cable shall operate over a temperature range of -40 to 74 degrees C at a relative humidity of 10% to 90% condensing.
 - 1.3. All fiber optic strand materials shall be non-conductive to electricity.
 - 1.4. The fiber optic cable shall meet or exceed the following performance characteristics when tested in accordance with the following fiber optic test procedures (FOTP) from EIA/TIA-455-B Series standards:
 - 1.4.1. When tested in accordance with FOTP-3, "Procedure to Measure Temperature Cycling Effects on Optical Fibers, Optical Cable, and Other Passive Fiber Optic Components," the change in attenuation at extreme operational temperatures (-40⁰C and +70⁰C) shall not exceed 0.2 dB/km at 1550 nm.
 - 1.4.2. When tested in accordance with FOTP-25, "Repeated Impact Testing of Fiber Optic Cables and Cable Assemblies," the cable shall withstand 25 impact cycles. The change in attenuation shall not exceed 0.2 dB at 1550 nm.
 - 1.4.3. When tested in accordance with FOTP-33, "Fiber Optic Cable Tensile Loading and Bending Test," using a maximum mandrel and sheave diameter of 560 mm, the cable shall withstand a tensile load of 2700 N (608 lbs). The change in attenuation shall not exceed 0.2 dB during loading and 0.1 dB after loading at 1550 nm.
 - 1.4.4. When tested in accordance with FOTP-37, "Low or High Temperature Bend Test for Fiber Optic Cable", the cable shall withstand four full turns around a mandrel of < 10 times the cable diameter for non-armored cables and < 20 times the cable diameter for armored cables after conditioning for four hours at test temperatures of -30⁰C and +60⁰C. Neither the inner or outer surfaces of the jacket shall exhibit visible cracks, splits, tears or other openings. Optical continuity shall be maintained throughout the test.
 - 1.4.5. When tested in accordance with FOTP-41, "Compressive Loading Resistance of Fiber Optic Cables," the cable shall withstand a minimum compressive load

of 440 N/cm (250 lbf/in) for armored cables and 220 N/cm (125 lbf/in) for non-armored cables applied uniformly over the length of the sample. The load shall be applied at the rate of 3 mm to 20 mm per minute and maintained for ten minutes. The change in attenuation shall not exceed 0.4 dB during loading and 0.2 dB after loading at 1550 nm.

- 1.4.6. When tested in accordance with FOTP-81, "Compound Flow (Drip) Test for Filled Fiber Optic Cable", the cable shall exhibit no flow (drip or leak) of filling and/or flooding material at 80°C.
- 1.4.7. When tested in accordance with FOTP-85, "Fiber Optic Cable Twist Test," a length of cable no greater than 4 meters shall withstand 10 cycles of mechanical twisting. The change in attenuation shall not exceed 0.1 dB at 1550 nm.
- 1.4.8. When tested in accordance with FOTP-104, "Fiber Optic Cable Cyclic Flexing Test," the cable shall withstand 25 mechanical flexing cycles around a sheave diameter not greater than 20 times the cable diameter. The change in attenuation shall not exceed 0.1 dB at 1550 nm.

2. Cable Construction: The cable shall be composed of the following elements:

- 2.1. Anti-buckling central member which shall prevent the cable from buckling and stretching. The central member shall consist of a dielectric glass reinforced plastic rod. The central member expansion and contraction characteristics shall be similar to the optical fibers and the fiber tubes.
- 2.2. Loose Buffered Tubes in which multiple fibers strands are placed inside. Each Buffer Tube shall meet the following requirements:
 - 2.2.1. Allowed buffered tube diameters shall be 3.0 mm or 1.9mm.
 - 2.2.2. The number of fibers inside a Buffer Tube shall not exceed 12 strands.
 - 2.2.3. Buffer Tube material shall prevent the fiber from adhering to the inside of the tube.
 - 2.2.4. Buffer Tubes shall be colored in accordance with TIA/EIA-598-A, "Color Coding of Optical Fiber Cables".
 - 2.2.5. Fiber Optic strands shall be placed loosely inside the Buffer Tube to allow for fiber expansion and contraction due to temperature changes.
 - 2.2.6. Buffer Tube shall be filled with a water blocking gel meeting the following requirements:

- 2.2.6.1. Filling compound in the buffer tubes shall be a homogeneous hydrocarbon based gel with anti-oxidant additives.
 - 2.2.6.2. The filling shall prevent water intrusion, be nontoxic, and non-irritant to skin contact.
 - 2.2.6.3. The filling shall be non-nutritive to fungus.
 - 2.2.6.4. The filling shall be electrically non-conductive and readily removable with conventional non-toxic solvents.
- 2.3. Fiber Optic Strands, which shall consist of a doped-glass cylindrical core, surrounded by a concentric cladding. An acrylate coating shall cover the fiber to add protection and color. Each fiber optic strand shall meet the following requirements:
- 2.3.1. Core diameter shall be $8.3 \mu\text{m} \pm 0.5\mu\text{m}$.
 - 2.3.2. Cladding diameter shall be $125 \mu\text{m} \pm 1.0 \mu\text{m}$.
 - 2.3.3. Core to Cladding offset shall be less than $0.8 \mu\text{m}$.
 - 2.3.4. Cladding Non-Circularity shall be less than 1.0 %.
 - 2.3.5. Total coating diameter shall be $245 \pm 10 \mu\text{m}$ and shall be mechanically strippable.
 - 2.3.6. Coating color shall be in accordance with TIA/EIA-598-A, "Optical Cable Color Coding".
 - 2.3.7. No point discontinuity along the fiber shall have attenuation greater than 0.10 dB at either 1310 or 1550 nm.
 - 2.3.8. Attenuation at the Water Peak shall not exceed 2.1 dB/km at $1383 \pm 3 \text{ nm}$.
 - 2.3.9. Mode-Field Diameter shall be $9.30 \pm 0.50 \mu\text{m}$ at 1310 nm, and $10.5 \pm 1.0 \mu\text{m}$ at 1550 nm.
 - 2.3.10. Zero Dispersion Wavelength shall be between 1301.5 nm and 1321.5 nm.
 - 2.3.11. Zero Dispersion Slope shall be less than $0.092 \text{ ps}/(\text{nm}^2 * \text{km})$.
 - 2.3.12. Cable loss shall not exceed 0.4dB/Km when measured at a light wavelength of 1310nm.
 - 2.3.13. Cable loss shall not exceed 0.3dB/Km when measured at a light wavelength of 1550nm.

- 2.4. The cable casing shall be composed of a minimum of two protective layers. Each layer requirements are as follows:
 - 2.4.1. The first casing layer shall be composed of high tensile strength dielectric yarns helically stranded evenly around the cable core.
 - 2.4.2. The second and outer most layer shall be a polyethylene jacket. The jacket shall meet the following requirements:
 - 2.4.2.1. The jacket shall be black medium or high density polyethylene in accordance with ASTM D1248, Type II or Type III, Class C, Category 3, 4, or 5 and contain a suitable antioxidant.
 - 2.4.2.2. The jacket shall contain carbon black to provide ultraviolet light protection.
 - 2.4.2.3. The jacket shall have a minimum thickness of 1.4 mm.
 - 2.4.2.4. The jacket shall have permanent affixed markings every two feet or every one meter along the cable. These markings shall contain at a minimum the cable length (in feet if markings appear every two feet or in meters if markings appear every one meter) manufacturer's name, date of manufacturer, and fiber count.
 - 2.4.3. A ripcord shall be provided between the first and second layer.
 - 2.4.4. All casing layers shall be non-nutritive to fungus.
3. Construction Methods: The Contractor shall meet the following construction and installation procedure when installing the fiber optic cable:
 - 3.1. Shipping Reels: The fiber optic cable shall be shipped in reels that meet the following requirements:
 - 3.1.1. The reels shall be designed to prevent damage to the cable during shipment and installation.
 - 3.1.2. Each reel shall contain an identification tag with the following minimum information:
 - 3.1.2.1. Date of Manufacture
 - 3.1.2.2. Manufacturer's Cable Code
 - 3.1.2.3. Fiber Count

3.1.2.4. Length of Cable

3.1.2.5. Beginning and End length markings

3.1.3. Both ends of the cable shall be accessible to provide access for testing.

3.1.4. The cable ends shall be securely fastened and shall not protrude beyond any portion of the reel in an unprotected manner to prevent the cable from becoming loose in transport.

3.1.5. Cables ends shall be sealed to prevent the escape of the water blocking material and entry of moisture during shipping, handling, storage, and installation.

3.2. Testing and Certification:

3.2.1. The personnel involved and responsible for the installation, splicing, and termination of the cable shall meet the following minimum requirements:

3.2.1.1. Documented proof of three (3) years experience with the installation of single-mode fiber optic cable, including splicing, termination, and testing.

3.2.1.2. The installation experience should be applicable to the work required for this project and shall include projects of similar or larger scope, providing mid-span access points and fusion splicing in field conditions.

3.2.1.3. The Contractor shall provide the names and phone numbers of references to the Engineer.

3.2.1.4. At least thirty (30) days prior to the installation of the fiber optic cable, the Contractor shall submit to the Engineer, documentation outlining the information above. Permission for the Engineer to contact the owner must be authorized prior to submitting the information.

3.2.2. The Contractor shall provide the Engineer with four (4) copies of the cable manufacturer's recommendations and requirements, listed below, for each fiber optic cable type and size:

3.2.2.1. A list of the cable manufacturer's approved pulling lubricants for use on the cable. No other lubricants will be permitted.

3.2.2.2. The maximum pulling tensions of the cable, which shall specify both pulling from the cable's strength member(s) and for pulling from the outer jacket.

- 3.2.2.3. The minimum bending radius of the cable, which shall specify a radius for both the construction and for the long-term installation.
- 3.2.3. Testing of the fiber optic system shall include verification by means of inspection that all fiber optic equipment has been installed in accordance with the Contract Documents.
- 3.2.4. Except for the two tests on the fiber optic cable that are performed prior to completion of the installation, as described below, all fiber optic communications testing shall be performed after the field installation of all equipment is complete. The tests shall validate the functionality of the fiber optic components of the project, relative to the requirements as contained in the contract. Fiber optic communications testing shall be conducted using equipment supplied by the Contractor for this purpose. If a unit fails to pass its communications test, the Contractor shall correct the problem or replace the unit and retest it until satisfactory results are achieved.
- 3.2.5. Prior to shipping, the manufacturer of the cable shall conduct fiber loss tests on all strands of the entire length of cable to be delivered for this project. These tests shall be conducted at both 1310 nm and 1550 nm light wavelengths. Four (4) manufacturer-certified copies of the fiber loss tests shall be delivered with the cable for review by the Engineer. If an OTDR is used for this test, then the OTDR settings shall conform to the requirements described below for the final fiber optic tests, except that bidirectional OTDR testing is not required (only unidirectional is required).
- 3.2.6. Upon delivery of the cable to the project site, the Contractor shall conduct fiber loss tests on all strands of the entire length of cable in the presence of the Engineer. These tests shall be conducted at both 1310 nm and 1550 nm light wavelengths. The Contractor shall provide the Engineer with four (4) certified copies of the loss test results for comparison with the tests made on the cable prior to delivery. If an OTDR is used for this test, then the OTDR settings shall conform to the requirements described below for the final fiber optic tests, except that bidirectional OTDR testing is not required (only unidirectional is required).
- 3.2.7. After installation of the cable is complete, the Contractor shall conduct final fiber optic tests on all strands of the entire length of each installed cable demonstrating that all requirements of this specification are met. All strands shall be tested as specified herein, both used strands as well as unused (dark) strands. These tests shall be conducted at both 1310 nm and 1550 nm light wavelengths. All testing shall be performed with an Optical Time Domain Reflectometer (OTDR), as follows:

- 3.2.7.1. Testing shall be conducted on all components of the fiber optic cable plant, including all strands of all fiber cables, all splices, and all terminated patch panel positions, as shown in the Plans.
- 3.2.7.2. The OTDR testing shall be performed bidirectionally, i.e., testing shall be conducted from both ends of each fiber segment. The optical loss for all components of the fiber optic cable plant (i.e., spans, splices, and connectors) used by the Engineer for comparison against the specification requirements shall be the average of the two readings from the two ends of each fiber segment.
- 3.2.7.3. The OTDR used shall internally store all fiber optic cable signatures, and the signatures shall be downloadable to a computer. Signatures of all cables tested shall be supplied by the Contractor in electronic format. The Contractor shall supply OTDR emulation software manufactured by the OTDR manufacturer which is capable of reading the stored signatures and performing all measurement and analysis on the stored signatures as if the OTDR were connected live to the fiber optic cable.
- 3.2.7.4. The analysis shall include, but not be limited to, readout of fiber loss per unit length, splice loss measurement (amount of loss and distance from OTDR), connector loss measurement (amount of loss and distance from OTDR), total fiber optic cable length, and generation of event tables, as well as identification and measurement of any other reflective events or faults.
- 3.2.7.5. The pulse width setting of the OTDR shall be set to the lowest possible setting while allowing the full length of fiber optic cable to be measured for faults or reflective events; however in no event shall the pulse width be set to a value greater than 100 ns. Further, the pulse width shall be set to a value sufficiently small so that the optical dead zone shall not extend into the cable under test by any distance.
- 3.2.7.6. All OTDR testing shall be performed using a launch cable of 1500 feet in length, or greater.
- 3.2.7.7. The OTDR A and B markers shall be placed as follows: For terminated fiber strands, the A marker shall be placed upstream of the connection between the launch cable and the cable under test. For unterminated fiber strands, the A marker shall be placed downstream of the launch cable connection, but it shall not be placed downstream of this point by a distance exceeding two percent of the length of the cable under test. The B marker shall be placed upstream of the end of the cable, but it shall not be placed upstream of this point by a distance exceeding two percent of the length of the cable under test. All OTDR traces shall show the total optical loss between the A and B markers, in units of decibels per kilometer (dB/km).
- 3.2.7.8. The Contractor shall document the OTDR readings by supplying hard copies of the OTDR signatures for all fiber optic cables. The Contractor shall also supply hard copies of the reflective event table for all optical fibers which shall be directly printed out from the OTDR.

- 3.2.8. The Contractor shall supply fiber optic cable plant loss calculations for all installed components of the cable plant demonstrating that the total plant losses for each fiber are less than the minimum optical fiber optic modem power budget by a safety margin of at least 4dB.
- 3.3. Installation: The Contractor shall adhere to the following installation procedures during the placement of the fiber optic cable:
- 3.3.1. All fiber optic cables to be installed on aerial messenger or in a conduit or duct facility shall be pulled as a unit. The Contractor shall ensure the cable is not damaged during storage, delivery and installation.
- 3.3.2. The cable shall not be pulled along the ground or over or around obstructions. The cable shall not be stepped on by workmen, nor run over by vehicles or equipment. All cable shall be inspected and approved by the Engineer prior to installation.
- 3.3.3. All cables shall be lashed to or pulled on aerial messenger cable or in conduit with a cable grip designed to provide a firm hold on the exterior covering of the cable, with heat shrinkable end caps placed on the cable ends.
- 3.3.4. The maximum pulling tensions and minimum bending radius shall not be violated at any time during installation, and shall be monitored at all times during installation. Prior to any installation of cable, the Contractor shall clean existing conduit and aerial messengers (if applicable), per industry standards.
- 3.3.5. The Contractor shall establish adequate voice communications between the cable feeding location and the cable pulling equipment prior to commencing any pulling operation. The cable reels shall be placed on the same side of the pull box with the conduit where the cable is being installed. The reel shall be made level and brought into proper alignment with the conduit or messenger section, such that the cable will pass from the top of the reel. The cable shall be fed by manually rotating the reel.
- 3.3.6. For underground installations, the fiber optic cable shall not be pulled through an intermediate junction box, pull box, or any other opening in the conduit, unless approved by the Engineer. The necessary length of cable to be installed shall be pulled from pull box, or cabinet to the immediate next downstream pull box, or cabinet. The remaining length of cable to be installed in the next conduit or along aerial messenger shall be carefully stacked or stored in a manner that allows that length of cable to be safely pulled into the next conduit.
- 3.3.7. An approved cable feeder guide shall be used between the cable reel or the storage stack and the face of the conduit to protect the cable, and to guide the cable installation. The dimensions and set-up of the feeder guide shall be such that the cable does not bend at any location to a radius less than the cable's minimum

allowable bending radius. The cable shall not be pulled over edges or corners, over or around obstructions, or through unnecessary curves or bends. The cable shall be looped in and out to cabinets and pull boxes to provide adequate slack (as specified in Section 3.5 Cable Spare of this specification) and the least amount of stress on the fibers. The Contractor shall ensure that the cable is not damaged during storage or installation.

- 3.3.8. Fiber optic cable ends shall be kept sealed at all times during installation, using an approved cable end cap. Tape shall not be permitted to seal the cable end. The cable end shall remain sealed until the Contractor terminates the fiber cables. Cables that are not immediately terminated shall have a minimum of six feet of slack.
 - 3.3.9. The allowable pulling tension shall be the lesser of either of the two values below:
 - 3.3.9.1. The cable manufacturer's recommended pulling tension from the outer jacket for the cable.
 - 3.3.9.2. Eighty percent of the cable manufacturer's maximum pulling tension from the outer jacket.
 - 3.3.10. The Contractor shall monitor the tension on the fiber optic cable with the use of an approved tension gauge. The gauge shall be placed sufficient distance from the take up reel, such that the tension can be read throughout the entire pulling operation.
 - 3.3.11. When using lubricants, the Contractor shall adhere to the cable manufacturer's requirements for the proper amount, application tools and method, and removal of the lubricant from the exposed cable.
 - 3.3.12. All cable shall run continuously from termination point to termination point as indicated on the plans or the Engineer. The Contractor shall carefully determine the length of cable to reach from termination point to termination point. Cutting of fiber optic cables at any location other than those shown on the plans shall not be permitted.
 - 3.3.13. The Contractor shall document the locations of all splices and connections for each strand of fiber optic cable. This documentation shall show the distance in feet of fiber optic cable from the end of the cable for every splice and connection, and shall also show the cable length marking as marked on the cable for every splice and connection. Four copies of the documentation shall be furnished to the Engineer prior to testing.
- 3.4. Cable Termination: The Contractor shall terminate fiber optic cables in the following manner:
- 3.4.1. All splice installations shall be performed using a fusion splicing technique. Splice insertion loss shall not exceed 0.1 dB.

- 3.4.2. The Contractor shall provide all equipment and consumable supplies necessary for performing the splices.
 - 3.4.3. Each spliced fiber shall be packaged in a protective, waterproof sleeve.
 - 3.4.4. Bare fibers shall be completely re-coated with a protective room temperature vulcanizing (RTV) coating gel, or similar approved substance, prior to the application of the sleeve so as to protect the fiber from scoring, dirt, or microbending.
- 3.5. Cable Spare: The Contractor shall install spare cable as follows and as indicated by the engineer:
- 3.5.1. A total of 50 feet shall be stored at all splice enclosure locations inside control cabinets unless otherwise noted on the Plans. A minimum of 20 feet of slack cable shall be located on each side of the splice enclosure.
 - 3.5.2. Cable storage shall be performed in an industry standard manner that does not violate the minimum bending radius specification of the cable.
 - 3.5.3. All spare cable shall be hung on cable racks where provided.

718.18 Twelve (12) Position Fiber Optic Patch Panel This item of work shall conform to this specification. This item shall consist of furnishing and installing 12 Position Fiber Optic Patch Panels at the locations shown on the plans or as indicated by the Engineer.

MATERIALS: The Fiber Optic Patch Panels shall meet the following requirements:

1. The Fiber Optic Patch Panel - 12 position shall be a stand-alone unit manufactured for outdoor field cabinets.
2. The Fiber Optic Patch Panel - 12 position shall include and be capable of accommodating a minimum of 12 SC type connector sleeves.
3. The Fiber Optic Patch Panel - 12 position shall include and be capable of terminating up to 12 connectorized pigtails.
4. The Fiber Optic Patch Panel shall incorporate a hinged access door.
5. The Fiber Optic Patch Panel shall be rack, wall, or shelf mountable as required by the specific location. The patch panel shall be securely fastened in place as recommended by the manufacturer.
6. The Fiber Optic Patch Panel shall include splice trays meeting the following requirements:
 - 6.1 The splice trays in the Fiber Optic Patch Panel - 12 position shall be capable of holding a minimum of 24 splices.
 - 6.2 The splice trays shall incorporate a system to retain and provide strain relief to the fiber optic buffers tubes and connector pigtails.
 - 6.3 The splice trays shall incorporate grooves where the fiber optic splice can be held in place.
 - 6.4 Each splice tray shall incorporate a clear snap on lid.
7. The Fiber Optic Patch Panel shall include a restraining system to hold the splice trays securely in place.
8. The Fiber Optic Patch Panel shall incorporate cable guides that maintain fiber strands and fiber buffer tubes bending radius greater than the minimum allowed by the manufacturer.

9. The Fiber Optic Patch Panel - 12 Position shall use 12 connectorized pigtails to connect the fiber optic cable to the Fiber Optic Patch Panel.
10. The number of pigtails to be furnished and spliced to the fiber optic cable are shown in the fiber optic splice tables in the plans. The connectorized pigtails shall meet the following requirements:
 - 10.1 All fiber optic connectors shall be SC type with a PC (physical contact) 2.5 mm ceramic ferrule.
 - 10.2 The connector mean insertion loss shall be 0.3 dB and maximum 0.5 dB.
 - 10.3 The connector mean return loss shall be ≤ -59 dB and maximum of ≤ -55 dB.
 - 10.4 All SC connectors shall have a durability rate of less than 0.2 dB change over 500 rematings.
 - 10.5 Connectors shall meet ANSI/TIA EIA-604-3A requirements.
 - 10.6 The fiber optic strand of the connectorized pigtail shall have matching optical properties as the fiber optic strand used on the fiber optic cable.
11. The Fiber Optic Patch Panel shall incorporate a restraining mechanism to hold the fiber optic cable central member and outside jacket.

718.19 Ethernet Switch With Fiber Optic Interfaces This item of work shall conform to this specification. This item shall consist of furnishing and installing an Ethernet Switch with fiber optic interfaces, as well as all needed accessories required for a full and complete installation, including but not limited to power adapters, Ethernet cables, and fiber optic patch cords, as described herein.

