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

Janet T. Mills
GOVERNOR

Dale F. Doughty
ACTING COMMISSIONER

September 10, 2025
Subject: RWIS
State WIN: 026140.00 & 027112.00
Location: **Statewide**
Amendment No. 2

Dear Sir/Ms.:

Please make the following changes to the Bid Documents:

In the Bid Book:

REMOVE pages 16-19 labeled Proposal Schedule of Items dated July 24, 2025 (4 pages) and **REPLACE** with the attached Proposal Schedule of Items dated September 8, 2025 (4 pages).

REMOVE pages 109-112 labeled Special Provisions 104 Utilities dated July 23, 2025 (4 pages) and **REPLACE** with the attached Special Provisions Section 104 Utilities dated September 5, 2025 (4 pages).

REMOVE pages 138-145 labeled Special Provision 654 Intelligent Transportation Systems dated May 30, 2025 (8 pages) and **REPLACE** with the attached Special Provision 654 Intelligent Transportation Systems dated September 5, 2025 (8 pages).

REMOVE pages 150-162 labeled Special Provision 654 Road Weather Information Station (RWIS) System Equipment dated July 18, 2025 (13 pages) and **REPLACE** with the attached Special Provision 654 Road Weather Information Station (RWIS) System Equipment dated September 5, 2025 (13 pages).

In the Plan Set:

REMOVE Plan Sheet 16 of 26 titled RWIS – MADISON SITE PLAN and **REPLACE** with the attached Plan Sheet 16 of 26 titled RWIS – MADISON SITE PLAN.

The following questions have been received:

Question: Under which conditions will the TMA be required? Is there a speed limit or AADT level that will trigger its use?

Response: The Resident has the authority to determine the need for a Truck Mounted Attenuator (TMA) in any work zone. The Contractor may include a TMA in any work zone as part of their

approved Traffic Control Plan. A TMA may be required on site in a lane closure at any location where the Contractor has unprotected personnel (other than Flaggers) working within ten feet of a travel lane with a posted speed of 40 MPH or greater.

Question: In locations where the power drop is within 20' from the RWIS wood pole, can the power feed be run aerially rather than underground as a cost saving measure? This would eliminate the need for pull boxes and trenching.

Response: MaineDOT will not consider aerial power feeds directly to the RWIS support poles.

Question: Section 654.027 lists three road sensors, Non-invasive, Pavement Surface Condition Sensor, and Subsurface Probe. Can you please confirm that Maine DOT requires the in-pavement Pavement Condition Sensor installed at each of the 17 locations.

Response: The in-pavement Pavement Condition Sensor is only required at the T1 R9 WELS location as indicated on Plan Sheet 22. This location is proposed to have a Pavement Condition Sensor because the Non-Invasive sensor is not capable of reaching Baxter Park Road from the RWIS support pole. All other RWIS locations have been designed to accommodate the Non-Invasive sensors and are not expected to require the in-pavement Pavement Condition Sensors. All locations shall include the Subsurface probe installed in accordance with the manufacturer's recommendations.

Question: On page 141 of the bid book, paragraph 3. iii. it states that if the operational testing is not completed by May 1, 2025, the Contractor shall be..." What is the correct year intended?

Response: The date has been corrected to May 1, 2026. See attached revised Special Provision Section 654 Intelligent Transportation Systems.

Question: Maine DOT have added a pavement condition monitoring sensor, which is an in-pavement sensor. Do you know if every station requires this sensor? If only some stations require the sensor, do those stations also have a non-invasive sensor?

Response: The in-pavement Pavement Condition Sensor is only required at the T1 R9 WELS location as indicated on Plan Sheet 22. This location is proposed to have a Pavement Condition Sensor because the Non-Invasive sensor is not capable of accurate measurements of Baxter Park Road from the RWIS support pole location. All other RWIS locations have been designed to accommodate the Non-Invasive sensors and are not expected to require the in-pavement Pavement Condition Sensors. The T1 R9 WELS location will not require the Non-Invasive sensors.

Question: Would it be possible to extend the bid date for this project? Several vendors have been away at a major industry conference ITS World Congress this past week and with the holiday weekend we respectfully request a weeks extension in order to prepare a price competitive bid.

Response: Through Addendum #1, the bid date has been modified to September 17, 2025.

Question: The plans include a site in Madison, but the Schedule of Items does not include a Electrical Service Connection item or RWIS item for this location.