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

1. The work under this item specifies the requirements for the Ethernet Switch with single mode fiber optic interfaces. The Ethernet Switch shall accept both RJ-45 Ethernet connection as well as single mode SC fiber optic connections. The Ethernet Switch shall be installed within the field cabinets as shown on the plans. The Ethernet Switch shall be capable of shelf mounting or wall mounting with supplied wall mount brackets.
2. The Ethernet Switch specified herein shall be a self-contained unit capable of 24-hour per day unattended operation. The Ethernet Switch shall be supplied, assembled and tested by the Contractor. The Ethernet Switch shall be of rugged design and suitable for reliable operation when mounted in the configuration as specified in these Specifications and the Plans. The Ethernet Switch shall be configured for minimum maintenance and need for adjustment after initial set-up. The Ethernet Switch shall include all software required for monitoring and updating the Ethernet Switch from a computer within the Police Department.
3. The Ethernet Switch shall have the following connections:
 - 3.1 Minimum of Six (6) 10/100 Mbps Ethernet ports with RJ-45 connectors that shall support the following network standards:
 - 3.1.1 IEEE.802.3 10 Base-T
 - 3.1.2 IEEE.802.3u 100 Base-T
 - 3.1.3 IEEE.802.1d Spanning Tree
 - 3.1.4 IEEE.802.1w Rapid Spanning Tree
 - 3.1.5 IEEE.802.1q VLAN
 - 3.1.6 IEEE.802.1p Class of service (CoS)
 - 3.2 The Contractor shall supply, install, and test all Ethernet cables required to make all connections as shown in the Plans.
 - 3.3 The Contractor shall supply, install, and test all fiber optic patch cords required to make all connections as shown in the Plans. Fiber optic patch cords shall meet the following requirements:

- 3.3.1 Each patch cord shall contain one single mode fiber strand with a factory terminated SC type connector.
- 3.3.2 Each patch cord shall be 3 feet in length.
- 3.3.3 The patch cords shall operate without degradation over a temperature range of -34 to 74 degrees Celsius at a relative humidity of 10% to 90% condensing.
- 3.3.4 All fiber optic strands shall be nonconductive to electricity.
- 3.3.5 The Fiber Optic Patch Cord shall meet or exceed the following performance characteristics:
 - 3.3.5.1 Fiber Optic Patch Cords shall consist of tight buffered optical fibers of the type used for interconnect cable with a 900 μ m secondary buffer.
 - 3.3.5.2 The fiber shall be surrounded by aramid fiber yarn strength members and a UL listed OFNR, UV resistant and fungus resistant yellow outer jacket 3mm in diameter.
 - 3.3.5.3 The optical fibers shall be 100 kpsi proof tested and have an attenuation change no greater than .05 dB/km.
 - 3.3.5.4 The attenuation of the Fiber Optic Patch Cord shall not exceed 1.0 dB/km at 1310 nm and 0.75 db/km at 1550 nm.
 - 3.3.5.5 The SC type connector shall meet the following requirements:
 - 3.3.5.5.1 All fiber optic connectors shall be SC type with a PC (physical contact) 2.5 mm ceramic ferrule.
 - 3.3.5.5.2 The connector mean insertion loss shall be 0.3 dB and maximum 0.5 dB.
 - 3.3.5.5.3 The connector mean return loss shall be -59 dB and maximum of -55 dB.
 - 3.3.5.5.4 All SC connectors shall have a durability rate of less than 0.2 dB change over 500 rematings.
 - 3.3.5.5.5 Connectors shall meet ANSI/TIA EIA-604-3A requirements.
- 3.4 Two single mode fiber optic ports, each containing two SC type connectors that shall support the following network standards:

- 3.4.1 IEEE.802.3u 100 Base-FX
- 3.4.2 IEEE.802.1d Spanning Tree
- 3.4.3 IEEE.802.1w Rapid Spanning Tree
- 3.4.4 IEEE.802.1q VLAN
- 3.4.5 IEEE.802.1p Class of Service (CoS)

3.5 The two single mode fiber optic ports shall meet the following optical requirements:

- 3.5.1 The two optical emitters shall be laser diode type.
- 3.5.2 The two single mode fiber optic ports shall have an operating wavelength of 1310 nm, single mode.
- 3.5.3 The two single mode fiber optic ports shall each have an optical power budget of 13dB, minimum.
- 3.5.4 The two optical emitters shall have a transmit power of -15dbM, minimum.
- 3.5.5 The two optical detectors shall have receive sensitivity of -28dbM, worst case.

4. The Ethernet Switch shall be a fully managed Ethernet layer 3 device.

5. The Ethernet Switch shall have a switching method of store and forward.

6. The Ethernet Switch shall support the following protocols:

- 6.1 RTP/ID
- 6.2 TCP/IP with full multicast support
- 6.3 DNS
- 6.4 DHCP

7. The Ethernet Switch shall support the following network management protocols:

- 7.1 SNMP V2c
- 7.2 RMON for Ethernet agent
- 7.3 Telnet/TFTP

8. The Ethernet Switch shall have an operating temperature range of -34°C to +74° C

9. The Ethernet Switch shall have a power usage of +12VDC to +24VDC at 1 amp or less. This shall be provided by an included plug-in type AC adapter.

718.20 Wireless Interconnect System This item of work shall conform to this specification. This item shall consist of furnishing, installing, configuring and testing a point-to-point radio unit (RU) all cable and wiring, and all other equipment, materials and incidental costs necessary to provide a complete, fully operational network between these three locations, as shown in the Plans, and shall conduct acceptance tests for this system under this specification.. The RU shall provide a TCP/IP communications capability between two locations. In each of the cabinets, the RU shall consist of an unlicensed radio operating in the 5.725 – 5.875 Ghz unlicensed U-NII Upper Band. The RU shall be furnished, install, configure, and test the RU,

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

1. The work under this item specifies the requirements of furnishing, installing and testing RU and associated equipment at the locations indicated on the Plans, or as directed by the Engineer as specified in these Specifications. The work shall also include furnishing, installing, and testing all ancillary items needed to establish a complete, functional wireless communication system including, but not limited to, cabling, mounts, power supplies, power injectors (POE), POE Surge, transient suppression devices as recommended by the manufacturer, antennas, etc.
2. The Contractor shall design, construct, and test a wireless communications system utilizing RU's that transport data between field cabinets at the locations shown in the Plans and as described herein.
3. The RU shall be a self-contained unit shall be supplied and installed with the ability to support 24-hour per day unattended operation. The RU shall be supplied, assembled and tested by the Contractor. The RU shall be of rugged design and suitable for reliable outdoor operation. The RU shall be configured for minimum maintenance and need for adjustment after initial set-up.
4. The RU shall be field hardened and rated by its manufacturer in accordance with the operating temperature, storage temperature, and relative humidity requirements of the NEMA TS2 Standard. The design shall be inherently temperature compensated to prevent abnormal operation. The circuit design shall include such compensation as is necessary to overcome effects due to temperature in the specified environmental range.
5. Electrical materials shall meet the standards herein, local and public utility codes, and the National Electrical Code (NEC).
6. The RU shall operate in the 5.725 – 5.875 Ghz unlicensed U-NII Upper Band. These units shall meet all applicable Federal Communications Commission (FCC) Part 15.407 U-NII regulations.
7. The RUs shall have a sufficient number of distinct frequency channels such that no harmful interference exists between different radio links on this project.

8. All RUs supplied for this project shall be identical models of current production and recently manufactured.
9. The RU shall be a self-contained unit designed for outdoor use and shall contain a fully integrated antenna within a weather proof housing. The Contractor shall supply, install, and configure the RU, along with all necessary cabling.
10. The RU shall provide an RJ-45 Ethernet data interface
11. The RU shall provide a wireless bandwidth end-to-end throughput of 500 Mbps, minimum.
12. The RU shall include an integrated antenna providing 20 dBi gain, minimum, and a beam width of 10 degrees azimuth, 10 degrees elevation.
13. The RU shall provide a data throughput latency of 5 milliseconds, maximum.
14. The RU shall be fully compatible with the ATC traffic signal controller and vehicle detection units supplied on the project and shall be certified by its manufacturer for streaming video applications.
15. The RU shall be supplied by the manufacturer complete with integrated radio unit, a Power Supply, and ultraviolet protected, weatherproof CAT6 cabling over which power and data will be transported between the traffic signal control cabinet and the RU.
16. The data connector on the RU shall be RJ-45 female modular plug with a weather protected shell. The Contractor shall connect the CAT6 cabling to the RJ-45 female modular plug in a manner that complies with all RU manufacturer's requirements, and thereby maintains a completely weatherproof connection.
17. The RU shall employ a cyclic redundancy check (CRC) on all wireless data, minimizing the occurrence of undetected errors in the data streams.
18. The RU shall provide to end-to-end encryption for all transported data.
19. The Contractor shall optimally align the antennas of the RUs on both ends of all point-to-point wireless links. The units shall be aligned so as to maximize wireless signal strength. The RU shall provide a means for aiding in antenna alignment.
20. The RUs shall have integral lightning protection.
 - 20.1 A lightning surge protector device recommended by the RU manufacturer shall be installed in the cabinet between the lead-in cable and the Ethernet switch at all locations. The protector shall be electrically connected to the grounding system, which shall meet applicable requirements for grounding at all locations. The grounding conductor for connecting the surge protector to the grounding system

shall be 6 AWG or larger copper wire. All connections shall be weatherproof with outdoor RF connection sealant tape or other approved method.

21. Each RU unit shall be securely attached to a grounded metallic structure and such grounding and bonding shall be in conformance with all applicable grounding and bonding requirements.
22. The RUs shall be securely fastened to the support structure and shall be supplied and installed with the ability of withstanding wind loads of 120 miles per hour (MPH).
23. The RU shall be supplied with management software for all discovery, status, and configuration of the unit. The management software shall also provide two level password access, and over-the-air firmware reprogramming of the radio unit.

718.21 Pedestrian Crossing System Pedestrian crossings must have 16-inch by 18-inch countdown pedestrian signals that count down during the pedestrian clearance interval. The pedestrian countdown modules shall be GE Lumination GT1 Series in 16 inch – McCain Model 1000 Series housings (exterior finish per Special Provision 643 color specification by municipality) or approved equal.

The Accessible Pedestrian Signal (APS) push buttons with locator tones shall be at a minimum Campbell Company Advisor Model A915 or approved equal. Signs shall be posted at each audible signal push button stating which street may be crossed based upon the related push button. Where APS are proposed to be separated by a distance of at least 10 feet and in accordance with Section 4E.11.07 of the Manual on Uniform Traffic Control Devices (MUTCD), the audible walk indication shall be a percussive tone. When using Campbell buttons, MaineDOT has selected “Perc EW 30” for east/west concurrent PED crossings and “Perc NS 70” for north/south PED crossings.

If field modifications dictate that buttons be moved to the same pole or are separated by less than 10 feet, audible walk interval messages should be used as follows:

- For locations with concurrent pedestrian phases – for example “Main Street, Walk sign is on to cross.” The name of the street to cross at locations with concurrent pedestrian phases will change at each audible push button.

The audible push button identification information messages used during the non-walk phases should be as follows:

- For locations with concurrent pedestrian phases – for example “Wait to cross Main Street.”

All controllers are to be set so that a pedestrian actuation does not knock the intersection out of coordination.

2020 STANDARD DETAIL UPDATES

Standard Details and Standard Detail updates are available at:
<http://maine.gov/mdot/contractors/publications/standarddetail/>

<u>Detail #</u>	<u>Description</u>	<u>Revision Date</u>
802(05)	Roadway Culvert End Slope Treatment	1/03/2017
643(11)	ATCC Cabinet	12/14/2020

SUPPLEMENTAL SPECIFICATIONS
(Corrections, Additions, & Revisions to Standard Specifications – March 2020)

SECTION 104
GENERAL RIGHTS AND RESPONSIBILITIES

104.2.1 Furnishing of Right-of-Way Revise the last sentence in the first paragraph by removing “105.4.5 – Special Detours” and replacing it with “**105.4.5 – Maintenance of Existing Structures.**”.

SECTION 401
HOT MIX ASPHALT PAVEMENT

401.19 Contractor Quality Control Amend this Section by adding the following to the end:
“**Failure to comply with the approved QCP will result in work suspension and pay reductions as outlined in Section 106.4.6. The Quality Control Plan Value shall be the total bid value for all items covered by the QCP as identified in Special Provision 403.**”

SECTION 502
STRUCTURAL CONCRETE

502.09 Forms and Falsework Amend this subsection by adding the subsection title “**502.10 Placing Concrete**” after section “D” Removal of Forms and False work” and after the paragraph beginning with “2. Forms and False work, including blocking...”. So that a new subsection starts and reads:

502.10 Placing Concrete

A. **General Concrete shall not be placed until forms”**

502.1701 Quality Control, Method A and B Revise this Section so that the first paragraph and the first sentence of the second paragraph read:

502.17 Quality Control The Contractor shall control the quality of the concrete through testing, inspection, and practices which shall be described in the QCP, sufficient to assure a product meeting the Contract requirements. The QCP shall meet the requirements of Section 106, Quality, and this specification. No work under this item shall proceed until the QCP is submitted to and approved by the Department. Failure to comply with the approved QCP will result in work suspension and pay reductions as outlined in Section 106.4.6. The Quality Control Plan Value shall be the total bid value for all cast-in-place items covered by the QCP, using the P value listed in Special Provision 502. If no P value is listed, a value of \$350, or bid value per cubic yard, whichever is less, shall be used.

502.1701 Quality Control, Method A and B The QCP shall address all elements that affect the quality of the structural concrete including, but not limited to, the following: “

502.18, Method of Measurement, Revise Subsection ‘F’ by removing the word ‘transverse’ so that it reads: **“Saw cut grooving of concrete wearing surfaces, complete and accepted, will be measured for payment as one lump sum.”**

502.19, Basis of Payment, Revise the third paragraph by removing the word ‘transverse’ so that it reads: **“Saw cut grooving of concrete wearing surfaces will be paid for at the Contract Lump Sum Price, which shall be payment for furnishing all materials, labor, and equipment, including depth gauges and all incidentals, to satisfactorily complete the work.”**

535.24, Installation of Slabs, Beams, and Girders Revise the 5th paragraph by replacing “6.0 and 9.0” to “5.0 and 8.0” so it reads: **“Ready mixed grout shall achieve a design compressive strength of 6,000 psi at 28 days, have an entrained air content of between 5.0 and 8.0 percent, be non-shrink, flowable, and contain a non-shrink additive listed on the Department QPL for expansive cements.”**

535.25, Installation of Precast/Prestressed Deck Panels Revise the 2nd paragraph by replacing “6.0 and 9.0” to “5.0 and 8.0” so it reads: **“Ready mixed grout shall achieve a design compressive strength of 6,000 psi at 28 days, have an entrained air content of between 5.0 and 8.0 percent, be non-shrink, flowable, and contain a non-shrink additive listed on the Department QPL for expansive cements.”**

SECTION 506 SHOP APPLIED PROTECTIVE COATING – STEEL

506.13 Surface Preparation Amend this section by adding this paragraph to the end:

“Steel shall meet the requirements of SSPC SP8 Pickling prior to being immersed in the zinc tanks. Verification of the surface preparation shall be included in the QC documentation.”

SECTION 523 BEARINGS

523.22 Fabrication Amend this subsection by adding the following: **“Elastomeric Bearings shall be fabricated in accordance with AASHTO M251.”**

SECTION 606 GUARDRAIL

Amend this section by replacing it with the following:

606.01 Description This work shall consist of furnishing and installing guardrail components in accordance with these specifications and in reasonably close conformity with the lines and grades shown on the plans or as established. Guardrail is designated as:

31" W-Beam Guardrail - Mid-Way Splice

Galvanized steel w-beam, 8" wood or composite offset blocks, galvanized steel posts

Thrie Beam

Galvanized steel thrie beam, 8" wood or composite offset blocks, galvanized steel posts

Median guardrail shall consist of two beams of the above types, mounted on single posts.

Bridge mounted guardrail shall consist of furnishing all labor, materials, and equipment necessary to install guardrail as shown on the plans. This work shall also include drilling for and installation of offset blocks if specified, and incidental hardware necessary for satisfactory completion of the work.

Remove and Reset and Remove, Modify, and Reset guardrail shall consist of removing the existing designated guardrail and resetting in a new location as shown on the plans or directed by the Resident. Remove, Modify, and Reset guardrail and Modify guardrail include the following guardrail modifications: Removing plate washers at all posts, except at anchorage assemblies as noted on the Standard Details, adding offset blocks, and other modifications as listed in the Construction Notes or General Notes. Modifications shall conform to the guardrail Standard Details.

Bridge Connection shall consist of the installation and attachment of beam guardrail to the existing bridge. This work shall consist of constructing a concrete end post or modifying an existing end post as required, furnishing, and installing a terminal connector, necessary hardware, and incidentals required to complete the work as shown on the plans. Bridge Transition shall consist of a bridge connection and furnishing and installing guardrail components as shown in the Standard Details.

606.02 Materials Materials shall meet the requirements specified in the following Sections of Division 700 - Materials:

Timber Preservative	708.05
Metal Beam Rail	710.04
Guardrail Posts	710.07
Guardrail Hardware	710.08

Guardrail components shall meet the applicable standards of "A Guide to Standardized Highway Barrier Hardware" prepared and approved by the AASHTO-AGC-ARTBA Joint Cooperative Committee, Task Force 13 Report.

Posts for underdrain delineators shall be "U" channel steel, 8 ft long, 2 ½ lb/ft minimum and have 3/8-inch round holes, 1-inch center to center for a minimum distance of 2 ft from the top of the post.

Reflectorized Flexible Guardrail Markers shall be mounted on all guardrails. A marker shall be mounted onto guardrail posts at the flared guardrail terminal end point and tangent point, both at the leading and trailing ends of each run of guardrail. The marker's flexible posts shall be gray with either silver-white or yellow reflectors (to match the edge line striping) at the tangents, red at leading ends, and green at trailing ends. Whenever the guardrail terminal is not flared, markers will only be required at the terminal end point. These shall be red or green as appropriate. Markers shall be

installed on the protected side of guardrail posts unless otherwise approved by the Resident. Reflectorized flexible guardrail markers shall be from the Department's Qualified Products List of Delineators. The marker shall be gray, flexible, durable, and of a non-discoloring material to which 3-inch by 9-inch reflectors shall be applied, and capable of recovering from repeated impacts and meeting MASH 16 requirements. Reflective material shall meet the requirements of Section 719.01 for ASTM D 4956 Type III reflective sheeting. The marker shall be secured to the guardrail post with two fasteners, as shown in the Standard Details.

Reflectorized beam guardrail ("butterfly"-type) delineators shall be mounted on all "w"-beam guardrail. The delineators shall be mounted within the guardrail beam at guardrail posts. Delineators shall be fabricated from high-impact, ultraviolet & weather resistant thermoplastic. Reflectorized beam guardrail delineators shall be placed at approximately 62.5 ft intervals or every tenth post on tangents and at approximately 31.25 ft intervals or every fifth post on curves. Exact locations of the delineators shall be as directed by the Resident. On divided highways, the left-hand delineators shall be yellow, and the right-hand delineators shall be silver/white. On two directional highways, the right-hand side shall be silver/white, and no reflectorized delineator used on the left. All reflectors shall have reflective sheeting applied to only one side of the delineator facing the direction of traffic as shown in the Standard Details. Reflectorized sheeting for guardrail delineators shall meet the requirements of Section 719.01.

Single wood post shall be of cedar, white oak, or tamarack, well-seasoned, straight, and sound and have been cut from live trees. The outer and inner bark shall be removed, and all knots trimmed flush with the surface of the post. Posts shall be uniform taper and free of kinks and bends.

Single steel post shall conform to the requirements of Section 710.07 b.

Single steel pipe post shall be galvanized, seamless steel pipe conforming to the requirements of ASTM A120, Schedule No. 40, Standard Weight.

Acceptable multiple mailbox assemblies shall be listed on the Department's Qualified Products List and shall be MASH 16 tested and approved.

Flared and Tangent w-beam guardrail terminals and guardrail offset blocks shall be from the Department's Qualified Products List. Flared terminals shall be installed with a 4 ft offset as shown in the Manufacturer's installation instructions.

Anchorage assemblies used to anchor trailing ends, radius guardrail, or other ends not exposed to traffic shall meet the applicable standards of "A Guide to Standardized Highway Barrier Hardware" prepared and approved by the AASHTO-AGC-ARTBA Joint Cooperative Committee, Task Force 13 Report, Drawing SEW02a.

Existing materials damaged or lost during adjusting, removing and resetting, or removing, modifying, and resetting, shall be replaced by the Contractor without additional compensation. Existing guardrail posts and guardrail beams found to be unfit for reuse shall be replaced when directed by the Resident.

606.03 Posts Posts for guardrail shall be set plumb in holes or they may be driven if suitable driving equipment is used to prevent battering and distorting the post. When posts are driven through pavement, the damaged area around the post shall be repaired with approved bituminous patching. Damage to lighting and signal conduit and conductors shall be repaired by the Contractor.

When set in holes, posts shall be on a stable foundation and the space around the posts, backfilled in layers with suitable material, thoroughly tamped.

The reflectorized flexible guardrail markers shall be set plumb with the reflective surface facing the oncoming traffic. Markers shall be installed on the protected side of guardrail posts. Markers, which become bent or otherwise damaged, shall be removed and replaced with new markers.

Single wood posts shall be set plumb in holes and backfilled in layers with suitable material, thoroughly tamped. The Resident will designate the elevation and shape of the top. The posts, that are not pressure treated, shall be painted two coats of good quality oil base exterior house paint.

Single steel posts shall be set plumb in holes as specified for single wood posts or they may be driven if suitable driving equipment is used to prevent battering and distorting the post.

Additional bolt holes required in existing posts shall be drilled or punched, but the size of the holes shall not exceed the dimensions given in the Standard Details. Metal around the holes shall be thoroughly cleaned and painted with two coats of approved aluminum rust resistant paint. Holes shall not be burned.

606.04 Rails Brackets and fittings shall be placed and fastened as shown on the plans. Rail beams shall be erected and aligned to provide a smooth, continuous barrier. Beams shall be lapped with the exposed end away from approaching traffic.

End assemblies shall be installed as shown on the plans and shall be securely attached to the rail section and end post.

All bolts shall be of sufficient length to extend beyond the nuts but not more than ½ inch. Nuts shall be drawn tight.

Additional bolt holes required in existing beams shall be drilled or punched, but the size of the holes shall not exceed the dimensions given in the Standard Details. Metal around the holes shall be thoroughly cleaned and painted with two coats of approved aluminum rust resistant paint. Holes shall not be burned.

606.045 Offset Blocks The same offset block material is to be provided for the entire project unless otherwise specified.

606.05 Shoulder Widening At designated locations the existing shoulder of the roadway shall be widened as shown on the plans. All grading, paving, seeding, and other necessary work shall be in accordance with the Specifications for the type work being done.

606.06 Mail Box Post Single wood post shall be installed at the designated location for the support of the mailbox. The multiple mailbox assemblies shall be installed at the designated location in accordance with the Standard Details and as recommended by the Manufacturer. Attachment of the mailbox to the post will be the responsibility of the home or business owner.

606.07 Abraded Surfaces All galvanized surfaces of new guardrail and posts, which have been abraded so that the base metal is exposed, and the threaded portions of all fittings and fasteners and cut ends of bolts shall be cleaned and painted with two coats of approved rust resistant paint.

606.08 Method of Measurement Guardrail will be measured by the linear foot from center to center of end posts along the gradient of the rail except where end connections are made to masonry or steel structures, in which case measurement will be as shown on the plans. When connected to radius rail, measurement will be to the end of the last tangent beam.

Guardrail terminal, reflectorized flexible guardrail marker, terminal end, anchorage assembly, bridge transition, bridge connection, multiple mailbox post, and single post will be measured by each unit of the kind specified and installed.

Widened shoulder will be measured as a unit of grading within the limits shown on the plans.

Excavation in solid rock for placement of posts will be paid under force account unless otherwise indicated in the Bid Documents.

606.09 Basis of Payment The accepted quantities of guardrail will be paid for at the contract unit price per linear foot for the type specified, complete in place. Reflectorized beam guardrail ("butterfly"-type) delineators will not be paid for directly but will be considered incidental to guardrail items. Reflectorized flexible guardrail marker, terminal end, anchorage assembly, bridge transition, bridge connection, multiple mailbox post, and single post will be paid for at the contract unit price each for the kind specified complete in place.

Guardrail terminals will be paid for at the contract price each, complete in place which price shall be full payment for furnishing and installing all components including the terminal section, posts, offset blocks, "w" beam, cable foundation posts, plates and for all incidentals necessary to complete the installation within the limits as shown on the Standard Details or the Manufacturer's installation instructions. Pay limits for a flared terminal will be 37.5 feet. Pay limits for a tangent terminal will be 50 feet. Each guardrail terminal will be clearly marked with the Manufacturer's name and model number to facilitate any future needed repair. Such payment shall also be full compensation for furnishing all material, excavating, backfilling holes, assembling, and all incidentals necessary to complete the work, except that for excavation for posts or anchorages in solid ledge rock, payment will be made under 109.7.5 – Force Account. Type III Retroreflective Adhesive Sheeting shall be applied to the approach buffer end sections and sized to substantially cover the end section. On all roadways, the ends shall be marked with alternating black and retroreflective yellow stripes. The stripes shall be 3 in wide and sloped down at an angle of 45 degrees toward the side on which traffic is to pass the end section. Guardrail terminals shall also include a set of installation drawings supplied to the Resident.

Anchorage to bridge end posts will be part of the bridge work. Connections thereto will be considered included in the unit bid price for guardrail.

Guardrail to be placed on a radius of curvature of 150 ft or less will be paid for under the designated radius pay item for the type guardrail being placed.

Widened shoulder will be paid for at the contract unit price each complete in place and will be full compensation for furnishing and placing, grading and compaction of aggregate subbase and any required fill material.

Adjust guardrail will be paid for at the contract unit price per linear foot and will be full compensation for adjusting to grade. Payment shall also include adjusting guardrail terminals where required.

Modify guardrail will be paid for at the contract unit price per linear foot and will be full compensation for furnishing and installing offset blocks, additional posts, and other specified modifications; removing, modifying, installing, and adjusting to grade existing posts and beams; removing plate washers and backup plates, and all incidentals necessary to complete the work. Payment shall also include removing and resetting guardrail terminals where required.

Remove and Reset guardrail will be paid for at the contract unit price per linear foot and will be full compensation for removing, transporting, storing, reassembling all parts, necessary cutting, furnishing new parts when necessary, reinstalling at the new location, and all other incidentals necessary to complete the work. Payment shall also include removing and resetting guardrail terminals when required.

Remove, Modify, and Reset guardrail will be paid for at the contract unit price per foot and will be full compensation for the requirements listed in Modify guardrail and Remove and Reset guardrail.

Bridge Connections will be paid for at the contract unit price each. Payment shall include, attaching the connection to the endpost including furnishing and placing concrete and reinforcing steel necessary to construct new endposts if required, furnishing and installing the terminal connector, and all miscellaneous hardware, labor, equipment, and incidentals necessary to complete the work.

Bridge Transitions will be paid for at the contract unit price each. Payment shall include furnishing and installing the thrie beam or "w"-beam terminal connector, doubled beam section, and transition section, where called for, posts, hardware, precast concrete transition curb, and any other necessary materials and labor, including the bridge connection as stated in the previous paragraph.

No payment will be made for guardrail removed, but not reset and all costs for such removal shall be considered incidental to the various contract pay items.

Payment will be made under:

Pay Item

Pay Unit

606.1301	31" W-Beam Guardrail - Mid-Way Splice – Single Faced	Linear Foot
606.1302	31" W-Beam Guardrail - Mid-Way Splice – Double Faced	Linear Foot
606.1303	31" W-Beam Guardrail - Mid-Way Splice, 15' Radius and Less	Linear Foot
606.1304	31" W-Beam Guardrail - Mid-Way Splice, Over 15' Radius	Linear Foot
606.1305	31" W-Beam Guardrail - Mid-Way Splice Flared Terminal	Each
606.1306	31" W-Beam Guardrail - Mid-Way Splice Tangent Terminal	Each
606.1307	Bridge Transition (Asymmetrical) – Type IA	Each
606.1721	Bridge Transition - Type I	Each
606.1722	Bridge Transition - Type II	Each
606.1731	Bridge Connection - Type I	Each
606.1732	Bridge Connection - Type II	Each
606.178	Guardrail Beam	Linear Foot
606.25	Terminal Connector	Each
606.257	Terminal Connector - Thrie Beam	Each
606.259	Anchorage Assembly	Each
606.265	Terminal End-Single Rail - Galvanized Steel	Each
606.266	Terminal End-Single Rail - Corrosion Resistant Steel	Each
606.275	Terminal End-Double Rail - Galvanized Steel	Each
606.276	Terminal End-Double Rail - Corrosion Resistant Steel	Each
606.353	Reflectorized Flexible Guardrail Marker	Each
606.354	Remove and Reset Reflectorized Flexible Guardrail Marker	Each
606.356	Underdrain Delineator Post	Each
606.358	Guardrail, Modify	Linear Foot
606.362	Guardrail, Adjust	Linear Foot
606.365	Guardrail, Remove, Modify, and Reset	Linear Foot
606.366	Guardrail, Remove and Reset	Linear Foot
606.367	Replace Unusable Existing Guardrail Posts	Each
606.47	Single Wood Post	Each
606.48	Single Galvanized Steel Post	Each
606.50	Single Steel Pipe Post	Each
606.51	Multiple Mailbox Support	Each
606.568	Guardrail, Modify - Double Rail	Linear Foot
606.63	Thrie Beam Rail Beam	Linear Foot
606.64	Guardrail Thrie Beam - Double Rail	Linear Foot
606.65	Guardrail Thrie Beam - Single Rail	Linear Foot
606.66	Terminal End Thrie Beam	Each
606.70	Transition Section - Thrie Beam	Each
606.71	Guardrail Thrie Beam - 15 ft radius and less	Linear Foot
606.72	Guardrail Thrie Beam - over 15 ft radius	Linear Foot
606.73	Guardrail Thrie Beam - Single Rail Bridge Mounted	Linear Foot
606.74	Guardrail - Single Rail Bridge Mounted	Linear Foot
606.753	Widen Shoulder for Low Volume Guardrail End	Each
606.754	Widen Shoulder for Flared Guardrail Terminal	Each
606.78	Low Volume Guardrail End	Each
606.80	Buried-in-Slope Guardrail End	Each

SECTION 609
CURB

609.02 Materials Revise the paragraph beginning “The Contractor shall submit a concrete mix...” so that it reads:

“The Contractor shall submit a concrete mix design for the Portland Cement Concrete to the Resident, with a minimum designed compressive strength of 3000 psi concrete fill.”

609.03 Vertical Stone Curb, Terminal Section and Transition Sections and Portland Cement Concrete Curb, Terminal Sections and Transition Sections Revise this section by underlining the section number and title so that it reads in the spec book as:

“609.03 Vertical Stone Curb, Terminal Section and Transition Sections and Portland Cement Concrete Curb, Terminal Sections and Transition Sections”

Revise the last paragraph beginning with “The Contractor may elect...” so that it reads:

“The Contractor may elect to substitute concrete to backfill Stone Curbing or Stone Edging at their option. If the concrete backfill option is elected, the Concrete Fill shall meet the requirements of 609.02.”

SECTION 610
STONE FILL, RIPRAP, STONE BLANKET, AND STONE DITCH PROTECTION

610.02 Materials Amend this subsection by adding the following to the end of the material list:
“Stone Ditch Protection 703.29”

SECTION 618
SEEDING

618.08 Mulching Revise this Section so that the third sentence reads: “Mulch for Seeding Method Number 1 shall only be cellulous fiber mulch Section 619.04 (b) or straw mulch Section 619.04 (a).”

SECTION 626
FOUNDATIONS, CONDUIT, AND JUNCTION BOXES FOR HIGHWAY
SIGNING, LIGHTING, AND SIGNALS

626.034 Concrete Foundations Revise this Section by changing ‘626.037’ to ‘**626.036**’ in the Second Paragraph which begins with “Foundations shall consist of cast-in-place...”.

Revise the 10th paragraph beginning with “Before placing concrete, the required elbows...” by removing “...in accordance with **Standard Specification 633.**”

SECTION 627 PAVEMENT MARKINGS

627.06 Application Revise this subsection by replacing the paragraph beginning with “ On other final pavement markings...” with the following:

“On other final pavement markings and on curb, where the paint is applied by hand painting or spraying, application shall be one uniform covering coat at least 16 mils thick. Before the paint has dried, the glass beads shall be applied by a pressure system that will force the glass beads onto the undried paint as uniformly as possible.

Painted lines and markings shall be applied in accordance with the manufacturer’s published recommendations. These recommendations will be supplied to the Resident prior to installation.”

SECTION 643 TRAFFIC SIGNALS

643.09 Service Connection Revise this subsection by removing the paragraph that begins with “Traffic signal services shall have...”.

And by removing the paragraphs beginning with “ A service ground rod shall be installed...” and “A total of 4, 10’ service...” and replace them with **“A total of 4, 10’ service ground rods shall be installed and properly connected together on the outside of the cabinet foundation. One ground rod shall be located at each corner and shall be either flush or slightly below finished grade. The connection between the ground rod and the ground wire shall be an exothermic connection such as a Cadweld. The ground wire from the interconnected ground rods shall be routed through a conduit in the foundation and into the base of the cabinet”.**

SECTION 645 HIGHWAY SIGNING

Section 645.023 Sign Support Structures. Under letter “c.”, revise the fifth paragraph beginning with “In addition to the required details...” by removing the words **”and foundation”** from the 5th sentence.

Section 645.08 Method of Measurement. Revise the second paragraph beginning with “Bridge-type, cantilever and...” by removing the words **”including the foundation”** .

Section 645.09 Basis of Payment. Revise the third paragraph beginning with “The accepted bridge-type, cantilever and...” by removing the word **”foundation”** from the second sentence. Add the following sentence to the end of the paragraph **“Conduits, Junction Boxes, and Foundations will be paid for under Section 626.”**

SECTION 652 MAINTENANCE OF TRAFFIC

652.4 Flaggers Revise the first paragraph of this section so that it reads:

“The Contractor shall furnish flaggers as required by the TCP or as otherwise specified by the Resident. All flaggers must have successfully completed a flagger test approved by the Department and administered by a Department-approved Flagger-Certifier who is employing that flagger. All flaggers must carry an official certification card with them while flagging that has been issued by their employer.”

SECTION 681 PRECAST AGGREGATE-FILLED, CONCRETE BLOCK GRAVITY WALL

681.08 Basis of Payment Amend this section by adding the Item Number **“681.10”** in front of the item “Precast Aggregate-Filled Concrete Block Gravity Wall” at the end of the section.

SECTION 703 AGGREGATES

Add the following to Section 703 - Aggregates

703.01 Fine Aggregate for Concrete Fine aggregate for concrete shall consist of natural sand or, when approved by the Resident, other inert materials with similar characteristics or combinations thereof, having strong, durable particles. Fine aggregate from different sources of supply shall not be mixed or stored in the same pile nor used alternately in the same class of construction or mix without permission of the Resident.

All fine aggregate shall be free from injurious amounts of organic impurities. Should the fine aggregate, when subjected to the colorimetric test for organic impurities, AASHTO T 21, produce a color darker than the reference standard color solution (laboratory designation Plate III), the fine aggregate shall be rejected.

Fine aggregate shall have a sand equivalent value of not less than 75 when tested in accordance with AASHTO T 176.

Fine aggregate sources shall meet the Alkali Silica Reactivity (ASR) requirements of Section 703.0201.

The fineness modulus shall not be less than 2.26 or more than 3.14. If this value is exceeded, the fine aggregate will be rejected unless suitable adjustments are made in proportions of coarse and fine aggregate. The fineness modulus of fine aggregate shall be determined by adding the cumulative percentages of material by weight retained on the following sieves: Nos. 4, 8, 16, 30, 50, 100 and dividing by 100.

Fine aggregate, from an individual source when tested for absorption as specified in AASHTO T 84, shall show an absorption of not more than 2.3 percent.

Sieve Designation	Percentage by Weight Passing Square Mesh Sieves
$\frac{3}{8}$ inch	100
No. 4	95-100
No. 8	80-100
No. 16	50-85
No. 30	25-60
No. 50	10-30
No. 100	2-10
No. 200	0-5.0

703.02 Coarse Aggregate for Concrete Coarse aggregate for concrete shall consist of crushed stone or gravel having hard, strong, durable pieces, free from adherent coatings and of which the composite blend retained on the $\frac{3}{8}$ inch sieve shall contain no more than 15 percent, by weight of flat and elongated particles when performed in accordance with test method ASTM D 4791, Flat Particles, Elongated Particles, or Flat and Elongated Particles in Coarse Aggregate, using a dimensional ratio of 1:5.

The coarse aggregate from an individual source shall have an absorption no greater than 2.0 percent by weight determined in accordance with AASHTO T 85 modified for weight of sample.

The composite blend shall have a Micro-Deval value of 18.0 percent or less as determined by AASHTO T 327 or not exceed 40 percent loss as determined by AASHTO T 96.

Coarse aggregate sources shall meet the Alkali Silica Reactivity (ASR) requirements of Section 703.0201.

Coarse aggregate shall conform to the requirements of the following table for the size or sizes designated and shall be well graded between the limits specified.

Sieve Designation	Percentage by Weight Passing Square Mesh Sieves			
	A	AA	S	LATEX
Grading				
Aggregate Size	1 inch	¾ inch	1½ inch	½ inch
2 inch			100	
1½ inch	100		95-100	
1 inch	95-100	100	-	
¾ inch	-	90-100	35-70	100
½ inch	25-60	-	-	90-100
¾ inch	-	20-55	10-30	40-70
No. 4	0-10	0-10	0-5	0-15
No. 8	0-5	0-5	-	0-5
No. 16	-	-	-	-
No. 50	-	-	-	-
No. 200	0 - 1.5	0 - 1.5	0 - 1.5	0 - 1.5

703.0201 Alkali Silica Reactive Aggregates All coarse and fine aggregates proposed for use in concrete shall be tested for Alkali Silica Reactivity (ASR) potential under AASHTO T 303 (ASTM C 1260), Accelerated Detection of Potentially Deleterious Expansion of Mortar Bars Due to Alkali-Silica Reaction, prior to being accepted for use. Acceptance will be based on testing performed by an accredited independent lab submitted to the Department. Aggregate submittals will be required on a 5-year cycle, unless the source or character of the aggregate in question has changed within 5 years from the last test date.

As per AASHTO T 303 (ASTM C 1260): Use of a particular coarse or fine aggregate will be allowed with no restrictions when the mortar bars made with this aggregate expand less than or equal to 0.10 percent at 30 days from casting. Use of a particular coarse or fine aggregate will be classified as potentially reactive when the mortar bars made with this aggregate expand greater than 0.10 percent at 30 days from casting. Use of this aggregate will only be allowed with the use of cement-pozzolan blends and/or chemical admixtures that result in mortar bar expansion of less than 0.10 percent at 30 days from casting as tested under ASTM C 1567.

Acceptable pozzolans and chemical admixtures that may be used when an aggregate is classified as potentially reactive include, but are not limited to the following:

- a. Class F Coal Fly Ash meeting the requirements of AASHTO M 295
- b. Ground Granulated Blast Furnace Slag (Grade 100 or 120) meeting the requirements of AASHTO M 302
- c. Densified Silica Fume meeting the requirements of AASHTO M 307
- d. Lithium-based admixtures
- e. Metakaolin

Pozzolans or chemical admixtures required to offset the effects of potentially reactive aggregates will be incorporated into the concrete at no additional cost to the Department.

703.05 Aggregate for Sand Leveling Aggregate for sand leveling shall be sand of hard durable particles free from vegetable matter, lumps or balls of clay and other deleterious substances. The aggregate shall meet the grading requirements of the following table.

Sieve Designation	Percentage by Weight Passing Square Mesh Sieves
3/8 inch	85-100
No. 200	0-5.0

703.06 Aggregate for Base and Subbase The following shall apply to Sections (a.) and (c.) below. The material shall have a Micro-Deval...” and replace with “The material shall have a minimum degradation value of 25.0 or less as determined by AASHTO T 327. If the Micro-Deval value exceeds 25.0, the Washington State Degradation DOT Test Method T 113T113, Method of Test for Determination of Degradation Value (January 2009 version) shall be performed), except that the test shall be performed on the reported degradation value will be the result of testing a single specimen from that portion of the sample that passes the 1/2 in sieve and is retained on the No. 10 sieve. If the material has a Washington Degradation value of less than 15, the material shall be rejected.

The material, minus any reclaimed asphalt pavement used in Section (b.) below shall have a Micro-Deval value of 25.0 or less as determined by AASHTO T 327. If the Micro-Deval value exceeds 25.0 the material may be used if it does not exceed 25 percent loss on AASHTO T 96, Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine. If AASHTO T 96 is used for acceptance of the material, the material shall be retested at intervals of 25%, 50% and 75% completion of the course.

Recycled Asphalt Pavement (RAP) shall not be used for or blended with aggregate base or subbase.

- a. Aggregate for base, Type A and B shall be crushed ledge or crushed gravel of hard durable particles free from vegetable matter, lumps or balls of clay and other deleterious substances. The gradation of the part that passes a 3 inch sieve shall meet the grading requirements of the following table:

Sieve Designation	Percentage by Weight Passing Square Mesh Sieves	
	Type A	Type B
1/2 inch	45-70	35-75
1/4 inch	30-55	25-60
No. 40	0-20	0-25

No. 200	0-6.0	0-6.0
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At least 50 percent by weight of the material retained on the No. 4 sieve shall have at least one fractured face as tested by AASHTO T 335.

Type A aggregate for base shall only contain particles of rock that will pass the 2 inch square mesh sieve.

Type B aggregate for base shall only contain particles of rock that will pass the 4 inch square mesh sieve.

- b. Aggregate for base, Type C shall be crushed ledge or crushed gravel of hard durable particles free from vegetable matter, lumps or balls of clay and other deleterious substances. The material shall meet the grading requirements of the following table:

Sieve Designation	Percentage by Weight Passing Square Mesh Sieves
	Type C
4 inches	100
3 inches	90-100
2 inches	75-100
1 inch	50-80
½ inch	30-60
No. 4	15-40
No. 200	0-6.0

At least 50 percent by weight of the material coarser than the No. 4 sieve shall have at least one fractured face as tested by AASHTO T 335.

- c. Aggregate for subbase shall be sand or gravel of hard durable particles free from vegetable matter, lumps or balls of clay and other deleterious substances. The gradation of the part that passes a 3 inch sieve shall meet the grading requirements of the following table:

Sieve Designation	Percentage by Weight Passing Square Mesh Sieves
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	Type D	Type E
½ in	35-80	
¼ inch	25-65	25-100
No. 40	0-30	0-50
No. 200	0-7.0	0-7.0

Type D aggregate for subbase gravel may contain up to 50 percent by weight Recycled Concrete Aggregate (RCA). When RCA is used, the portion of the resulting blend of gravel and RCA retained on a ½” square mesh sieve shall contain a total of no more than 5 percent by weight of other recycled materials such as brick, concrete masonry block, or asphalt pavement as determined by visual inspection.

RCA shall be substantially free of wood, metal, plaster, and gypsum board as defined in Note 9 in Section 7.4 of AASHTO M 319. RCA shall also be free of all substances that fall under the category of solid waste or hazardous materials.

Aggregate for subbase shall not contain particles of rock which will not pass the 6 inch square mesh sieve.

703.08 Recycled Asphalt Pavement Recycled asphalt pavement shall consist of salvaged asphalt materials from milled pavements or production waste that has been processed before use to meet the requirements of the job mix formula. It shall be free of winter sand, granular fill, construction debris, or other materials not generally considered asphalt pavement.

703.081 RAP for Asphalt Pavement Recycled Asphalt Pavement (RAP) may be introduced into hot-mix asphalt pavement at percentages approved by the Department according to the MaineDOT Policies and Procedures for HMA Sampling and Testing.

If approved by the Department, the Contractor shall provide documentation stating the source, test results for average residual asphalt content, and stockpile gradations showing RAP materials have been sized to meet the maximum aggregate size requirements of each mix designation. The Department will obtain samples for verification and approval prior to its use.

The maximum allowable percent of RAP shall be determined by the asphalt content, the percent passing the 0.075 mm sieve, the ratio between the percent passing the 0.075 mm sieve and the asphalt content, and Coarse Micro-Deval loss values as tested by the Department.

The maximum percentage of RAP allowable shall be the lowest percentage as determined according to Table 4 below:

Classification	Maximum RAP Percentage Allowed	Asphalt content standard deviation	Percent passing 0.075 mm sieve standard deviation	Percent passing 0.075 mm sieve / asphalt content ratio	Residual aggregate M-D loss value
Class III	10%	≤ 1.0	N/A	≤ 4.0	≤ 18
Class II	20%	≤ 0.5	≤ 1.0	≤ 2.8	
Class I	30%	≤ 0.3	≤ 0.5	≤ 1.8	

Table 4: Maximum Percent RAP According to Test Results

The Department will monitor RAP asphalt content and gradation during production by testing samples from the stockpile at approximately 15,000 T intervals (in terms of mix production). The allowable variance limits (from the numerical average values used for mix designs) for this testing are determined based upon the maximum allowable RAP percentage and are shown below in Table 5.

Table 5: RAP Verification Limits

Classification	Asphalt content (compared to aim)	Percent passing 0.075 mm sieve (compared to aim)
Class III	± 1.5	± 2.0
Class II	± 1.0	± 1.5
Class I	± 0.5	± 0.7

For specification purposes, RAP will be categorized as follows:

Class III – A maximum of 10.0 percent of Class III RAP may be used in any base, intermediate base, surface, or shim mixture. A maximum of 20.0 percent of Class III RAP may be used in hand-placed mixes for item 403.209.

Class II – A maximum of 20.0 percent Class II RAP in any base, binder, surface, or shim course.

Class I – A maximum of 20.0 percent Class I RAP may be used in any base, intermediate base, surface, or shim mixture without requiring a change to the specified asphalt binder. A maximum

of 30.0 percent Class I RAP may be used in in any base or intermediate base mixture provided that a PG 58-28 or PG 58-34 asphalt binder is used. A maximum of 30.0 percent Class I RAP may be used in any surface or shim mixture provided that PG 58-34 asphalt binder is used. Mixtures exceeding 20.0 percent Class I RAP must be evaluated and approved by the Department.

The Contractor may use up to two different RAP sources in any one mix design. The total RAP percentage of the mix shall not exceed the maximum allowed for the highest classification RAP source used (i.e. if a Class I & Class III used, total RAP must not exceed 30.0%). The blended RAP material must meet all the requirements of the classification for which the RAP is entered (i.e. 10% Class III with 20% Class I, blend must meet Class I criteria). The Department may take belt cuts of the blended RAP to verify the material meets these requirements. If the Contractor elects to use more than one RAP source in a design, the Contractor shall provide an acceptable point of sampling blended RAP material from the feed belt.

In the event that RAP source or properties change, the Contractor shall notify the Department of the change and submit new documentation stating the new source or properties a minimum of 72 hours prior to the change to allow for obtaining new samples and approval.

SECTION 710 FENCE AND GUARDRAIL

710.06 Fence Posts and Braces Revise the first Paragraph so that it reads:

“Wood posts shall be of cedar, white oak, or tamarack or other AWWA approved species, of the diameter or section and length shown on the plans.”

Remove the fourth paragraph which starts “ That portion of wood posts...”.

Revise the paragraph beginning with “Braces shall be of spruce, eastern hemlock ... so that it now reads:

“Braces shall be of spruce, eastern hemlock, Norway pine, pitch pine, or tamarack timbers or other AWWA approved species, or spruce, cedar, tamarack or other AWWA approved species round posts of sufficient length to make a diagonal brace between adjacent posts. All wood posts and braces shall be pressure-treated in accordance with AASHTO M 133 and AWWA U1, UC4A Commodity Specification B: Posts. “

710.07 Guardrail Posts Revise this section so that the first sentence of section a. reads:

“a. Wood posts shall be of Norway pine, southern yellow pine, pitch pine, Douglas fir, red pine, white pine, or eastern hemlock or other AWWA approved species.”

Revise the next paragraph so that it reads:

Wood posts and offset brackets shall be preservative treated in accordance with the requirements of AASHTO M 133 and AWPA U1, UC4A Commodity Specification B: Posts.

SECTION 712 MISCELLANEOUS HIGHWAY MATERIAL

712.061 Structural Precast Units Amend this section by adding the following sentence to the end of the first paragraph of the Construction subsection:

“Facilities certified by NPCA or PCI shall provide to the Fabrication Engineer a copy of their annual audit to include deficiency reports and corrective actions.”

Revise this section by changing the letter “b” of ASTM C1611 of the Concrete Testing subsection so that it reads:

“b. Air content shall be 5.0% to 8.0%.”

SECTION 718 TRAFFIC SIGNALS MATERIAL

718.03 Signal Mounting Amend the paragraph beginning with “All trunions, brackets and...” by adding **“For polycarbonate signal heads with more than 3 sections or requiring mounting extensions greater than 12 inches in length, reinforcing plates shall be used to reinforce the housings at the point of attachment.”** to the end of the paragraph.

718.08 Controller Cabinet Revise this subsection by replacing the paragraph beginning with “The cabinet shall be supplied with LED light panels...” on or about page 7-66 with **“The cabinet shall be supplied with white LED light panels which shall automatically illuminate via a door open switch whenever one of the four main cabinet doors are opened for the ground mount cabinet or two main doors for the side of pole cabinet. The ground mounted cabinet shall contain four LED light panels per side totaling eight panels for the cabinet; one panel each at the top and bottom portion of the front side and back side on the Control side and Power/Auxiliary side of the cabinet. Each light panel shall produce a minimum of 250 lumens for a total minimum lumen output of 2000 lumens with all eight panels illuminated. The minimum output per side would be 1000 lumens. The LED panels shall be protected by a clear shatterproof shield. The side of pole mounted cabinet shall contain four light panels; one at the top of the rack assembly and one at the bottom rack assembly on each side of the cabinet. A second door open status switch per door shall activate a controller input to log a report event that one of the doors was opened. All door open status switches shall be connected to the same controller input. For the ground mount cabinet, there shall be two switches on each of the four main doors. For the side-of-pole mount cabinet, there shall be two switches on each of the two main doors.”**

Revise this subsection by replacing the paragraph beginning with “The cabinet shall be supplied with a generator panel ...” on or about page 7-68 with:

“The cabinet shall be supplied with a generator panel. The generator panel shall consist of a manual transfer switch and a twist-lock connector for generator hookup. The transfer switch knob and twist-lock connector shall be located inside a stainless steel enclosure with a separate lockable door accessed with a Corbin #2 key. The unit shall be mounted on the left, exterior of the control side wall of the ground mount cabinet a minimum of 36” above the surrounding grade and on the lower left side of the pole mounted cabinet. The generator transfer switch shall be a Reliance C30A1 Signa Series or approved equal. “

Revise this subsection by removing the following from the paragraph beginning with “The ground mounted cabinet shall be supplied and installed with an electric service meter socket trim and electrical service disconnect switch ...” on or about page 7-69: **“(removed: thus preventing that space from being used either by equipment supplied as part of the project, or future equipment that would be installed in the rack system. Joe indicated that he would add this language to the detail so it is covered.)”**.

Revise this subsection by replacing the following in the paragraph beginning with “The Contractor shall reconfigure the default user name...” on or around page 7-70; “MaineDOT IT” with **“MaineDOT Traffic Division”**.

In the paragraph beginning with “Tests shall be conducted by the contractor...” on or around page 7-73, amend this subsection by removing **“in the state of Maine and”** after “The facility shall be”.

Amend this Section by adding the following subsection:

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

Where applicable, communications from MaineDOT’s cloud-based Central Management System (CMS) to the on-street traffic signal controllers shall be made through fiber optic interconnect cable connected back to existing internet connections and/or the Field Monitoring Unit (FMU). The Contractor shall furnish and install all materials necessary for a complete and operational fiber optic interconnection to all project intersections as shown on the plans. All connections to the CMS cloud-based system shall be via a secure VPN network.

The FMU shall be the only remote connection device used by isolated intersections to connect to the cloud-based system. All connections shall be encrypted VPN tunnels. The Contractor shall coordinate all configuration settings with MaineDOT IT and the Engineer.

The FMU central web based interface shall be a separate element from the CMS.

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

1. The work under this item specifies the requirements for the FMU. The FMU shall operate independent of the brand/type of intersection controller deployed in the ATC traffic cabinet.
2. The FMU shall conform to the following requirements:
 - 2.1 The FMU shall function correctly between -34 degrees C and +74 degrees C.
 - 2.2 The FMU shall be provided with appropriately rated connectors that allows the FMU to be exchanged by unplugging connectors, without tools.
 - 2.3 The FMU shall monitor and log all ATC Controller and ATC cabinet faults and or alarms.
 - 2.4 The FMU shall be wired directly to the ATC cabinet.
 - 2.5 The FMU shall have an internal cellular modem running at 4G LTE.
 - 2.5.1 The Cellular modem shall be designed to be replaced / upgraded to 5G service when available.
 - 2.6 The FMU shall incorporate an integrated GPS and cell modem.
 - 2.7 The configuration of the FMU shall be accomplished by accessing the internal web server with a browser. It shall be possible to configure the FMU without any special software.
 - 2.8 The FMU shall be powered via a standard 120V input power.
 - 2.9 The FMU shall allow for the routing of the controller configuration packets to and from the controller (either by Ethernet or serial communications) for any type of controller utilized by the MaineDOT. In this way it shall be possible to configure the controller and utilize the controller specific software to interrogate the controller, and the FMU shall provide the communications pipe which allows this to be accomplished.
 - 2.10 The FMU shall, within the size limitations above, include a battery and battery charging/monitoring circuit, to allow the FMU to function correctly even when all power to the intersection has failed. The battery shall continue to power the FMU for a minimum of 5 hours after all power has failed to the intersection.
 - 2.11 The FMU shall incorporate an integrated GPS which will allow the FMU to geo-locate itself on the FMU management software map, without configuration.
 - 2.12 The FMU shall operate without requiring a static IP address. The only configuration required at the FMU is to enter the URL of where the FMU management software is hosted.
 - 2.13 In the event that the cell service is interrupted or is not available, the FMU shall store any events that occur in internal memory and forward these events automatically to the FMU management software when the cell service is restored. In this way, a complete

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

- 2.14 The FMU shall utilize HTTP and HTTPS protocols, and XML data structures, for communication with the FMU management software. In this way the data will be open for future expansion and competition. The use of secret proprietary protocols is not permitted.
- 2.15 The FMU shall include Ethernet communications via an Ethernet Port with RJ45 connector.
- 2.16 The FMU shall include weather proof antennas.

3. Map Display FMU Management Software

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

4. Intersection Detail Display FMU Management Software

- 4.1 It shall be possible to drill down, either from the map icon or from the list, to a device level detail for the intersection, which as a minimum shall display the following parameters:
 - 4.1.1 The alarm status, with priority indicated, and a text description of the alarm (if an alarm is present for this device).
 - 4.1.2 The time since the last communication with the device

- 4.1.3 The following parameters (real time now values, minimum for the day values, maximum for the day values, and average for the day values)
 - 4.1.3.1 The AC mains voltage (value)
 - 4.1.3.2 The battery back-up voltage (value)
 - 4.1.3.3 The cabinet temperature (value)
 - 4.1.3.4 The cabinet humidity (value)
 - 4.1.3.5 The presence of AC power (OK or Fail)
 - 4.1.3.6 The flashing status of the intersection (OK or Flashing)
 - 4.1.3.7 Stop Time status (OK or Stop Time Active)
 - 4.1.3.8 The cabinet door status (Open or Closed)
 - 4.1.3.9 The intersection fan status (Fan On or Fan off)
- 4.1.4 It shall be possible to view graphs of each of the value parameters in graphical form, over the recent two-week period. This includes real time graphs of:
 - 4.1.4.1 The AC mains voltage
 - 4.1.4.2 The battery back-up voltage
 - 4.1.4.3 The cabinet temperature
 - 4.1.4.4 The cabinet humidity

5. Diagnostics and Log Display FMU Management Software

- 5.1 From the device level detail within the FMU management software, it shall be possible to drill down to get the raw data; the error logs; and the communications logs to allow a technician to fault-find problems.
- 5.2 It shall be possible to filter the logs by Device; by Device Type and/or by Group as well as between dates.
- 5.3 It shall be possible to print these selected logs to a local printer or a PDF file.
- 5.4 It shall be possible to export these logs to Excel on the local computer for further analysis.

6. Alarms FMU Management Software

- 6.1 The FMU management software shall have a comprehensive alarm generation capability
- 6.2 It shall be possible to configure alarms to be generated on any parameter becoming out of tolerance, including analog values, digital values and enumerated values.
- 6.3 Alarms shall be configurable to be of Low, High or Critical Priority.

6.4 The alarm priority shall be displayed throughout the FMU management software, on all displays, using color codes such as red-critical; yellow – high; and amber-low to indicate the priority of the alarm.

6.5 The current active alarms shall be accessible for view via an expandable window, to see which alarms are active and when the alarm occurred. The highest priority alarms shall rise to the top of the list.

7. Alerts FMU Management Software

7.1 The FMU management software shall have comprehensive alerting capability, to enable the response personnel to be notified when an abnormal situation has occurred.

7.2 It shall be possible to configure alerts to one or more personnel for each alarm. This will cause, as selected, an SMS and/or an email to be sent to the person when an alarm occurs.

7.3 The alert shall be configurable to optionally send via email and/or via SMS a message when an alarm clears.

7.4 The intention is that the FMU management software provides the alerts to the user in near real time. The SMS and email shall be issued within 30 seconds of the occurrence of event which results in an alert being issued.

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

8.1 The contractor shall supply the FMU with the FMU manufacturers 10 year options for Connectivity and Service, as part of the purchase price. The Connectivity and Service agreement shall include at a minimum:

8.1.1 Cellular Connectivity

8.1.2 No cellular overage charges

8.1.3 Extended warranty on the hardware for the period of the Connectivity and Service Agreement

8.1.4 Over-the-air software updates

8.1.5 Over-the-air security updates

8.1.6 Future Connected Vehicles Service

SECTION 720 **STRUCTURAL SUPPORTS FOR HIGHWAY SIGNS, LUMINAIRES AND TRAFFIC SIGNALS**

720.12 Wood Sign Posts Revise the first sentence so that it reads:

Wood sign posts shall be rectangular, straight and sound timber, cut from live growing native spruce, red pine, hemlock, cedar trees or other AWPA approved species, free from loose knots or other structurally weakening defects of importance, such as shake or holes or heart rot.

Revise the third paragraph that starts with “When pressure treated...” so that it reads:

All sign posts shall be pressure-treated in accordance with AASHTO M 133 and AWPA Standard U1, UC4A, Commodity Specification A: Sawn Products.

APPENDIX A TO DIVISION 100

SECTION 1 - BIDDING PROVISIONS

A. Federally Required Certifications By signing and delivering a Bid, the Bidder certifies as provided in all certifications set forth in this Appendix A - Federal Contract Provisions Supplement including:

- Certification Regarding No Kickbacks to Procure Contract as provided on this page 1 below.
- Certification Regarding Non-collusion as provided on page 1 below.
- Certification Regarding Non-segregated Facilities as provided by FHWA Form 1273, section III set forth on page 21 below.
- "Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion" as provided by FHWA Form 1273, section XI set forth on page 32 below.
- "Certification Regarding Use of Contract Funds for Lobbying" as provided by FHWA Form 1273, section XII set forth on page 35 below.

Unless otherwise provided below, the term "Bidder", for the purposes of these certifications, includes the Bidder, its principals, and the person(s) signing the Bid. Upon execution of the Contract, the Bidder (then called the Contractor) will again make all the certifications indicated in this paragraph above.

CERTIFICATION REGARDING NO KICKBACKS TO PROCURE CONTRACT Except expressly stated by the Bidder on sheets submitted with the Bid (if any), the Bidder hereby certifies, to the best of its knowledge and belief, that it has not:

(A) employed or retained for a commission, percentage, brokerage, contingent fee, or other consideration, any firm or person (other than a bona fide employee working solely for me) to solicit or secure this contract;

(B) agreed, as an express or implied condition for obtaining this contract, to employ or retain the services of any firm or person in connection with carrying out the contract, or;

(C) paid, or agreed to pay, to any firm, organization, or person (other than a bona fide employee working solely for me) any fee, contribution, donation, or consideration of any kind for, or in connection with, procuring or carrying out the contract;

By signing and submitting a Bid, the Bidder acknowledges that this certification is to be furnished to the Maine Department of Transportation and the Federal Highway Administration, U.S. Department of Transportation in connection with this contract in anticipation of federal aid highway funds and is subject to applicable state and federal laws, both criminal and civil.

CERTIFICATION REGARDING NONCOLLUSION Under penalty of perjury as provided by federal law (28 U.S.C. §1746), the Bidder hereby certifies, to the best of its knowledge and belief, that:

the Bidder has not, either directly or indirectly, entered into any agreement, participated in any collusion, or otherwise taken any action in restraint of competitive bidding in connection with the Contract.

For a related provisions, see Section 102.7.2 (C) of the Standard Specifications - "Effects of Signing and Delivery of Bids" - "Certifications", Section 3 of this Appendix A entitled "Other Federal Requirements" including section XI - "Certification Regarding Debarment, Suspension, Ineligibility, and Voluntary Exclusion" and section XII. - "Certification Regarding Use of Contract Funds for Lobbying."

B. Bid Rigging Hotline To report bid rigging activities call: **1-800-424-9071**

The U.S. Department of Transportation (DOT) operates the above toll-free "hotline" Monday through Friday, 8:00 a.m. to 5:00 p.m., eastern time. Anyone with knowledge of possible bid rigging, bidder collusion, or other fraudulent activities should use the "hotline" to report such activities.

The "hotline" is part of the DOT's continuing effort to identify and investigate highway construction contract fraud and abuse and is operated under the direction of the DOT Inspector General. All information will be treated confidentially and caller anonymity will be respected.

SECTION 2 - FEDERAL EEO AND CIVIL RIGHTS REQUIREMENTS

Unless expressly otherwise provided in the Bid Documents, the provisions contained in this Section 2 of this "Federal Contract Provisions Supplement" are hereby incorporated into the Bid Documents and Contract.

A. Nondiscrimination & Civil Rights - Title VI The Contractor and its subcontractors shall not discriminate on the basis of race, color, national origin, or sex in the performance of this Contract. The Contractor shall carry out applicable requirements of 49 CFR Part 26 in the award and administration of DOT assisted contracts. Failure by the Contractor to carry out these requirements is a material breach of this contract, which may result in the termination of this contract or such other remedy as the Department deems appropriate. The Contractor and subcontractors shall comply with Title VI of the Civil Rights Act of 1964, as amended, and with all State of Maine and other Federal Civil Rights laws.

For related provisions, see Subsection B - "Nondiscrimination and Affirmative Action - Executive Order 11246" of this Section 2 and Section 3 - Other Federal Requirements of this "Federal Contract Provisions Supplement" including section II - "Nondiscrimination" of the "Required Contract Provisions, Federal Aid Construction Contracts", FHWA-1273.

B. Nondiscrimination and Affirmative Action - Executive Order 11246 Pursuant to Executive Order 11246, which was issued by President Johnson in 1965 and amended in 1967 and 1978, this Contract provides as follows.

The Contractor shall take specific affirmative actions to ensure equal employment opportunity. The evaluation of the Contractor's compliance with these specifications shall be based upon its efforts to achieve maximum results from its actions. The Contractor shall document these efforts fully, and shall implement affirmative action steps at least as extensive as the following:

Ensure and maintain a working environment free of harassment, intimidations, and coercion at all sites, and in all facilities at which the Contractor's employees are assigned to work. The Contractor, where possible, will assign two or more women to each construction project. The Contractor shall specifically ensure that all forepersons, superintendents, and other on-site supervisory personnel are aware of and carry out the Contractor's obligation to maintain such a working environment, with specific attention to minority or female individuals working at such sites or in such facilities.

Establish and maintain a current list of minority and female recruitment sources, provide written notification to minority and female recruitment sources and to community organizations when the Contractor or its union have employment opportunities available, and to maintain a record of the organization's responses.

Maintain a current file of the names, addresses and telephone numbers of each minority and female off-the-street applicant and minority or female referral from a union, a recruitment source or community organization and of what action was taken with respect to each such individual. If such individual was sent to the union hiring hall for referral and was not referred back to the Contractor by the union or, if referred, not employed by the Contractor, this shall be documented in the file with the reason therefore, along with whatever additional actions the Contractor may have taken.

Provide immediate written notification to the Department's Civil Rights Office when the union or unions with which the Contractor has a collective bargaining agreement has not referred to the Contractor a minority person or woman sent by the Contractor, or when the Contractor has other information that the union referral process has impeded the Design-Builder's efforts to meet its obligations.

Develop on-the-job training opportunities and/or participate in training programs for the area which expressly include minorities and women, including upgrading programs and apprenticeship and trainee programs relevant to the Contractor's employment needs, especially those programs funded or approved by the Department of Labor. The Contractor shall provide notice of these programs to the sources compiled under B above.

Disseminate the Contractor's EEO policy by providing notice of the policy to unions and training programs and requesting their cooperation in assisting the Contractor in meeting its EEO obligation; by including it in any policy manual and collective bargaining agreement; by publicizing it in the company newspaper, annual report, etc.; by specific review of the policy with all management personnel and with all minority and female employees at least once a year; and by posting the company EEO policy on bulletin boards accessible to all employees at each location where construction work is performed.

Review, at least annually, the company's EEO policy and affirmative action obligations under these specifications with all employees having any responsibility for hiring, assignment, layoff, termination, or other employment decisions including specific review of these items with on-site supervisory personnel such as Superintendents, General Forepersons, etc., prior to the initiation of construction work at any job site. A written record shall be made and maintained identifying the time and place of these meetings, persons attending, subject matter discussed, and disposition of the subject matter.

Disseminate the Contractor's EEO policy externally by including it in any advertising in the news media, specifically including minority and female news media, and providing written notification to and discussing the Contractor's EEO policy with other Contractor's and Subcontractors with whom the Contractor does or anticipates doing business.

Direct its recruitment efforts, both orally and written to minority, female and community organizations, to schools with minority and female students and to minority and female recruitment and training organizations serving the Contractor's recruitment area and employment needs. Not later than one month prior to the date for the acceptance of applications for apprenticeship or other training by any recruitment source, the Contractor shall send written notification to organizations such as the above describing the openings, screenings, procedures, and test to be used in the selection process.

Encourage present minority and female employees to recruit other minority persons and women and, where reasonable, provide after school, summer and vacation employment to minority and female youth, both on the site and in other areas of a Contractor's workforce.

Validate all tests and other selection requirements.

Conduct, at least annually, an inventory and evaluation at least of all minority and female personnel for promotional opportunities and encourage these employees to seek or to prepare for, through appropriate training, etc., such opportunities.

Ensure that seniority practices, job classifications, work assignments and other personnel practices, do not have a discriminatory effect by continually monitoring all personnel and employment related activities to ensure that the EEO policy and the Contractor's obligations under these specifications are being carried out.

Ensure that all facilities and company activities are non segregated except that separate or single-user toilet and necessary changing facilities shall be provided to assure privacy between the sexes.

Document and maintain a record of all solicitations of offers for subcontracts from minority and female construction Contractor's and suppliers, including circulation of solicitations to minority and female Contractor associations and other business associations.

Conduct a review, at least annually, of all supervisors' adherence to and performance under the Contractor's EEO policies and affirmative action obligations.

C. Goals for Employment of Women and Minorities Per Executive Order 11246, craft tradesperson goals are 6.9% women and .5% minorities employed. However, goals may be adjusted upward at the mutual agreement of the Contractor and the Department. Calculation of these percentages shall not include On-the-Job Training Program trainees, and shall not include clerical or field clerk position employees.

For a more complete presentation of requirements for such Goals, see the federally required document "Goals for Employment of Females and Minorities" set forth in the next 6 pages below.

Start of GOALS FOR EMPLOYMENT OF FEMALES AND MINORITIES
Federally Required Contract Document

§60-4.2 Solicitations

(d) The following notice shall be included in, and shall be part of, all solicitations for offers and bids on all Federal and federally assisted construction contracts or subcontracts in excess of \$10,000 to be performed in geographical areas designated by the Director pursuant to §60-4.6 of this part (see 41 CFR 60-4.2(a)):

Notice of Requirement for Affirmative Action to Ensure Equal Opportunity (Executive Order 11246)

1. The Offeror's or bidder's attention is called to the "Equal Opportunity Clause" and the "Standard Federal Equal Employment Specifications" set forth herein.
2. The goals and timetables for minority and female participation, expressed in percentage terms for the Contractor's aggregate work force in each trade on all construction work in the covered area, are as follows:

<u>Goals for female participation in each trade</u>	6.9%
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Goals for minority participation for each trade

Maine

001 Bangor, ME	0.8%
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Non-SMSA Counties (Aroostook, Hancock, Penobscot, Piscataquis, Waldo, Washington)

002 Portland-Lewiston, ME

SMSA Counties: 4243 Lewiston-Auburn, ME	0.5%
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(Androscoggin)

6403 Portland, ME	0.6%
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(Cumberland, Sagadahoc)

Non-SMSA Counties:
(Franklin, Kennebec, Knox, Lincoln, Oxford, Somerset, York)

These goals are applicable to all the Contractor's construction work (whether or not it is Federal or federally assisted) performed in the covered area. If the contractor performs construction work in a geographical area located outside of the covered area, it shall apply the goals established for such geographical area where the work is actually performed. With regard to this second area, the contractor also is subject to the goals for both its federally involved and non federally involved construction.

The contractor's compliance with the Executive Order and the regulations in 41 CFR Part 60-4 shall be based on its implementation of the Equal Opportunity Clause, specific affirmative action obligations required by the specifications set forth in 41 CFR 60-4.3(a), and its efforts to meet the goals. The hours of minority and female employment and training must be substantially uniform throughout the length of the contract, and in each trade, and the contractor shall make a good faith effort to employ minorities and women evenly on each of its projects. The transfer of minority or female employees or trainees from Contractor to Contractor or from project to project for the sole purpose of meeting the Contractor's goals shall be in violation of the contract, the Executive Order and the regulations in 41 CFR Part 60-4. Compliance with the goals will be measured against the total work hours performed.

3. The Contractor shall provide written notification to the Director of the Office of Federal Contract Compliance Programs within 10 working days of award of any construction subcontract in excess of \$10,000 at any tier for construction work under the contract resulting from this solicitation. The notification shall list the name, address and telephone number of the subcontractor, employer identification number of the subcontractor, estimated dollar amount of the subcontract; estimated started and completion dates of the subcontract; and the geographical area in which the subcontract is to be performed.

4. As used in this Notice, and in the Contract resulting from this solicitation, the "covered area" is (insert description of the geographical areas where the contract is to be performed giving the state, county and city, if any).

STANDARD FEDERAL EQUAL EMPLOYMENT OPPORTUNITY CONSTRUCTION
CONTRACT SPECIFICATIONS (EXECUTIVE ORDER 11246)

1. As used in these specifications:
 - a. "Covered area" means the geographical area described in the solicitation from which this contract resulted;
 - b. "Director" means Director, Office of Federal Contract Compliance Programs, United States Department of Labor, or any person to whom the Director delegates authority;
 - c. "Employer identification number" means the Federal Social Security number used on the Employer's Quarterly Federal Tax Return, U.S. Treasury Department form 941;
 - d. "Minority" includes:

- (i) Black (all persons having origins in any of the Black African racial groups not of Hispanic origin);
 - (ii) Hispanic (all persons of Mexican, Puerto Rican, Cuban, Central or South American or other Spanish Culture or origin, regardless of race);
 - (iii) Asian and Pacific Islander (all persons having origins in any of the original peoples of the Far East, Southeast Asia, the Indian Subcontinent, or the Pacific Islands); and
 - (iv) American Indian or Alaskan Native (all persons having origins in any of the original peoples of the North America and maintaining identifiable tribal affiliations through membership and participation or community identification).
2. Whenever the Contractor, or any subcontractor at any tier, subcontracts a portion of the work involving any construction trade, it shall physically include in each subcontract in excess of \$10,000 the provisions of these specifications and the Notice which contains the applicable goals for minority and female participation and which is set forth in the solicitations from which this contract resulted.
3. If the contractor, is participating (pursuant to 41 CFR 60-4.5) in a Hometown Plan approved by the U.S. Department of Labor in the covered area either individually or through an association, its affirmative action obligations on all work in the Plan area (including goals and timetables) shall be in accordance with that Plan for those trades which have unions participating in the Plan. Contractors must be able to demonstrate their participation in and compliance with the provisions of any such Hometown Plan. Each Contractor or Subcontractor participating in an approved Plan is individually required to comply with its obligations under the EEO clause, and to make a good faith effort to achieve each goal under the Plan in each trade in which it has employees. The overall good faith performance by other Contractors for Subcontractors toward a goal in an approved Plan does not excuse any covered Contractor's or Subcontractor's failure to take good faith efforts to achieve the Plan goals and timetables.
4. The Contractor shall implement the specific affirmative action standards provided in paragraphs 7 a. through p. of these specifications. The goals set forth in the solicitation from which this contract resulted are expressed as percentages of the total hours of employment and training of minority and female utilization the Contractor should reasonably be able to achieve in each construction trade in which it has employees in contractors performing construction work in geographical areas where they do not have a Federal or federally assisted construction contract shall apply the minority and female goals established for the geographical areas where the work is being performed. Goals are published periodically in the Federal Register in notice form and such notices may be obtained from any Office of Federal Contract Compliance Programs office or from Federal procurement contracting officers. The Contractor is expected to make substantially uniform progress in meeting its goals in each craft during the period specific.
5. Neither the provisions of any collective bargaining agreement, nor the failure by a union with whom the Contractor has a collective bargaining agreement, to refer either minorities or women shall excuse the Contractor's obligations under these specifications, Executive Order 11246, or the regulations promulgated pursuant, thereto.

6. In order for the non working training hours of apprentices and trainees to be counted in meeting the goals, such apprentices and trainees must be employed by the Contractor during the training period, and the Contractor must have made a commitment to employ the apprentices and trainees at the completion of their training, subject to the availability of employment opportunities. Trainees must be trained pursuant to training programs approved by the U.S. Department of Labor.
7. The Contractor shall take specific affirmative actions to ensure equal employment opportunity. The evaluation of the Contractor's compliance with these specifications shall be based upon its effort to achieve maximum results from its actions. The Contractor shall document these efforts fully, and shall implement affirmative action steps at least as expensive as the following:
 - a. Ensure and maintain a working environment free of harassment, intimidation, coercion at all sites, and in all facilities at which the Contractor's employees are assigned to work. The Contractor, when possible, will assign two or more women to each construction project. The Contractor shall specifically ensure that all foremen, superintendents, and other on-site supervisory personnel are aware of and carry out the Contractor's obligation to maintain such a working environment, with specific attention to minority or female individuals working at such sites or in such facilities.
 - b. Establish and maintain a current list of minority and female recruitment sources provide written notification to minority and female recruitment sources and to community organizations when the Contractor or its unions have employment opportunities available, and maintain a record of the organization's responses.
 - c. Maintain a current file of the names, addresses and telephone numbers of each minority and female off-the-street applicant and minority or female referral from a union, a recruitment sources or community organization and of what action was taken with respect to each such individual. If such individual was sent to the union hiring hall for referral and was not referred back to the Contractor by the union or, if referred, not employed by the Contractor, this shall be documented in the file with the reason therefore, along with whatever additional actions the Contractor may have taken.
 - d. Provide immediate written notification to the Director when the union or unions with which the Contractor has a collective bargaining agreement has not referred to the Contractor a minority person or woman sent by the Contractor, or when the Contractor has other information that the union referral process has impeded the Contractor's efforts to meet its obligations.
 - e. Develop on-the-job training opportunities and/or participate in training programs for the area which expressly include minorities and women, including upgrading programs and apprenticeship and trainee programs relevant to the Contractor's employment needs, especially those programs funded or approved by the Department of Labor. The Contractor shall provide notice of these programs to the sources complied under 7b above.

- f. Disseminate the Contractor's EEO policy by providing notice of the policy to unions and training programs and requesting their cooperation in assisting the Contractor in meeting its EEO obligations; by including in any policy manual and collective bargaining agreement; by publicizing it in the company newspaper, annual report, etc.; by specific review of the policy with all management personnel and with all minority and female employees at least once a year; and by posting the company EEO policy on bulletin boards accessible to all employees at each location where construction work is performed.
- g. Review, at least annually, the company's EEO policy and affirmative action obligations under these specifications with all employees having any responsibility for hiring, assignment, layoff, termination or other employment decisions including specific review of these items with on-site supervisory personnel such as Superintendents, General Foremen, etc., prior to the initiation of construction work at any job site. A written record shall be made and maintained identifying the time and place of these meetings, persons attending, subject matter discussed, and disposition of the subject matter.
- h. Disseminate the Contractor's EEO policy externally by including it in any advertising in the news media, specifically including minority and female news media, and providing written notification to and discussing the Contractor's EEO policy with other Contractors and Subcontractors with whom the Contractor does or anticipates doing business.
- i. Direct its recruitment, efforts, both oral and written, to minority, female and community organizations, to schools with minority and female students and to minority and female recruitment and training organizations serving the Contractor's recruitment area and employment needs. Not later than one month other training by any recruitment source, the Contractor shall send written notification to organizations such as the above, describing prior to the date for the acceptance of applications for apprenticeship or the openings, screening procedures, and tests to be used in the selection process.
- j. Encourage present minority and female employees to recruit other minority persons and women and, where reasonable, provide after school, summer and vacation employment to minority and female youth both on site and in other areas of a Contractor's work force.
- k. Validate all tests and other selection requirements where there is an obligation to do so under 41 CFR Part 60-3.
- l. Conduct, at least annually, an inventory and evaluation at least of all minority and female personnel for promotional opportunities and encourage these employees to seek or to prepare for, through appropriate training, etc., such opportunities.
- m. Ensure that seniority practices, job classifications, work assignments and other personnel practices, do not have a discriminatory effect by continually monitoring all personnel and employment related activities to ensure that the EEO policy and the Contractor's obligations under these specifications are being carried out.

- n. Ensure that all facilities and company activities are non segregated except that separate or single-user toilet and necessary changing facilities shall be provided to assure privacy between the sexes.
 - o. Document and maintain a record of all solicitations of offers for subcontracts from minority and female construction contractors and suppliers, including circulation of solicitation to minority and female contractor associations and other business associations.
 - p. Conduct a review, at least annually, of all supervisor's adherence to and performance under the Contractor's EEO policies and affirmative action obligations.
8. Contractors are encouraged to participate in voluntary associations which assist in fulfilling one or more of their affirmative action obligations (7 a through p.). The efforts of a contractor association, joint contractor-union, contractor-community, or other similar group of which the contractor is a member and participant, may be asserted as fulfilling any one or more of its obligations under 7 a through p. of these specifications provided that the contractor actively participates in the group, makes every effort to assure that the group has a positive impact on the employment of minorities and women in the industry, ensures that the concrete benefits of the program and reflected in the Contractor's minority and female work force participation, makes a good faith effort to meet its individual goals and timetables, and can provide access to documentation which demonstrates the effectiveness of actions take on behalf of the Contractor. The obligation to comply, however, is the Contractor's and failure of such a group to fulfill an obligation shall not be a defense for the Contractor's noncompliance.
9. A single goal for minorities and a separate single goal for women have been established. The Contractor, however, is required to provide equal employment opportunity and to take affirmative action for all minority groups, both male and female, and all women, both minority and non-minority. Consequently, the Contractor may be in violation of the Executive Order if a particular group is employed in a substantially disparate manner (for example, specific minority group of women is underutilized.)
10. The Contractor shall not use the goals and timetables or affirmative action even through the Contractor has achieved its goals for women generally, the Contractor may be in violation of the Executive Order if standards to discriminate against any person because of race, color, religion, sex, or national origin.
11. The Contractor shall not enter into any Subcontract with any person or firm debarred from Government contracts pursuant to Executive Order 11246.
12. The Contractor shall carry out such sanctions and penalties for violation of these specifications and of the Equal Opportunity Clause, including suspension, termination and cancellation of existing subcontracts as may be imposed or ordered pursuant to Executive Order 11246, as amended, and its implementation regulations by the Office of Federal Contract Compliance Programs. Any Contractor who fails to carry out such sanctions and penalties shall be in violation of these specifications and Executive Order 11246, as amended.

- 13. The Contractor, in fulfilling its obligations under these specifications, shall implement specific affirmative action steps, at least as extensive as those standards prescribed in paragraph 7 of these specifications, so as to achieve maximum results from its efforts to ensure equal employment opportunity. If the Contractor fails to comply with the requirements of the Executive Order, the implementing regulations, or these specifications, the Director shall proceed in accordance with 41 CFR 60-4.6.
- 14. The Contractor shall designate a responsible official to monitor all employment related activity to ensure that the company EEO policy is being carried out, to submit reports relating to the provisions hereof as may be required by the Government and to keep records. Records shall at least include for each employee the name, address, telephone numbers, construction trade, union affiliation if any, employee identification number when assigned, social security number, race, sex, status (e.g. mechanic, apprentice, trainee, helper, or laborer), dates of changes in status, hours worked per week in the indicated trade, rate of pay, and location sat which the work was performed. Records be maintained in an easily understandable and retrievable form; however, to the degree that existing records satisfy this requirement, contractors shall not be required to maintain separate records.
- 15. Nothing herein provided shall be construed as a limitation upon the application of other laws which establish different standards of compliance or upon the application of requirements for the hiring of local or other area residents (e.g., those under the Public Works Employment Act of 1977 and the Community Development Block Grant Program).

End of GOALS FOR EMPLOYMENT OF FEMALES AND MINORITIES
Federally Required Contract Document

D. Section '**D Disadvantaged Business Enterprise (DBE) Requirements**' is removed in its entirety. The DBE material is in:

Section 105.10 EQUAL OPPORTUNITY AND CIVIL RIGHTS.

SECTION 3 - OTHER FEDERAL REQUIREMENTS

Unless expressly otherwise provided in the Bid Documents, the provisions contained in this Section 3 of this "Federal Contract Provisions Supplement" are hereby incorporated into the Bid Documents and Contract.

A. Buy America

If the cost of products purchased for permanent use in this project which are manufactured of steel, iron or the application of any coating to products of these materials exceeds 0.1 percent of the contract amount, or \$2,500.00, whichever is greater, the products shall have been manufactured and the coating applied in the United States. The coating materials are not subject to this clause, only the application of the coating. In computing that amount, only the cost of the product and coating application cost will be included.

Ore, for the manufacture of steel or iron, may be from outside the United States; however, all other manufacturing processes of steel or iron must be in the United States to qualify as having been manufactured in the United States.

United States includes the 50 United States and any place subject to the jurisdiction thereof.

Products of steel include, but are not limited to, such products as structural steel, piles, guardrail, steel culverts, reinforcing steel, structural plate and steel supports for signs, luminaries and signals.

Products of iron include, but are not limited to, such products as cast iron grates.

Application of coatings include, but are not limited to, such applications as epoxy, galvanized and paint.

To assure compliance with this section, the Contractor shall submit a certification letter on its letterhead to the Department stating the following:

“This is to certify that products made of steel, iron or the application of any coating to products of these materials whose costs are in excess of \$2,500.00 or 0.1 percent of the original contract amount, whichever is greater, were manufactured and the coating, if one was required, was applied in the United States.”

B. Materials

a. Convict Produced Materials References: 23 U.S.C. 114(b)(2), 23 CFR 635.417

Applicability: FHWA's prohibition against the use of convict material only applies to Federal-aid highways. Materials produced after July 1, 1991, by convict labor may only be incorporated in a Federal-aid highway construction project if: 1) such materials have been produced by convicts who are on parole, supervised release, or probation from a prison; or 2) such material has been produced in a qualified prison facility, e.g., prison industry, with the amount produced during any 12-month period, for use in Federal-aid projects, not exceeding the amount produced, for such use, during the 12-month period ending July 1, 1987.

Materials obtained from prison facilities (e.g., prison industries) are subject to the same requirements for Federal-aid participation that are imposed upon materials acquired from other sources. Materials manufactured or produced by convict labor will be given no preferential treatment.

The preferred method of obtaining materials for a project is through normal contracting procedures which require the contractor to furnish all materials to be incorporated in the work. The contractor selects the source, public or private, from which the materials are to be obtained (23 CFR 635.407). Prison industries are prohibited from bidding on projects directly (23 CFR 635.112e), but may act as material supplier to construction contractors.

Prison materials may also be approved as State-furnished material. However, since public agencies may not bid in competition with private firms, direct acquisition of materials from a

prison industry for use as State-furnished material is subject to a public interest finding with the Division Administrator's concurrence (23 CFR 635.407d). Selection of materials produced by convict labor as State-furnished materials for mandatory use should be cleared prior to the submittal of the Plans Specifications & Estimates (PS&E).

b. Patented/Proprietary Products References: 23 U.S.C. 112, 23 CFR 635.411

FHWA will not participate, directly or indirectly, in payment for any premium or royalty on any patented or proprietary material, specification, or process specifically set forth in the plans and specifications for a project, unless:

- the item is purchased or obtained through competitive bidding with equally suitable unpatented items,
- the STA certifies either that the proprietary or patented item is essential for synchronization with the existing highway facilities or that no equally suitable alternative exists, or
- the item is used for research or for a special type of construction on relatively short sections of road for experimental purposes. States should follow FHWA's procedures for "Construction Projects Incorporating Experimental Features" ([expermnt.htm](#)) for the submittal of work plans and evaluations.

The primary purpose of the policy is to have competition in selection of materials and allow for development of new materials and products. The policy further permits materials and products that are judged equal may be bid under generic specifications. If only patented or proprietary products are acceptable, they shall be bid as alternatives with all, or at least a reasonable number of, acceptable materials or products listed; and the Division Administrator may approve a single source if it can be found that its utilization is in the public interest.

Trade names are generally the key to identifying patented or proprietary materials. Trade name examples include 3M, Corten, etc. Generally, products identified by their brand or trade name are not to be specified without an "or equal" phrase, and, if trade names are used, all, or at least a reasonable number of acceptable "equal" materials or products should be listed. The licensing of several suppliers to produce a product does not change the fact that it is a single product and should not be specified to the exclusion of other equally suitable products.

c. State Preference References: 23 U.S.C. 112, 23 CFR 635.409

Materials produced within Maine shall not be favored to the exclusion of comparable materials produced outside of Maine. State preference clauses give particular advantage to the designated source and thus restrict competition. Therefore, State preference provisions shall not be used on any Federal-aid construction projects.

This policy also applies to State preference actions against materials of foreign origin, except as otherwise permitted by Federal law. Thus, States cannot give preference to in-State material sources over foreign material sources. Under the Buy America provisions, the States are

permitted to expand the Buy America restrictions provided that the STA is legally authorized under State law to impose more stringent requirements.

d. State Owned/Furnished/Designated Materials References: 23 U.S.C. 112, 23 CFR 635.407

Current FHWA policy requires that the contractor must furnish all materials to be incorporated in the work, and the contractor shall be permitted to select the sources from which the materials are to be obtained. Exceptions to this requirement may be made when there is a definite finding, by MaineDOT and concurred in by Federal Highway Administration's (FHWA) Division Administrator, that it is in the public interest to require the contractor to use materials furnished by the MaineDOT or from sources designated by MaineDOT. The exception policy can best be understood by separating State-furnished materials into the categories of manufactured materials and local natural materials.

Manufactured Materials When the use of State-furnished manufactured materials is approved based on a public interest finding, such use must be made mandatory. The optional use of State-furnished manufactured materials is in violation of our policy prohibiting public agencies from competing with private firms. Manufactured materials to be furnished by MaineDOT must be acquired through competitive bidding, unless there is a public interest finding for another method, and concurred in by FHWA's Division Administrator.

Local Natural Materials When MaineDOT owns or controls a local natural materials source such as a borrow pit or a stockpile of salvaged pavement material, etc., the materials may be designated for either optional or mandatory use; however, mandatory use will require a public interest finding (PIF) and FHWA's Division Administrator's concurrence.

In order to permit prospective bidders to properly prepare their bids, the location, cost, and any conditions to be met for obtaining materials that are made available to the contractor shall be stated in the bidding documents.

Mandatory Disposal Sites Normally, the disposal site for surplus excavated materials is to be of the contractor's choosing; although, an optional site(s) may be shown in the contract provisions. A mandatory site shall be specified when there is a finding by MaineDOT, with the concurrence of the Division Administrator, that such placement is the most economical or that the environment would be substantially enhanced without excessive cost. Discussion of the mandatory use of a disposal site in the environmental document may serve as the basis for the public interest finding.

Summarizing FHWA policy for the mandatory use of borrow or disposal sites:

- mandatory use of either requires a public interest finding and FHWA's Division Administrator's concurrence,
- mandatory use of either may be based on environmental consideration where the environment will be substantially enhanced without excessive additional cost, and
- where the use is based on environmental considerations, the discussion in the environmental document may be used as the basis for the public interest finding.

Factors to justify a public interest finding should include such items as cost effectiveness, system integrity, and local shortages of material.

C. Standard FHWA Contract Provisions - FHWA 1273

Unless expressly otherwise provided in the Bid Documents, the following “Required Contract Provisions, Federal Aid Construction Contracts”, FHWA-1273, are hereby incorporated into the Bid Documents and Contract.

Cargo Preference Act : Contractor and Subcontractor Clauses. “Use of United States-flag vessels: The contractor agrees—“(1) To utilize privately owned United States-flag commercial vessels to ship at least 50 percent of the gross tonnage (computed separately for dry bulk carriers, dry cargo liners, and tankers) involved, whenever shipping any equipment, material, or commodities pursuant to this contract, to the extent such vessels are available at fair and reasonable rates for United States-flag commercial vessels.”(2) To furnish within 20 days following the date of loading for shipments originating within the United States or within 30 working days following the date of loading for shipments originating outside the United States, a legible copy of a rated, ‘on-board’ commercial ocean bill-of-lading in English for each shipment of cargo described in paragraph (1) of this section to both the Contracting Officer (through the prime contractor in the case of subcontractor bills-of-lading) and to the Division of National Cargo, Office of Market Development, Maritime Administration, Washington, DC 20590.”(3) To insert the substance of the provisions of this clause in all subcontracts issued pursuant to this contract.”(Reorganization Plans No. 21 of 1950 (64 Stat. 1273) and No. 7 of 1961 (75 Stat. 840) as amended by Pub. L. 91-469 (84 Stat. 1036) and Department of Commerce Organization Order 10-8 (38 FR 19707, July 23, 1973)) [42 FR 57126, Nov. 1, 1977]

The Cargo Preference Act requirements apply to materials or equipment that are acquired for a specific Federal-aid highway project. In general, the requirements are not applicable to goods or materials that come into inventories independent of an FHWA funded-contract. For example, the requirements would not apply to shipments of Portland cement, asphalt cement, or aggregates, as industry suppliers and contractors use these materials to replenish existing inventories. In general, most of the materials used for highway construction originate from existing inventories and are not acquired solely for a specific Federal-aid project. However, if materials or equipment are acquired solely for a Federal-aid project, then the Cargo Preference Act requirements apply.”

Start of FHWA 1273 REQUIRED CONTRACT PROVISIONS
FEDERAL-AID CONSTRUCTION CONTRACTS (As revised through May 1, 2012)

FHWA-1273 -- Revised May 1, 2012

**REQUIRED CONTRACT PROVISIONS
FEDERAL-AID CONSTRUCTION CONTRACTS**

- I. General
- II. Nondiscrimination
- III. Nonsegregated Facilities
- IV. Davis-Bacon and Related Act Provisions
- V. Contract Work Hours and Safety Standards Act Provisions
- VI. Subletting or Assigning the Contract
- VII. Safety: Accident Prevention
- VIII. False Statements Concerning Highway Projects
- IX. Implementation of Clean Air Act and Federal Water Pollution Control Act
- X. Compliance with Governmentwide Suspension and Debarment Requirements
- XI. Certification Regarding Use of Contract Funds for Lobbying

ATTACHMENTS

A. Employment and Materials Preference for Appalachian Development Highway System or Appalachian Local Access Road Contracts (included in Appalachian contracts only)

I. GENERAL

1. Form FHWA-1273 must be physically incorporated in each construction contract funded under Title 23 (excluding emergency contracts solely intended for debris removal). The contractor (or subcontractor) must insert this form in each subcontract and further require its inclusion in all lower tier subcontracts (excluding purchase orders, rental agreements and other agreements for supplies or services).

The applicable requirements of Form FHWA-1273 are incorporated by reference for work done under any purchase order, rental agreement or agreement for other services. The prime contractor shall be responsible for compliance by any subcontractor, lower-tier subcontractor or service provider.

Form FHWA-1273 must be included in all Federal-aid design-build contracts, in all subcontracts and in lower tier subcontracts (excluding subcontracts for design services, purchase orders, rental agreements and other agreements for supplies or services). The design-builder shall be responsible for compliance by any subcontractor, lower-tier subcontractor or service provider.

Contracting agencies may reference Form FHWA-1273 in bid proposal or request for proposal documents, however, the Form FHWA-1273 must be physically incorporated (not referenced) in all contracts, subcontracts and lower-tier subcontracts (excluding purchase orders, rental agreements and other agreements for supplies or services related to a construction contract).

2. Subject to the applicability criteria noted in the following sections, these contract provisions shall apply to all work performed on the contract by the contractor's own organization and with the assistance of workers under the contractor's immediate superintendence and to all work performed on the contract by piecework, station work, or by subcontract.

3. A breach of any of the stipulations contained in these Required Contract Provisions may be sufficient grounds for withholding of progress payments, withholding of final payment,

termination of the contract, suspension / debarment or any other action determined to be appropriate by the contracting agency and FHWA.

4. Selection of Labor: During the performance of this contract, the contractor shall not use convict labor for any purpose within the limits of a construction project on a Federal-aid highway unless it is labor performed by convicts who are on parole, supervised release, or probation. The term Federal-aid highway does not include roadways functionally classified as local roads or rural minor collectors.

II. NONDISCRIMINATION

The provisions of this section related to 23 CFR Part 230 are applicable to all Federal-aid construction contracts and to all related construction subcontracts of \$10,000 or more. The provisions of 23 CFR Part 230 are not applicable to material supply, engineering, or architectural service contracts.

In addition, the contractor and all subcontractors must comply with the following policies: Executive Order 11246, 41 CFR 60, 29 CFR 1625-1627, Title 23 USC Section 140, the Rehabilitation Act of 1973, as amended (29 USC 794), Title VI of the Civil Rights Act of 1964, as amended, and related regulations including 49 CFR Parts 21, 26 and 27; and 23 CFR Parts 200, 230, and 633.

The contractor and all subcontractors must comply with: the requirements of the Equal Opportunity Clause in 41 CFR 60-1.4(b) and, for all construction contracts exceeding \$10,000, the Standard Federal Equal Employment Opportunity Construction Contract Specifications in 41 CFR 60-4.3.

Note: The U.S. Department of Labor has exclusive authority to determine compliance with Executive Order 11246 and the policies of the Secretary of Labor including 41 CFR 60, and 29 CFR 1625-1627. The contracting agency and the FHWA have the authority and the responsibility to ensure compliance with Title 23 USC Section 140, the Rehabilitation Act of 1973, as amended (29 USC 794), and Title VI of the Civil Rights Act of 1964, as amended, and related regulations including 49 CFR Parts 21, 26 and 27; and 23 CFR Parts 200, 230, and 633.

The following provision is adopted from 23 CFR 230, Appendix A, with appropriate revisions to conform to the U.S. Department of Labor (US DOL) and FHWA requirements.

1. Equal Employment Opportunity: Equal employment opportunity (EEO) requirements not to discriminate and to take affirmative action to assure equal opportunity as set forth under laws, executive orders, rules, regulations (28 CFR 35, 29 CFR 1630, 29 CFR 1625-1627, 41 CFR 60 and 49 CFR 27) and orders of the Secretary of Labor as modified by the provisions prescribed herein, and imposed pursuant to 23 U.S.C. 140 shall constitute the EEO and specific affirmative action standards for the contractor's project activities under this contract. The provisions of the Americans with Disabilities Act of 1990 (42 U.S.C. 12101 et seq.) set forth under 28 CFR 35 and 29 CFR 1630 are incorporated by reference in this contract. In the execution of this contract, the contractor agrees to comply with the following minimum specific requirement activities of EEO:

a. The contractor will work with the contracting agency and the Federal Government to ensure that it has made every good faith effort to provide equal opportunity with respect to all of its terms and conditions of employment and in their review of activities under the contract.

b. The contractor will accept as its operating policy the following statement:

"It is the policy of this Company to assure that applicants are employed, and that employees are treated during employment, without regard to their race, religion, sex, color, national origin, age or disability. Such action shall include: employment, upgrading, demotion, or transfer; recruitment or recruitment advertising; layoff or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship, pre-apprenticeship, and/or on-the-job training."

2. EEO Officer: The contractor will designate and make known to the contracting officers an EEO Officer who will have the responsibility for and must be capable of effectively administering and promoting an active EEO program and who must be assigned adequate authority and responsibility to do so.

3. Dissemination of Policy: All members of the contractor's staff who are authorized to hire, supervise, promote, and discharge employees, or who recommend such action, or who are substantially involved in such action, will be made fully cognizant of, and will implement, the contractor's EEO policy and contractual responsibilities to provide EEO in each grade and classification of employment. To ensure that the above agreement will be met, the following actions will be taken as a minimum:

a. Periodic meetings of supervisory and personnel office employees will be conducted before the start of work and then not less often than once every six months, at which time the contractor's EEO policy and its implementation will be reviewed and explained. The meetings will be conducted by the EEO Officer.

b. All new supervisory or personnel office employees will be given a thorough indoctrination by the EEO Officer, covering all major aspects of the contractor's EEO obligations within thirty days following their reporting for duty with the contractor.

c. All personnel who are engaged in direct recruitment for the project will be instructed by the EEO Officer in the contractor's procedures for locating and hiring minorities and women.

d. Notices and posters setting forth the contractor's EEO policy will be placed in areas readily accessible to employees, applicants for employment and potential employees.

e. The contractor's EEO policy and the procedures to implement such policy will be brought to the attention of employees by means of meetings, employee handbooks, or other appropriate means.

4. Recruitment: When advertising for employees, the contractor will include in all advertisements for employees the notation: "An Equal Opportunity Employer." All such advertisements will be placed in publications having a large circulation among minorities and women in the area from which the project work force would normally be derived.

- a. The contractor will, unless precluded by a valid bargaining agreement, conduct systematic and direct recruitment through public and private employee referral sources likely to yield qualified minorities and women. To meet this requirement, the contractor will identify sources of potential minority group employees, and establish with such identified sources procedures whereby minority and women applicants may be referred to the contractor for employment consideration.
- b. In the event the contractor has a valid bargaining agreement providing for exclusive hiring hall referrals, the contractor is expected to observe the provisions of that agreement to the extent that the system meets the contractor's compliance with EEO contract provisions. Where implementation of such an agreement has the effect of discriminating against minorities or women, or obligates the contractor to do the same, such implementation violates Federal nondiscrimination provisions.
- c. The contractor will encourage its present employees to refer minorities and women as applicants for employment. Information and procedures with regard to referring such applicants will be discussed with employees.

5. Personnel Actions: Wages, working conditions, and employee benefits shall be established and administered, and personnel actions of every type, including hiring, upgrading, promotion, transfer, demotion, layoff, and termination, shall be taken without regard to race, color, religion, sex, national origin, age or disability.

The following procedures shall be followed:

- a. The contractor will conduct periodic inspections of project sites to insure that working conditions and employee facilities do not indicate discriminatory treatment of project site personnel.
- b. The contractor will periodically evaluate the spread of wages paid within each classification to determine any evidence of discriminatory wage practices.
- c. The contractor will periodically review selected personnel actions in depth to determine whether there is evidence of discrimination. Where evidence is found, the contractor will promptly take corrective action. If the review indicates that the discrimination may extend beyond the actions reviewed, such corrective action shall include all affected persons.
- d. The contractor will promptly investigate all complaints of alleged discrimination made to the contractor in connection with its obligations under this contract, will attempt to resolve such complaints, and will take appropriate corrective action within a reasonable time. If the investigation indicates that the discrimination may affect persons other than the complainant, such corrective action shall include such other persons. Upon completion of each investigation, the contractor will inform every complainant of all of their avenues of appeal.

6. Training and Promotion:

a. The contractor will assist in locating, qualifying, and increasing the skills of minorities and women who are applicants for employment or current employees. Such efforts should be aimed at developing full journey level status employees in the type of trade or job classification involved.

b. Consistent with the contractor's work force requirements and as permissible under Federal and State regulations, the contractor shall make full use of training programs, i.e., apprenticeship, and on-the-job training programs for the geographical area of contract performance. In the event a special provision for training is provided under this contract, this subparagraph will be superseded as indicated in the special provision. The contracting agency may reserve training positions for persons who receive welfare assistance in accordance with 23 U.S.C. 140(a).

c. The contractor will advise employees and applicants for employment of available training programs and entrance requirements for each.

d. The contractor will periodically review the training and promotion potential of employees who are minorities and women and will encourage eligible employees to apply for such training and promotion.

7. Unions: If the contractor relies in whole or in part upon unions as a source of employees, the contractor will use good faith efforts to obtain the cooperation of such unions to increase opportunities for minorities and women.

Actions by the contractor, either directly or through a contractor's association acting as agent, will include the procedures set forth below:

a. The contractor will use good faith efforts to develop, in cooperation with the unions, joint training programs aimed toward qualifying more minorities and women for membership in the unions and increasing the skills of minorities and women so that they may qualify for higher paying employment.

b. The contractor will use good faith efforts to incorporate an EEO clause into each union agreement to the end that such union will be contractually bound to refer applicants without regard to their race, color, religion, sex, national origin, age or disability.

c. The contractor is to obtain information as to the referral practices and policies of the labor union except that to the extent such information is within the exclusive possession of the labor union and such labor union refuses to furnish such information to the contractor, the contractor shall so certify to the contracting agency and shall set forth what efforts have been made to obtain such information.

d. In the event the union is unable to provide the contractor with a reasonable flow of referrals within the time limit set forth in the collective bargaining agreement, the contractor will, through independent recruitment efforts, fill the employment vacancies without regard to race, color, religion, sex, national origin, age or disability; making full efforts to obtain qualified and/or qualifiable minorities and women. The failure of a union to provide sufficient referrals (even

though it is obligated to provide exclusive referrals under the terms of a collective bargaining agreement) does not relieve the contractor from the requirements of this paragraph. In the event the union referral practice prevents the contractor from meeting the obligations pursuant to Executive Order 11246, as amended, and these special provisions, such contractor shall immediately notify the contracting agency.

8. Reasonable Accommodation for Applicants / Employees with Disabilities: The contractor must be familiar with the requirements for and comply with the Americans with Disabilities Act and all rules and regulations established there under. Employers must provide reasonable accommodation in all employment activities unless to do so would cause an undue hardship.

9. Selection of Subcontractors, Procurement of Materials and Leasing of Equipment: The contractor shall not discriminate on the grounds of race, color, religion, sex, national origin, age or disability in the selection and retention of subcontractors, including procurement of materials and leases of equipment. The contractor shall take all necessary and reasonable steps to ensure nondiscrimination in the administration of this contract.

a. The contractor shall notify all potential subcontractors and suppliers and lessors of their EEO obligations under this contract.

b. The contractor will use good faith efforts to ensure subcontractor compliance with their EEO obligations.

10. Assurance Required by 49 CFR 26.13(b):

a. The requirements of 49 CFR Part 26 and the State DOT's U.S. DOT-approved DBE program are incorporated by reference.

b. The contractor or subcontractor shall not discriminate on the basis of race, color, national origin, or sex in the performance of this contract. The contractor shall carry out applicable requirements of 49 CFR Part 26 in the award and administration of DOT-assisted contracts. Failure by the contractor to carry out these requirements is a material breach of this contract, which may result in the termination of this contract or such other remedy as the contracting agency deems appropriate.

11. Records and Reports: The contractor shall keep such records as necessary to document compliance with the EEO requirements. Such records shall be retained for a period of three years following the date of the final payment to the contractor for all contract work and shall be available at reasonable times and places for inspection by authorized representatives of the contracting agency and the FHWA.

a. The records kept by the contractor shall document the following:

(1) The number and work hours of minority and non-minority group members and women employed in each work classification on the project;

(2) The progress and efforts being made in cooperation with unions, when applicable, to increase employment opportunities for minorities and women; and

(3) The progress and efforts being made in locating, hiring, training, qualifying, and upgrading minorities and women;

b. The contractors and subcontractors will submit an annual report to the contracting agency each July for the duration of the project, indicating the number of minority, women, and non-minority group employees currently engaged in each work classification required by the contract work. This information is to be reported on [Form FHWA-1391](#). The staffing data should represent the project work force on board in all or any part of the last payroll period preceding the end of July. If on-the-job training is being required by special provision, the contractor will be required to collect and report training data. The employment data should reflect the work force on board during all or any part of the last payroll period preceding the end of July.

III. NONSEGREGATED FACILITIES

This provision is applicable to all Federal-aid construction contracts and to all related construction subcontracts of \$10,000 or more.

The contractor must ensure that facilities provided for employees are provided in such a manner that segregation on the basis of race, color, religion, sex, or national origin cannot result. The contractor may neither require such segregated use by written or oral policies nor tolerate such use by employee custom. The contractor's obligation extends further to ensure that its employees are not assigned to perform their services at any location, under the contractor's control, where the facilities are segregated. The term "facilities" includes waiting rooms, work areas, restaurants and other eating areas, time clocks, restrooms, washrooms, locker rooms, and other storage or dressing areas, parking lots, drinking fountains, recreation or entertainment areas, transportation, and housing provided for employees. The contractor shall provide separate or single-user restrooms and necessary dressing or sleeping areas to assure privacy between sexes.

IV. DAVIS-BACON AND RELATED ACT PROVISIONS

This section is applicable to all Federal-aid construction projects exceeding \$2,000 and to all related subcontracts and lower-tier subcontracts (regardless of subcontract size). The requirements apply to all projects located within the right-of-way of a roadway that is functionally classified as Federal-aid highway. This excludes roadways functionally classified as local roads or rural minor collectors, which are exempt. Contracting agencies may elect to apply these requirements to other projects.

The following provisions are from the U.S. Department of Labor regulations in 29 CFR 5.5 "Contract provisions and related matters" with minor revisions to conform to the FHWA-1273 format and FHWA program requirements.

1. Minimum wages

a. All laborers and mechanics employed or working upon the site of the work, will be paid unconditionally and not less often than once a week, and without subsequent deduction or rebate on any account (except such payroll deductions as are permitted by regulations issued by the Secretary of Labor under the Copeland Act (29 CFR part 3)), the full amount of wages and bona fide fringe benefits (or cash equivalents thereof) due at time of payment computed at rates not less than those contained in the wage determination of the Secretary of Labor which is attached hereto and made a part hereof, regardless of any contractual relationship which may be alleged to exist between the contractor and such laborers and mechanics.

Contributions made or costs reasonably anticipated for bona fide fringe benefits under section 1(b)(2) of the Davis-Bacon Act on behalf of laborers or mechanics are considered wages paid to such laborers or mechanics, subject to the provisions of paragraph 1.d. of this section; also, regular contributions made or costs incurred for more than a weekly period (but not less often than quarterly) under plans, funds, or programs which cover the particular weekly period, are deemed to be constructively made or incurred during such weekly period. Such laborers and mechanics shall be paid the appropriate wage rate and fringe benefits on the wage determination for the classification of work actually performed, without regard to skill, except as provided in 29 CFR 5.5(a)(4). Laborers or mechanics performing work in more than one classification may be compensated at the rate specified for each classification for the time actually worked therein: Provided, That the employer's payroll records accurately set forth the time spent in each classification in which work is performed. The wage determination (including any additional classification and wage rates conformed under paragraph 1.b. of this section) and the Davis-Bacon poster (WH-1321) shall be posted at all times by the contractor and its subcontractors at the site of the work in a prominent and accessible place where it can be easily seen by the workers.

b. (1) The contracting officer shall require that any class of laborers or mechanics, including helpers, which is not listed in the wage determination and which is to be employed under the contract shall be classified in conformance with the wage determination. The contracting officer shall approve an additional classification and wage rate and fringe benefits therefore only when the following criteria have been met:

- (i) The work to be performed by the classification requested is not performed by a classification in the wage determination; and
- (ii) The classification is utilized in the area by the construction industry; and
- (iii) The proposed wage rate, including any bona fide fringe benefits, bears a reasonable relationship to the wage rates contained in the wage determination.

(2) If the contractor and the laborers and mechanics to be employed in the classification (if known), or their representatives, and the contracting officer agree on the classification and wage rate (including the amount designated for fringe benefits where appropriate), a report of the action taken shall be sent by the contracting officer to the Administrator of the Wage and Hour Division, Employment Standards Administration, U.S. Department of Labor, Washington, DC 20210. The Administrator, or an authorized representative, will approve, modify, or disapprove every additional classification action within 30 days of receipt and so advise the contracting officer or will notify the contracting officer within the 30-day period that additional time is necessary.

(3) In the event the contractor, the laborers or mechanics to be employed in the classification or their representatives, and the contracting officer do not agree on the proposed classification and wage rate (including the amount designated for fringe benefits, where appropriate), the contracting officer shall refer the questions, including the views of all interested parties and the recommendation of the contracting officer, to the Wage and Hour Administrator for determination. The Wage and Hour Administrator, or an authorized representative, will issue a determination within 30 days of receipt and so advise the contracting officer or will notify the contracting officer within the 30-day period that additional time is necessary.

(4) The wage rate (including fringe benefits where appropriate) determined pursuant to paragraphs 1.b.(2) or 1.b.(3) of this section, shall be paid to all workers performing work in the classification under this contract from the first day on which work is performed in the classification.

c. Whenever the minimum wage rate prescribed in the contract for a class of laborers or mechanics includes a fringe benefit which is not expressed as an hourly rate, the contractor shall either pay the benefit as stated in the wage determination or shall pay another bona fide fringe benefit or an hourly cash equivalent thereof.

d. If the contractor does not make payments to a trustee or other third person, the contractor may consider as part of the wages of any laborer or mechanic the amount of any costs reasonably anticipated in providing bona fide fringe benefits under a plan or program, Provided, That the Secretary of Labor has found, upon the written request of the contractor, that the applicable standards of the Davis-Bacon Act have been met. The Secretary of Labor may require the contractor to set aside in a separate account assets for the meeting of obligations under the plan or program.

2. Withholding

The contracting agency shall upon its own action or upon written request of an authorized representative of the Department of Labor, withhold or cause to be withheld from the contractor under this contract, or any other Federal contract with the same prime contractor, or any other federally-assisted contract subject to Davis-Bacon prevailing wage requirements, which is held by the same prime contractor, so much of the accrued payments or advances as may be considered necessary to pay laborers and mechanics, including apprentices, trainees, and helpers, employed by the contractor or any subcontractor the full amount of wages required by the contract. In the event of failure to pay any laborer or mechanic, including any apprentice, trainee, or helper, employed or working on the site of the work, all or part of the wages required by the contract, the contracting agency may, after written notice to the contractor, take such action as may be necessary to cause the suspension of any further payment, advance, or guarantee of funds until such violations have ceased.

3. Payrolls and basic records

a. Payrolls and basic records relating thereto shall be maintained by the contractor during the course of the work and preserved for a period of three years thereafter for all laborers and mechanics working at the site of the work. Such records shall contain the name, address, and social security number of each such worker, his or her correct classification, hourly rates of wages paid (including rates of contributions or costs anticipated for bona fide fringe benefits or cash equivalents thereof of the types described in section 1(b)(2)(B) of the Davis-Bacon Act),

daily and weekly number of hours worked, deductions made and actual wages paid. Whenever the Secretary of Labor has found under 29 CFR 5.5(a)(1)(iv) that the wages of any laborer or mechanic include the amount of any costs reasonably anticipated in providing benefits under a plan or program described in section 1(b)(2)(B) of the Davis-Bacon Act, the contractor shall maintain records which show that the commitment to provide such benefits is enforceable, that the plan or program is financially responsible, and that the plan or program has been communicated in writing to the laborers or mechanics affected, and records which show the costs anticipated or the actual cost incurred in providing such benefits. Contractors employing apprentices or trainees under approved programs shall maintain written evidence of the registration of apprenticeship programs and certification of trainee programs, the registration of the apprentices and trainees, and the ratios and wage rates prescribed in the applicable programs.

b. (1) The contractor shall submit weekly for each week in which any contract work is performed a copy of all payrolls to the contracting agency. The payrolls submitted shall set out accurately and completely all of the information required to be maintained under 29 CFR 5.5(a)(3)(i), except that full social security numbers and home addresses shall not be included on weekly transmittals. Instead the payrolls shall only need to include an individually identifying number for each employee (e.g. , the last four digits of the employee's social security number). The required weekly payroll information may be submitted in any form desired. Optional Form WH-347 is available for this purpose from the Wage and Hour Division Web site at <http://www.dol.gov/esa/whd/forms/wh347instr.htm> or its successor site. The prime contractor is responsible for the submission of copies of payrolls by all subcontractors. Contractors and subcontractors shall maintain the full social security number and current address of each covered worker, and shall provide them upon request to the contracting agency for transmission to the State DOT, the FHWA or the Wage and Hour Division of the Department of Labor for purposes of an investigation or audit of compliance with prevailing wage requirements. It is not a violation of this section for a prime contractor to require a subcontractor to provide addresses and social security numbers to the prime contractor for its own records, without weekly submission to the contracting agency..

(2) Each payroll submitted shall be accompanied by a "Statement of Compliance," signed by the contractor or subcontractor or his or her agent who pays or supervises the payment of the persons employed under the contract and shall certify the following:

(i) That the payroll for the payroll period contains the information required to be provided under §5.5 (a)(3)(ii) of Regulations, 29 CFR part 5, the appropriate information is being maintained under §5.5 (a)(3)(i) of Regulations, 29 CFR part 5, and that such information is correct and complete;

(ii) That each laborer or mechanic (including each helper, apprentice, and trainee) employed on the contract during the payroll period has been paid the full weekly wages earned, without rebate, either directly or indirectly, and that no deductions have been made either directly or indirectly from the full wages earned, other than permissible deductions as set forth in Regulations, 29 CFR part 3;

(iii) That each laborer or mechanic has been paid not less than the applicable wage rates and fringe benefits or cash equivalents for the classification of work performed, as specified in the applicable wage determination incorporated into the contract.

(3) The weekly submission of a properly executed certification set forth on the reverse side of Optional Form WH-347 shall satisfy the requirement for submission of the “Statement of Compliance” required by paragraph 3.b.(2) of this section.

(4) The falsification of any of the above certifications may subject the contractor or subcontractor to civil or criminal prosecution under section 1001 of title 18 and section 231 of title 31 of the United States Code.

c. The contractor or subcontractor shall make the records required under paragraph 3.a. of this section available for inspection, copying, or transcription by authorized representatives of the contracting agency, the State DOT, the FHWA, or the Department of Labor, and shall permit such representatives to interview employees during working hours on the job. If the contractor or subcontractor fails to submit the required records or to make them available, the FHWA may, after written notice to the contractor, the contracting agency or the State DOT, take such action as may be necessary to cause the suspension of any further payment, advance, or guarantee of funds. Furthermore, failure to submit the required records upon request or to make such records available may be grounds for debarment action pursuant to 29 CFR 5.12.

4. Apprentices and trainees

a. Apprentices (programs of the USDOL).

Apprentices will be permitted to work at less than the predetermined rate for the work they performed when they are employed pursuant to and individually registered in a bona fide apprenticeship program registered with the U.S. Department of Labor, Employment and Training Administration, Office of Apprenticeship Training, Employer and Labor Services, or with a State Apprenticeship Agency recognized by the Office, or if a person is employed in his or her first 90 days of probationary employment as an apprentice in such an apprenticeship program, who is not individually registered in the program, but who has been certified by the Office of Apprenticeship Training, Employer and Labor Services or a State Apprenticeship Agency (where appropriate) to be eligible for probationary employment as an apprentice.

The allowable ratio of apprentices to journeymen on the job site in any craft classification shall not be greater than the ratio permitted to the contractor as to the entire work force under the registered program. Any worker listed on a payroll at an apprentice wage rate, who is not registered or otherwise employed as stated above, shall be paid not less than the applicable wage rate on the wage determination for the classification of work actually performed. In addition, any apprentice performing work on the job site in excess of the ratio permitted under the registered program shall be paid not less than the applicable wage rate on the wage determination for the work actually performed. Where a contractor is performing construction on a project in a locality other than that in which its program is registered, the ratios and wage rates (expressed in percentages of the journeyman's hourly rate) specified in the contractor's or subcontractor's registered program shall be observed.

Every apprentice must be paid at not less than the rate specified in the registered program for the apprentice's level of progress, expressed as a percentage of the journeymen hourly rate specified in the applicable wage determination. Apprentices shall be paid fringe benefits in accordance with the provisions of the apprenticeship program. If the apprenticeship program does not specify fringe benefits, apprentices must be paid the full amount of fringe benefits listed on the wage determination for the applicable classification. If the Administrator determines that a

different practice prevails for the applicable apprentice classification, fringes shall be paid in accordance with that determination.

In the event the Office of Apprenticeship Training, Employer and Labor Services, or a State Apprenticeship Agency recognized by the Office, withdraws approval of an apprenticeship program, the contractor will no longer be permitted to utilize apprentices at less than the applicable predetermined rate for the work performed until an acceptable program is approved.

b. Trainees (programs of the USDOL).

Except as provided in 29 CFR 5.16, trainees will not be permitted to work at less than the predetermined rate for the work performed unless they are employed pursuant to and individually registered in a program which has received prior approval, evidenced by formal certification by the U.S. Department of Labor, Employment and Training Administration.

The ratio of trainees to journeymen on the job site shall not be greater than permitted under the plan approved by the Employment and Training Administration.

Every trainee must be paid at not less than the rate specified in the approved program for the trainee's level of progress, expressed as a percentage of the journeyman hourly rate specified in the applicable wage determination. Trainees shall be paid fringe benefits in accordance with the provisions of the trainee program. If the trainee program does not mention fringe benefits, trainees shall be paid the full amount of fringe benefits listed on the wage determination unless the Administrator of the Wage and Hour Division determines that there is an apprenticeship program associated with the corresponding journeyman wage rate on the wage determination which provides for less than full fringe benefits for apprentices. Any employee listed on the payroll at a trainee rate who is not registered and participating in a training plan approved by the Employment and Training Administration shall be paid not less than the applicable wage rate on the wage determination for the classification of work actually performed. In addition, any trainee performing work on the job site in excess of the ratio permitted under the registered program shall be paid not less than the applicable wage rate on the wage determination for the work actually performed.

In the event the Employment and Training Administration withdraws approval of a training program, the contractor will no longer be permitted to utilize trainees at less than the applicable predetermined rate for the work performed until an acceptable program is approved.

c. Equal employment opportunity. The utilization of apprentices, trainees and journeymen under this part shall be in conformity with the equal employment opportunity requirements of Executive Order 11246, as amended, and 29 CFR part 30.

d. Apprentices and Trainees (programs of the U.S. DOT).

Apprentices and trainees working under apprenticeship and skill training programs which have been certified by the Secretary of Transportation as promoting EEO in connection with Federal-aid highway construction programs are not subject to the requirements of paragraph 4 of this Section IV. The straight time hourly wage rates for apprentices and trainees under such programs will be established by the particular programs. The ratio of apprentices and trainees to journeymen shall not be greater than permitted by the terms of the particular program.

5. Compliance with Copeland Act requirements. The contractor shall comply with the requirements of 29 CFR part 3, which are incorporated by reference in this contract.

6. Subcontracts. The contractor or subcontractor shall insert Form FHWA-1273 in any subcontracts and also require the subcontractors to include Form FHWA-1273 in any lower tier subcontracts. The prime contractor shall be responsible for the compliance by any subcontractor or lower tier subcontractor with all the contract clauses in 29 CFR 5.5.

7. Contract termination: debarment. A breach of the contract clauses in 29 CFR 5.5 may be grounds for termination of the contract, and for debarment as a contractor and a subcontractor as provided in 29 CFR 5.12.

8. Compliance with Davis-Bacon and Related Act requirements. All rulings and interpretations of the Davis-Bacon and Related Acts contained in 29 CFR parts 1, 3, and 5 are herein incorporated by reference in this contract.

9. Disputes concerning labor standards. Disputes arising out of the labor standards provisions of this contract shall not be subject to the general disputes clause of this contract. Such disputes shall be resolved in accordance with the procedures of the Department of Labor set forth in 29 CFR parts 5, 6, and 7. Disputes within the meaning of this clause include disputes between the contractor (or any of its subcontractors) and the contracting agency, the U.S. Department of Labor, or the employees or their representatives.

10. Certification of eligibility.

a. By entering into this contract, the contractor certifies that neither it (nor he or she) nor any person or firm who has an interest in the contractor's firm is a person or firm ineligible to be awarded Government contracts by virtue of section 3(a) of the Davis-Bacon Act or 29 CFR 5.12(a)(1).

b. No part of this contract shall be subcontracted to any person or firm ineligible for award of a Government contract by virtue of section 3(a) of the Davis-Bacon Act or 29 CFR 5.12(a)(1).

c. The penalty for making false statements is prescribed in the U.S. Criminal Code, 18 U.S.C. 1001.

V. CONTRACT WORK HOURS AND SAFETY STANDARDS ACT

The following clauses apply to any Federal-aid construction contract in an amount in excess of \$100,000 and subject to the overtime provisions of the Contract Work Hours and Safety Standards Act. These clauses shall be inserted in addition to the clauses required by 29 CFR 5.5(a) or 29 CFR 4.6. As used in this paragraph, the terms laborers and mechanics include watchmen and guards.

1. Overtime requirements. No contractor or subcontractor contracting for any part of the contract work which may require or involve the employment of laborers or mechanics shall require or permit any such laborer or mechanic in any workweek in which he or she is employed on such work to work in excess of forty hours in such workweek unless such laborer or mechanic receives compensation at a rate not less than one and one-half times the basic rate of pay for all hours worked in excess of forty hours in such workweek.

2. Violation; liability for unpaid wages; liquidated damages. In the event of any violation of the clause set forth in paragraph (1.) of this section, the contractor and any subcontractor responsible therefor shall be liable for the unpaid wages. In addition, such contractor and subcontractor shall be liable to the United States (in the case of work done under contract for the District of Columbia or a territory, to such District or to such territory), for liquidated damages. Such liquidated damages shall be computed with respect to each individual laborer or mechanic, including watchmen and guards, employed in violation of the clause set forth in paragraph (1.) of this section, in the sum of \$10 for each calendar day on which such individual was required or permitted to work in excess of the standard workweek of forty hours without payment of the overtime wages required by the clause set forth in paragraph (1.) of this section.

3. Withholding for unpaid wages and liquidated damages. The FHWA or the contacting agency shall upon its own action or upon written request of an authorized representative of the Department of Labor withhold or cause to be withheld, from any moneys payable on account of work performed by the contractor or subcontractor under any such contract or any other Federal contract with the same prime contractor, or any other federally-assisted contract subject to the Contract Work Hours and Safety Standards Act, which is held by the same prime contractor, such sums as may be determined to be necessary to satisfy any liabilities of such contractor or subcontractor for unpaid wages and liquidated damages as provided in the clause set forth in paragraph (2.) of this section.

4. Subcontracts. The contractor or subcontractor shall insert in any subcontracts the clauses set forth in paragraph (1.) through (4.) of this section and also a clause requiring the subcontractors to include these clauses in any lower tier subcontracts. The prime contractor shall be responsible for compliance by any subcontractor or lower tier subcontractor with the clauses set forth in paragraphs (1.) through (4.) of this section.

VI. SUBLETTING OR ASSIGNING THE CONTRACT

This provision is applicable to all Federal-aid construction contracts on the National Highway System.

1. The contractor shall perform with its own organization contract work amounting to not less than 30 percent (or a greater percentage if specified elsewhere in the contract) of the total original contract price, excluding any specialty items designated by the contracting agency. Specialty items may be performed by subcontract and the amount of any such specialty items performed may be deducted from the total original contract price before computing the amount of work required to be performed by the contractor's own organization (23 CFR 635.116).

a. The term “perform work with its own organization” refers to workers employed or leased by the prime contractor, and equipment owned or rented by the prime contractor, with or without operators. Such term does not include employees or equipment of a subcontractor or lower tier subcontractor, agents of the prime contractor, or any other assignees. The term may include payments for the costs of hiring leased employees from an employee leasing firm meeting all relevant Federal and State regulatory requirements. Leased employees may only be included in this term if the prime contractor meets all of the following conditions:

- (1) the prime contractor maintains control over the supervision of the day-to-day activities of the leased employees;
- (2) the prime contractor remains responsible for the quality of the work of the leased employees;
- (3) the prime contractor retains all power to accept or exclude individual employees from work on the project; and
- (4) the prime contractor remains ultimately responsible for the payment of predetermined minimum wages, the submission of payrolls, statements of compliance and all other Federal regulatory requirements.

b. "Specialty Items" shall be construed to be limited to work that requires highly specialized knowledge, abilities, or equipment not ordinarily available in the type of contracting organizations qualified and expected to bid or propose on the contract as a whole and in general are to be limited to minor components of the overall contract.

2. The contract amount upon which the requirements set forth in paragraph (1) of Section VI is computed includes the cost of material and manufactured products which are to be purchased or produced by the contractor under the contract provisions.

3. The contractor shall furnish (a) a competent superintendent or supervisor who is employed by the firm, has full authority to direct performance of the work in accordance with the contract requirements, and is in charge of all construction operations (regardless of who performs the work) and (b) such other of its own organizational resources (supervision, management, and engineering services) as the contracting officer determines is necessary to assure the performance of the contract.

4. No portion of the contract shall be sublet, assigned or otherwise disposed of except with the written consent of the contracting officer, or authorized representative, and such consent when given shall not be construed to relieve the contractor of any responsibility for the fulfillment of the contract. Written consent will be given only after the contracting agency has assured that each subcontract is evidenced in writing and that it contains all pertinent provisions and requirements of the prime contract.

5. The 30% self-performance requirement of paragraph (1) is not applicable to design-build contracts; however, contracting agencies may establish their own self-performance requirements.

VII. SAFETY: ACCIDENT PREVENTION

This provision is applicable to all Federal-aid construction contracts and to all related subcontracts.

1. In the performance of this contract the contractor shall comply with all applicable Federal, State, and local laws governing safety, health, and sanitation (23 CFR 635). The contractor shall provide all safeguards, safety devices and protective equipment and take any other needed actions as it determines, or as the contracting officer may determine, to be reasonably necessary to protect the life and health of employees on the job and the safety of the public and to protect property in connection with the performance of the work covered by the contract.

2. It is a condition of this contract, and shall be made a condition of each subcontract, which the contractor enters into pursuant to this contract, that the contractor and any subcontractor shall not permit any employee, in performance of the contract, to work in surroundings or under conditions which are unsanitary, hazardous or dangerous to his/her health or safety, as determined under construction safety and health standards (29 CFR 1926) promulgated by the Secretary of Labor, in accordance with Section 107 of the Contract Work Hours and Safety Standards Act (40 U.S.C. 3704).

3. Pursuant to 29 CFR 1926.3, it is a condition of this contract that the Secretary of Labor or authorized representative thereof, shall have right of entry to any site of contract performance to inspect or investigate the matter of compliance with the construction safety and health standards and to carry out the duties of the Secretary under Section 107 of the Contract Work Hours and Safety Standards Act (40 U.S.C.3704).

VIII. FALSE STATEMENTS CONCERNING HIGHWAY PROJECTS

This provision is applicable to all Federal-aid construction contracts and to all related subcontracts.

In order to assure high quality and durable construction in conformity with approved plans and specifications and a high degree of reliability on statements and representations made by engineers, contractors, suppliers, and workers on Federal-aid highway projects, it is essential that all persons concerned with the project perform their functions as carefully, thoroughly, and honestly as possible. Willful falsification, distortion, or misrepresentation with respect to any facts related to the project is a violation of Federal law. To prevent any misunderstanding regarding the seriousness of these and similar acts, Form FHWA-1022 shall be posted on each Federal-aid highway project (23 CFR 635) in one or more places where it is readily available to all persons concerned with the project:

18 U.S.C. 1020 reads as follows:

"Whoever, being an officer, agent, or employee of the United States, or of any State or Territory, or whoever, whether a person, association, firm, or corporation, knowingly makes any false statement, false representation, or false report as to the character, quality, quantity, or cost of the material used or to be used, or the quantity or quality of the work performed or to be performed, or the cost thereof in connection with the submission of plans, maps, specifications, contracts, or costs of construction on any highway or related project submitted for approval to the Secretary of Transportation; or

Whoever knowingly makes any false statement, false representation, false report or false claim with respect to the character, quality, quantity, or cost of any work performed or to be performed, or materials furnished or to be furnished, in connection with the construction of any highway or related project approved by the Secretary of Transportation; or

Whoever knowingly makes any false statement or false representation as to material fact in any statement, certificate, or report submitted pursuant to provisions of the Federal-aid Roads Act approved July 1, 1916, (39 Stat. 355), as amended and supplemented;

Shall be fined under this title or imprisoned not more than 5 years or both."

IX. IMPLEMENTATION OF CLEAN AIR ACT AND FEDERAL WATER POLLUTION CONTROL ACT

This provision is applicable to all Federal-aid construction contracts and to all related subcontracts.

By submission of this bid/proposal or the execution of this contract, or subcontract, as appropriate, the bidder, proposer, Federal-aid construction contractor, or subcontractor, as appropriate, will be deemed to have stipulated as follows:

1. That any person who is or will be utilized in the performance of this contract is not prohibited from receiving an award due to a violation of Section 508 of the Clean Water Act or Section 306 of the Clean Air Act.
2. That the contractor agrees to include or cause to be included the requirements of paragraph (1) of this Section X in every subcontract, and further agrees to take such action as the contracting agency may direct as a means of enforcing such requirements.

X. CERTIFICATION REGARDING DEBARMENT, SUSPENSION, INELIGIBILITY AND VOLUNTARY EXCLUSION

This provision is applicable to all Federal-aid construction contracts, design-build contracts, subcontracts, lower-tier subcontracts, purchase orders, lease agreements, consultant contracts or any other covered transaction requiring FHWA approval or that is estimated to cost \$25,000 or more – as defined in 2 CFR Parts 180 and 1200.

1. Instructions for Certification – First Tier Participants:

- a. By signing and submitting this proposal, the prospective first tier participant is providing the certification set out below.
- b. The inability of a person to provide the certification set out below will not necessarily result in denial of participation in this covered transaction. The prospective first tier participant shall submit an explanation of why it cannot provide the certification set out below. The certification or explanation will be considered in connection with the department or agency's determination whether to enter into this transaction. However, failure of the prospective first tier participant to furnish a certification or an explanation shall disqualify such a person from participation in this transaction.
- c. The certification in this clause is a material representation of fact upon which reliance was placed when the contracting agency determined to enter into this transaction. If it is later determined that the prospective participant knowingly rendered an erroneous certification, in addition to other remedies available to the Federal Government, the contracting agency may terminate this transaction for cause of default.

d. The prospective first tier participant shall provide immediate written notice to the contracting agency to whom this proposal is submitted if any time the prospective first tier participant learns that its certification was erroneous when submitted or has become erroneous by reason of changed circumstances.

e. The terms "covered transaction," "debarred," "suspended," "ineligible," "participant," "person," "principal," and "voluntarily excluded," as used in this clause, are defined in 2 CFR Parts 180 and 1200. "First Tier Covered Transactions" refers to any covered transaction between a grantee or subgrantee of Federal funds and a participant (such as the prime or general contract). "Lower Tier Covered Transactions" refers to any covered transaction under a First Tier Covered Transaction (such as subcontracts). "First Tier Participant" refers to the participant who has entered into a covered transaction with a grantee or subgrantee of Federal funds (such as the prime or general contractor). "Lower Tier Participant" refers any participant who has entered into a covered transaction with a First Tier Participant or other Lower Tier Participants (such as subcontractors and suppliers).

f. The prospective first tier participant agrees by submitting this proposal that, should the proposed covered transaction be entered into, it shall not knowingly enter into any lower tier covered transaction with a person who is debarred, suspended, declared ineligible, or voluntarily excluded from participation in this covered transaction, unless authorized by the department or agency entering into this transaction.

g. The prospective first tier participant further agrees by submitting this proposal that it will include the clause titled "Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion-Lower Tier Covered Transactions," provided by the department or contracting agency, entering into this covered transaction, without modification, in all lower tier covered transactions and in all solicitations for lower tier covered transactions exceeding the \$25,000 threshold.

h. A participant in a covered transaction may rely upon a certification of a prospective participant in a lower tier covered transaction that is not debarred, suspended, ineligible, or voluntarily excluded from the covered transaction, unless it knows that the certification is erroneous. A participant is responsible for ensuring that its principals are not suspended, debarred, or otherwise ineligible to participate in covered transactions. To verify the eligibility of its principals, as well as the eligibility of any lower tier prospective participants, each participant may, but is not required to, check the Excluded Parties List System website (<https://www.epls.gov/>), which is compiled by the General Services Administration.

i. Nothing contained in the foregoing shall be construed to require the establishment of a system of records in order to render in good faith the certification required by this clause. The knowledge and information of the prospective participant is not required to exceed that which is normally possessed by a prudent person in the ordinary course of business dealings.

j. Except for transactions authorized under paragraph (f) of these instructions, if a participant in a covered transaction knowingly enters into a lower tier covered transaction with a person who is suspended, debarred, ineligible, or voluntarily excluded from participation in this transaction, in addition to other remedies available to the Federal Government, the department or agency may terminate this transaction for cause or default.

* * * * *

2. Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion – First Tier Participants:

a. The prospective first tier participant certifies to the best of its knowledge and belief, that it and its principals:

(1) Are not presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from participating in covered transactions by any Federal department or agency;

(2) Have not within a three-year period preceding this proposal been convicted of or had a civil judgment rendered against them for commission of fraud or a criminal offense in connection with obtaining, attempting to obtain, or performing a public (Federal, State or local) transaction or contract under a public transaction; violation of Federal or State antitrust statutes or commission of embezzlement, theft, forgery, bribery, falsification or destruction of records, making false statements, or receiving stolen property;

(3) Are not presently indicted for or otherwise criminally or civilly charged by a governmental entity (Federal, State or local) with commission of any of the offenses enumerated in paragraph (a)(2) of this certification; and

(4) Have not within a three-year period preceding this application/proposal had one or more public transactions (Federal, State or local) terminated for cause or default.

b. Where the prospective participant is unable to certify to any of the statements in this certification, such prospective participant shall attach an explanation to this proposal.

2. Instructions for Certification - Lower Tier Participants:

(Applicable to all subcontracts, purchase orders and other lower tier transactions requiring prior FHWA approval or estimated to cost \$25,000 or more - 2 CFR Parts 180 and 1200)

a. By signing and submitting this proposal, the prospective lower tier is providing the certification set out below.

b. The certification in this clause is a material representation of fact upon which reliance was placed when this transaction was entered into. If it is later determined that the prospective lower tier participant knowingly rendered an erroneous certification, in addition to other remedies available to the Federal Government, the department, or agency with which this transaction originated may pursue available remedies, including suspension and/or debarment.

c. The prospective lower tier participant shall provide immediate written notice to the person to which this proposal is submitted if at any time the prospective lower tier participant learns that its certification was erroneous by reason of changed circumstances.

d. The terms "covered transaction," "debarred," "suspended," "ineligible," "participant," "person," "principal," and "voluntarily excluded," as used in this clause, are defined in 2 CFR Parts 180 and 1200. You may contact the person to which this proposal is submitted for assistance in obtaining a copy of those regulations. "First Tier Covered Transactions" refers to any covered transaction between a grantee or subgrantee of Federal funds and a participant (such as the prime or general contract). "Lower Tier Covered Transactions" refers to any covered transaction under a First Tier Covered Transaction (such as subcontracts). "First Tier Participant" refers to the participant who has entered into a covered transaction with a grantee or subgrantee of Federal funds (such as the prime or general contractor). "Lower Tier Participant" refers any participant who has entered into a covered transaction with a First Tier Participant or other Lower Tier Participants (such as subcontractors and suppliers).

e. The prospective lower tier participant agrees by submitting this proposal that, should the proposed covered transaction be entered into, it shall not knowingly enter into any lower tier covered transaction with a person who is debarred, suspended, declared ineligible, or voluntarily excluded from participation in this covered transaction, unless authorized by the department or agency with which this transaction originated.

f. The prospective lower tier participant further agrees by submitting this proposal that it will include this clause titled "Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion-Lower Tier Covered Transaction," without modification, in all lower tier covered transactions and in all solicitations for lower tier covered transactions exceeding the \$25,000 threshold.

g. A participant in a covered transaction may rely upon a certification of a prospective participant in a lower tier covered transaction that is not debarred, suspended, ineligible, or voluntarily excluded from the covered transaction, unless it knows that the certification is erroneous. A participant is responsible for ensuring that its principals are not suspended, debarred, or otherwise ineligible to participate in covered transactions. To verify the eligibility of its principals, as well as the eligibility of any lower tier prospective participants, each participant may, but is not required to, check the Excluded Parties List System website (<https://www.epls.gov/>), which is compiled by the General Services Administration.

h. Nothing contained in the foregoing shall be construed to require establishment of a system of records in order to render in good faith the certification required by this clause. The knowledge and information of participant is not required to exceed that which is normally possessed by a prudent person in the ordinary course of business dealings.

i. Except for transactions authorized under paragraph e of these instructions, if a participant in a covered transaction knowingly enters into a lower tier covered transaction with a person who is suspended, debarred, ineligible, or voluntarily excluded from participation in this transaction, in addition to other remedies available to the Federal Government, the department or agency with which this transaction originated may pursue available remedies, including suspension and/or debarment.

* * * * *

**Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion--
Lower Tier Participants:**

1. The prospective lower tier participant certifies, by submission of this proposal, that neither it nor its principals is presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from participating in covered transactions by any Federal department or agency.

2. Where the prospective lower tier participant is unable to certify to any of the statements in this certification, such prospective participant shall attach an explanation to this proposal.

XI. CERTIFICATION REGARDING USE OF CONTRACT FUNDS FOR LOBBYING

This provision is applicable to all Federal-aid construction contracts and to all related subcontracts which exceed \$100,000 (49 CFR 20).

1. The prospective participant certifies, by signing and submitting this bid or proposal, to the best of his or her knowledge and belief, that:

a. No Federal appropriated funds have been paid or will be paid, by or on behalf of the undersigned, to any person for influencing or attempting to influence an officer or employee of any Federal agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with the awarding of any Federal contract, the making of any Federal grant, the making of any Federal loan, the entering into of any cooperative agreement, and the extension, continuation, renewal, amendment, or modification of any Federal contract, grant, loan, or cooperative agreement.

b. If any funds other than Federal appropriated funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any Federal agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with this Federal contract, grant, loan, or cooperative agreement, the undersigned shall complete and submit Standard Form-LLL, "Disclosure Form to Report Lobbying," in accordance with its instructions.

2. This certification is a material representation of fact upon which reliance was placed when this transaction was made or entered into. Submission of this certification is a prerequisite for making or entering into this transaction imposed by 31 U.S.C. 1352. Any person who fails to file the required certification shall be subject to a civil penalty of not less than \$10,000 and not more than \$100,000 for each such failure.

3. The prospective participant also agrees by submitting its bid or proposal that the participant shall require that the language of this certification be included in all lower tier subcontracts, which exceed \$100,000 and that all such recipients shall certify and disclose accordingly.

**ATTACHMENT A - EMPLOYMENT AND MATERIALS PREFERENCE FOR
APPALACHIAN DEVELOPMENT HIGHWAY SYSTEM OR APPALACHIAN LOCAL
ACCESS ROAD CONTRACTS**

This provision is applicable to all Federal-aid projects funded under the Appalachian Regional Development Act of 1965.

1. During the performance of this contract, the contractor undertaking to do work which is, or reasonably may be, done as on-site work, shall give preference to qualified persons who regularly reside in the labor area as designated by the DOL wherein the contract work is situated, or the subregion, or the Appalachian counties of the State wherein the contract work is situated, except:

a. To the extent that qualified persons regularly residing in the area are not available.

b. For the reasonable needs of the contractor to employ supervisory or specially experienced personnel necessary to assure an efficient execution of the contract work.

c. For the obligation of the contractor to offer employment to present or former employees as the result of a lawful collective bargaining contract, provided that the number of nonresident persons employed under this subparagraph (1c) shall not exceed 20 percent of the total number of employees employed by the contractor on the contract work, except as provided in subparagraph (4) below.

2. The contractor shall place a job order with the State Employment Service indicating (a) the classifications of the laborers, mechanics and other employees required to perform the contract work, (b) the number of employees required in each classification, (c) the date on which the participant estimates such employees will be required, and (d) any other pertinent information required by the State Employment Service to complete the job order form. The job order may be placed with the State Employment Service in writing or by telephone. If during the course of the contract work, the information submitted by the contractor in the original job order is substantially modified, the participant shall promptly notify the State Employment Service.

3. The contractor shall give full consideration to all qualified job applicants referred to him by the State Employment Service. The contractor is not required to grant employment to any job applicants who, in his opinion, are not qualified to perform the classification of work required.

4. If, within one week following the placing of a job order by the contractor with the State Employment Service, the State Employment Service is unable to refer any qualified job applicants to the contractor, or less than the number requested, the State Employment Service will forward a certificate to the contractor indicating the unavailability of applicants. Such certificate shall be made a part of the contractor's permanent project records. Upon receipt of this certificate, the contractor may employ persons who do not normally reside in the labor area to fill positions covered by the certificate, notwithstanding the provisions of subparagraph (1c) above.

5. The provisions of 23 CFR 633.207(e) allow the contracting agency to provide a contractual preference for the use of mineral resource materials native to the Appalachian region.

6. The contractor shall include the provisions of Sections 1 through 4 of this Attachment A in every subcontract for work which is, or reasonably may be, done as on-site work.

End of FHWA 1273

The United States Department of Transportation (USDOT) Standard Title VI/Non-Discrimination Assurances

DOT Order No. 1050.2A

The **Maine Department of Transportation** (herein referred to as the "Recipient"), **HEREBY AGREES THAT**, as a condition to receiving any Federal financial assistance from the U.S. Department of Transportation (DOT), through the **Federal Highway Administration (FHWA)**, is subject to and will comply with the following:

Statutory/Regulatory Authorities

- Title VI of the Civil Rights Act of 1964 (42 U.S.C. § 2000d et seq., 78 stat. 252), (prohibits discrimination on the basis of race, color, national origin);
- 49 C.F.R. Part 21 (entitled Non-discrimination In Federally-Assisted Programs Of The Department Of Transportation-Effectuation Of Title VI Of The Civil Rights Act Of 1964);
- 28 C.F.R. Section 50.3 (U.S. Department of Justice Guidelines for Enforcement of Title VI of the Civil Rights Act of 1964);

The preceding statutory and regulatory cites hereinafter are referred to as the "Acts" and "Regulations," respectively.

General Assurances

In accordance with the Acts, the Regulations, and other pertinent directives, circulars, policy, memoranda, and/or guidance, the Recipient hereby gives assurance that it will promptly take any measures necessary to ensure that:

"No person in the United States shall, on the grounds of race, color, or national origin, be excluded from participation in, be denied the benefits of, or be otherwise subjected to discrimination under any program or activity, "for which the Recipient receives Federal financial assistance from DOT, including the FHWA.

The Civil Rights Restoration Act of 1987 clarified the original intent of Congress, with respect to Title VI and other Non-discrimination requirements (The Age Discrimination Act of 1975, and Section 504 of the Rehabilitation Act of 1973), by restoring the broad, institutional-wide scope and coverage of these non-discrimination statutes and requirements to include all programs and activities of the Recipient, so long as any portion of the program is Federally assisted.

Specific Assurances

More specifically, and without limiting the above general Assurance, the Recipient agrees with and gives the following Assurances with respect to its Federally assisted **Highway Program**:

1. The Recipient agrees that each "activity," "facility," or "program," as defined in §§ 21.23(b) and 21.23(e) of 49 C.F.R. § 21 will be (with regard to an "activity") facilitated, or will be (with regard

to a "facility") operated, or will be (with regard to a "program") conducted in compliance with all requirements imposed by, or pursuant to the Acts and the Regulations.

2. The Recipient will insert the following notification in all solicitations for bids, Requests For Proposals for work, or material subject to the Acts and the Regulations made in connection with all ***Federal-Aid Highway Program activities*** and, in adapted form, in all proposals for negotiated agreements regardless of funding source:

"The ***Maine Department of Transportation***, in accordance with the provisions of Title VI of the Civil Rights Act of 1964 (78 Stat. 252, 42 U.S.C. §§ 2000d to 2000d-4) and the Regulations, hereby notifies all bidders that it will affirmatively ensure that any contract entered into pursuant to this advertisement, disadvantaged business enterprises will be afforded full and fair opportunity to submit bids in response to this invitation and will not be discriminated against on the grounds of race, color, or national origin in consideration for an award."


3. The Recipient will insert the clauses of Appendix A and E of this Assurance in every contract or agreement subject to the Acts and the Regulations.
4. The Recipient will insert the clauses of Appendix B of this Assurance, as a covenant running with the land, in any deed from the United States effecting or recording a transfer of real property, structures, use, or improvements thereon or interest therein to a Recipient.
5. That where the Recipient receives Federal financial assistance to construct a facility, or part of a facility, the Assurance will extend to the entire facility and facilities operated in connection therewith.
6. That where the Recipient receives Federal financial assistance in the form, or for the acquisition of real property or an interest in real property, the Assurance will extend to rights to space on, over, or under such property.
7. That the Recipient will include the clauses set forth in Appendix C and Appendix D of this Assurance, as a covenant running with the land, in any future deeds, leases, licenses, permits, or similar instruments entered into by the Recipient with other parties:
 - a. for the subsequent transfer of real property acquired or improved under the applicable activity, project, or program; and
 - b. for the construction or use of, or access to, space on, over, or under real property acquired or improved under the applicable activity, project, or program.
8. That this Assurance obligates the Recipient for the period during which Federal financial assistance is extended to the program, except where the Federal financial assistance is to provide, or is in the form of, personal property, or real property, or interest therein, or structures or improvements thereon, in which case the Assurance obligates the Recipient, or any transferee for the longer of the following periods:

- a. the period during which the property is used for a purpose for which the Federal financial assistance is extended, or for another purpose involving the provision of similar services or benefits; or
 - b. the period during which the Recipient retains ownership or possession of the property.
9. The Recipient will provide for such methods of administration for the program as are found by the Secretary of Transportation or the official to whom he/she delegates specific authority to give reasonable guarantee that it, other recipients, sub-recipients, sub-grantees, contractors, subcontractors, consultants, transferees, successors in interest, and other participants of Federal financial assistance under such program will comply with all requirements imposed or pursuant to the Acts, the Regulations, and this Assurance.
10. The Recipient agrees that the United States has a right to seek judicial enforcement with regard to any matter arising under the Acts, the Regulations, and this Assurance.

By signing this ASSURANCE, the **Maine Department of Transportation** also agrees to comply (and require any sub-recipients, sub-grantees, contractors, successors, transferees, and/or assignees to comply) with all applicable provisions governing the **FHWA and USDOT** access to records, accounts, documents, information, facilities, and staff. You also recognize that you must comply with any program or compliance reviews, and/or complaint investigations conducted by the **FHWA and USDOT**. You must keep records, reports, and submit the material for review upon request to **FHWA and USDOT**, or its designee in a timely, complete, and accurate way. Additionally, you must comply with all other reporting, data collection, and evaluation requirements, as prescribed by law or detailed in program guidance.

The **Maine Department of Transportation** gives this ASSURANCE in consideration of and for obtaining any Federal grants, loans, contracts, agreements, property, and/or discounts, or other Federal-aid and Federal financial assistance extended after the date hereof to the recipients by the U.S. Department of Transportation under the **Federal Aid Highway Program**. This ASSURANCE is binding on [*insert State*], other recipients, sub-recipients, sub-grantees, contractors, subcontractors and their subcontractors', transferees, successors in interest, and any other participants in the **Federal Aid Highway Program**. The person(s) signing below is authorized to sign this ASSURANCE on behalf of the Recipient.

MAINE DEPARTMENT OF TRANSPORTATION
(Name of Recipient)

by 
Bruce A. Van Note, Commissioner

DATED 2/13/19

APPENDIX A

During the performance of this contract, the contractor, for itself, its assignees, and successors in interest (hereinafter referred to as the "contractor") agrees as follows:

1. **Compliance with Regulations:** The contractor (hereinafter includes consultants) will comply with the Acts and the Regulations relative to Non-discrimination in Federally-assisted programs of the U.S. Department of Transportation, *Federal Highway Administration (FHWA)*, as they may be amended from time to time, which are herein incorporated by reference and made a part of this contract.
2. **Non-discrimination:** The contractor, with regard to the work performed by it during the contract, will not discriminate on the grounds of race, color, or national origin in the selection and retention of subcontractors, including procurements of materials and leases of equipment. The contractor will not participate directly or indirectly in the discrimination prohibited by the Acts and the Regulations, including employment practices when the contract covers any activity, project, or program set forth in Appendix B of 49 CFR Part 21.
3. **Solicitations for Subcontracts, Including Procurements of Materials and Equipment:** In all solicitations, either by competitive bidding, or negotiation made by the contractor for work to be performed under a subcontract, including procurements of materials, or leases of equipment, each potential subcontractor or supplier will be notified by the contractor of the contractor's obligations under this contract and the Acts and the Regulations relative to Non-discrimination on the grounds of race, color, or national origin.
4. **Information and Reports:** The contractor will provide all information and reports required by the Acts, the Regulations, and directives issued pursuant thereto and will permit access to its books, records, accounts, other sources of information, and its facilities as may be determined by the Recipient or the *FHWA* to be pertinent to ascertain compliance with such Acts, Regulations, and instructions. Where any information required of a contractor is in the exclusive possession of another who fails or refuses to furnish the information, the contractor will so certify to the Recipient or the *FHWA*, as appropriate, and will set forth what efforts it has made to obtain the information.
5. **Sanctions for Noncompliance:** In the event of a contractor's noncompliance with the Non discrimination provisions of this contract, the Recipient will impose such contract sanctions as it or the *FHWA* may determine to be appropriate, including, but not limited to:
 - a. withholding payments to the contractor under the contract until the contractor complies; and/or
 - b. cancelling, terminating, or suspending a contract, in whole or in part.
6. **Incorporation of Provisions:** The contractor will include the provisions of paragraphs one through six in every subcontract, including procurements of materials and leases of equipment, unless exempt by the Acts, the Regulations and directives issued pursuant thereto. The contractor will take action with respect to any subcontract or procurement as the Recipient or the *FHWA* may direct as a means of enforcing such provisions including sanctions for

noncompliance. Provided, that if the contractor becomes involved in, or is threatened with litigation by a subcontractor, or supplier because of such direction, the contractor may request the Recipient to enter into any litigation to protect the interests of the Recipient. In addition, the contractor may request the United States to enter into the litigation to protect the interests of the United States.

APPENDIX B

CLAUSES FOR DEEDS TRANSFERRING UNITED STATES PROPERTY

The following clauses will be included in deeds effecting or recording the transfer of real property, structures, or improvements thereon, or granting interest therein from the United States pursuant to the provisions of Assurance 4:

NOW, THEREFORE, the U.S. Department of Transportation as authorized by law and upon the condition that the **Maine Department of Transportation** will accept title to the lands and maintain the project constructed thereon in accordance with **23 U.S. Code § 107**, the Regulations for the Administration of **the Federal Aid Highway Program**, and the policies and procedures prescribed by the **FHWA** of the U.S. Department of Transportation in accordance and in compliance with all requirements imposed by Title 49, Code of Federal Regulations, U.S. Department of Transportation, Subtitle A, Office of the Secretary, Part 21, Non-discrimination in Federally-assisted programs of the U.S. Department of Transportation pertaining to and effectuating the provisions of Title VI of the Civil Rights Act of 1964 (78 Stat. 252; 42 U.S.C. § 2000d to 2000d-4), does hereby remise, release, quitclaim and convey unto the **Maine Department of Transportation** all the right, title and interest of the U.S. Department of Transportation in and to said lands described in Exhibit A attached hereto and made a part hereof.

(HABENDUM CLAUSE)

TO HAVE AND TO HOLD said lands and interests therein unto **Maine Department of Transportation** and its successors forever, subject, however, to the covenants, conditions, restrictions and reservations herein contained as follows, which will remain in effect for the period during which the real property or structures are used for a purpose for which Federal financial assistance is extended or for another purpose involving the provision of similar services or benefits and will be binding on the **Maine Department of Transportation**, its successors and assigns.

The **Maine Department of Transportation**, in consideration of the conveyance of said lands and interests in lands, does hereby covenant and agree as a covenant running with the land for itself, its successors and assigns, that (1) no person will on the grounds of race, color, or national origin, be excluded from participation in, be denied the benefits of, or be otherwise subjected to discrimination with regard to any facility located wholly or in part on, over, or under such lands hereby conveyed [,] [and]* (2) that the **Maine Department of Transportation** will use the lands and interests in lands and interests in lands so conveyed, in compliance with all requirements imposed by or pursuant to Title 49, Code of Federal Regulations, U.S. Department of Transportation, Subtitle A, Office of the Secretary, Part 21, Nondiscrimination in Federally-assisted programs of the U.S. Department of Transportation, Effectuation of Title VI of the Civil Rights Act of 1964, and as said Regulations and Acts may be amended [, and (3) that in the event of breach of any of the above-mentioned non-discrimination conditions, the Department will have a right to enter or re-enter said lands and facilities on said land, and that above described land and facilities will thereon revert to and vest in and become the absolute property of the U.S. Department of Transportation and its assigns as such interest existed prior to this instruction].*

(*Reverter clause and related language to be used only when it is determined that such a clause is necessary in order to make clear the purpose of Title VI.)

APPENDIX C

CLAUSES FOR TRANSFER OF REAL PROPERTY ACQUIRED OR IMPROVED UNDER THE ACTIVITY, FACILITY, OR PROGRAM

The following clauses will be included in deeds, licenses, leases, permits, or similar instruments entered into by the **Maine Department of Transportation** pursuant to the provisions of Assurance 7(a):

- A. The (grantee, lessee, permittee, etc. as appropriate) for himself/herself, his/her heirs, personal representatives, successors in interest, and assigns, as a part of the consideration hereof, does hereby covenant and agree [in the case of deeds and leases add "as a covenant running with the land"] that:
 1. In the event facilities are constructed, maintained, or otherwise operated on the property described in this (deed, license, lease, permit, etc.) for a purpose for which a U.S. Department of Transportation activity, facility, or program is extended or for another purpose involving the provision of similar services or benefits, the (grantee, licensee, lessee, permittee, etc.) will maintain and operate such facilities and services in compliance with all requirements imposed by the Acts and Regulations (as may be amended) such that no person on the grounds of race, color, or national origin, will be excluded from participation in, denied the benefits of, or be otherwise subjected to discrimination in the use of said facilities.
- B. With respect to licenses, leases, permits, etc., in the event of breach of any of the above Non-discrimination covenants, **Maine Department of Transportation** will have the right to terminate the (lease, license, permit, etc.) and to enter, re-enter, and repossess said lands and facilities thereon, and hold the same as if the (lease, license, permit, etc.) had never been made or issued.*
- C. With respect to a deed, in the event of breach of any of the above Non-discrimination covenants, the **Maine Department of Transportation** will have the right to enter or re-enter the lands and facilities thereon, and the above described lands and facilities will there upon revert to and vest in and become the absolute property of the **Maine Department of Transportation** and its assigns.*

(*Reverter clause and related language to be used only when it is determined that such a clause is necessary to make clear the purpose of Title VI.)

APPENDIX D

CLAUSES FOR CONSTRUCTION/USE/ACCESS TO REAL PROPERTY ACQUIRED UNDER THE ACTIVITY, FACILITY OR PROGRAM

The following clauses will be included in deeds, licenses, permits, or similar instruments/agreements entered into by the **Maine Department of Transportation** pursuant to the provisions of Assurance 7(b):

- A. The (grantee, licensee, permittee, etc., as appropriate) for himself/herself, his/her heirs, personal representatives, successors in interest, and assigns, as a part of the consideration hereof, does hereby covenant and agree (in the case of deeds and leases add, "as a covenant running with the land") that (1) no person on the ground of race, color, or national origin, will be excluded from participation in, denied the benefits of, or be otherwise subjected to discrimination in the use of said facilities, (2) that in the construction of any improvements on, over, or under such land, and the furnishing of services thereon, no person on the ground of race, color, or national origin, will be excluded from participation in, denied the benefits of, or otherwise be subjected to discrimination, (3) that the (grantee, licensee, lessee, permittee, etc.) will use the premises in compliance with all other requirements imposed by or pursuant to the Acts and Regulations, as amended, set forth in this Assurance.
- B. With respect to (licenses, leases, permits, etc.), in the event of breach of any of the above Non-discrimination covenants, the **Maine Department of Transportation** will have the right to terminate the (license, permit, etc., as appropriate) and to enter or re-enter and repossess said land and the facilities thereon, and hold the same as if said (license, permit, etc., as appropriate) had never been made or issued.*
- C. With respect to deeds, in the event of breach of any of the above Non-discrimination covenants, the **Maine Department of Transportation** will there upon revert to and vest in and become the absolute property of the **Maine Department of Transportation** and its assigns.*

(*Reverter clause and related language to be used only when it is determined that such a clause is necessary to make clear the purpose of Title VI.)

APPENDIX E

During the performance of this contract, the contractor, for itself, its assignees, and successors in interest (hereinafter referred to as the "contractor") agrees to comply with the following non-discrimination statutes and authorities; including but not limited to:

Pertinent Non-Discrimination Authorities:

- Title VI of the Civil Rights Act of 1964 (42 U.S.C. § 2000d et seq., 78 stat. 252), (prohibits discrimination on the basis of race, color, national origin); and 49 CFR Part 21.
- The Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, (42 U.S.C. § 4601), (prohibits unfair treatment of persons displaced or whose property has been acquired because of Federal or Federal-aid programs and projects);
- Federal-Aid Highway Act of 1973, (23 U.S.C. § 324 et seq.), (prohibits discrimination on the basis of sex);
- Section 504 of the Rehabilitation Act of 1973, (29 U.S.C. § 794 et seq.), as amended, (prohibits discrimination on the basis of disability); and 49 CFR Part 27;
- The Age Discrimination Act of 1975, as amended, (42 U.S.C. § 6101 et seq.), (prohibits discrimination on the basis of age);
- Airport and Airway Improvement Act of 1982, (49 USC § 471, Section 47123), as amended, (prohibits discrimination based on race, creed, color, national origin, or sex);
- The Civil Rights Restoration Act of 1987, (PL 100-209), (Broadened the scope, coverage and applicability of Title VI of the Civil Rights Act of 1964, The Age Discrimination Act of 1975 and Section 504 of the Rehabilitation Act of 1973, by expanding the definition of the terms "programs or activities" to include all of the programs or activities of the Federal-aid recipients, sub-recipients and contractors, whether such programs or activities are Federally funded or not);
- Titles II and III of the Americans with Disabilities Act, which prohibit discrimination on the basis of disability in the operation of public entities, public and private transportation systems, places of public accommodation, and certain testing entities (42 U.S.C. §§ 12131-12189) as implemented by Department of Transportation regulations at 49 C.F.R. parts 37 and 38;
- The Federal Aviation Administration's Non-discrimination statute (49 U.S.C. § 47123) (prohibits discrimination on the basis of race, color, national origin, and sex);
- Executive Order 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations, which ensures Non-discrimination against minority populations by discouraging programs, policies, and activities with disproportionately high and adverse human health or environmental effects on minority and low-income populations;
- Executive Order 13166, Improving Access to Services for Persons with Limited English Proficiency, and resulting agency guidance, national origin discrimination includes discrimination because of Limited English proficiency (LEP). To ensure compliance with Title VI, you must take reasonable steps to ensure that LEP persons have meaningful access to your programs (70 Fed. Reg. at 74087 to 74100);
- Title IX of the Education Amendments of 1972, as amended, which prohibits you from discriminating because of sex in education programs or activities (20 U.S.C. 1681 et seq.).

**AUGUSTA
WATER STREET AND BRIDGE STREET (Intersection / Project #36)
TRAFFIC SIGNAL UPGRADES
WIN 24301.00**

GENERAL NOTE

Review of Maine Department of Environmental Protection (MDEP) environmental records indicate spills and releases involving petroleum products adjacent to the project area, and the potential for contaminants to remain at the documented spill locations. Available MDEP data suggests existing contamination may only be adjacent to the immediate areas of excavation proposed by the Maine Department of Transportation (MaineDOT). However, considering the environmental data review findings, the Contractor shall employ appropriate health and safety measures to protect its workers against hazards associated with working near petroleum-impacted soils. Furthermore, the Contractor shall remain alert for any additional evidence of contamination. If the Contractor encounters any evidence of soil or groundwater contamination, the Contractor shall stop work in the contaminated area, secure the excavation, and immediately notify the Resident. The Resident shall contact the Senior Geologist with the MaineDOT Environmental Office at (207) 624-3100 and contact MDEP at 800-482-0777. Work may only continue with authorization from the Resident.