Response: The Schedule of Items, Plan Sheet 16, and Special Provision 104 have been updated to reflect that Item 654.51 Electrical Service Connection is for Madison, not Solon. Additionally, Item 654.53 Road Weather Information System has been updated for Madison, not Solon.

Question: There is a bid item for s site in Solon, but the plans do not include any information for this site. Should this site be removed from the schedule of items or can plans for this site be provided?

Response: The Schedule of Items, Plan Sheet 16, and Special Provision 104 have been updated to reflect that Item 654.51 Electrical Service Connection is for Madison, not Solon. Additionally, Item 654.53 Road Weather Information System has been updated for Madison, not Solon.

Question: Please provide information on the equipment for 654.53 Road Weather Information system.

Response: All information for Item 654.53 Road Weather Information System is contained in the Special Provision Section 654 for Road Weather Information Station (RWIS) System Equipment, the plans, and this Addendum. Please clarify what additional information is needed.

Question: Can the bid date be extended to September 10, 2025?

Response: Through Addendum #1, the bid date has been modified to September 17, 2025.

Question: Will 3rd party services be required for software integration?

Response: The Contractor is no longer required to contract with Southwest Research Institute to integrate the RWIS equipment into the Compass ATMS, subject to all RWIS equipment proposed on the project shall be fully compatible with Compass ATMS. The Contractor remains responsible for integration of the RWIS data in the WSP Road and Weather software and the cameras in Axis Camera Station. For specifics on software integration requirements, see the revised Special Provisions 654 for Intelligent Transportation Systems and for Road Weather Information Station (RWIS) System Equipment.

Question: For the camera, will it be required to have multiple views from the camera (PTZ)? Or will it just be required to look at the roadway (Bullet)?

Response: The camera system associated with the RWIS equipment is not required to have pan, tilt, or zoom capabilities. The purpose of the camera is to provide visual confirmation of the weather conditions at each RWIS location.

Question: Section 2.b requires that the Datalogger have 512 MB of DDR3 memory. DDR3 is largely obsolete and is being phased out of production generally. In an effort to future proof the system and generally improve performance would alternate types of RAM be acceptable if their performance speed would be equal to or better than the required memory?

Response: MaineDOT has removed the memory requirements for the controller in the revised Special Provision 654 for Road Weather Information Station (RWIS) System Equipment. The Contractor shall be responsible for providing a system with adequate memory capability to meet the functional and operational testing requirements included in the Special Provision.

Question: Section 5.c.1 requires that the battery back-up system provide power for all components for a minimum of 24 hours at full function. Does this include heaters or can heaters be disabled if AC power is disconnected?

Response: MaineDOT has excluded the operation of sensor heaters or cabinet heater(s) from the required initial 24-hour "full function" back-up system as well as from the subsequent low power/survival mode 24 hours.

Question: Section 5.c.2 requires that the battery back-up system be Ethernet ready. It is not entirely clear what this means. If the battery state can be read through an ethernet connection to the datalogger would that be sufficient to meet this requirement?

Response: The battery back-up system shall have the capability of being remotely monitored and be Ethernet-ready for a future connection to an Ethernet switch.

Question: Section 7.f requires that the fiber optic Ethernet switch meet the requirements of Item 654.311, however there is no such reference elsewhere in the document. Can clarification be given to the requirements of the switch?

Response: MaineDOT has eliminated the requirement for furnishing and installing an Ethernet switch as part of the RWIS equipment. In its place, please note the new requirement for the Contractor to complete a cellular coverage analysis at each RWIS location prior to installing any RWIS equipment.

Question: Section 2.c requires that the visibility sensor use back scatter optical technology. No current visibility/present weather sensor uses exclusively backscatter technology. A single vendor uses a backscatter detector as a supplement to the primary forward scatter measurement technique. Will a sensor that uses a forward scatter technique alone be acceptable.

Response: The visibility sensor requirement states that the sensor shall use back scatter optical technology but does not indicate that it shall use back scatter technology exclusively. The Contractor may submit a visibility sensor that uses both back scatter and forward scatter technologies. Alternatively, if the Contractor believes that strict conformance to using back scatter technology is unnecessary or the performance requirements may be met using only forward scatter technology, the Contractor may submit the alternative product for consideration

as functionally equivalent in accordance with Special Provision 103. All sensors shall be evaluated based on how they perform against the functional requirements.

Question: Section 3.c.ii specifies the accuracy of the accumulation rate for the Precipitation and Accumulation Detector as a fixed measurement. It is typical for this specification to be presented as a percentage of the accumulation or precipitation intensity. Would it be acceptable for a sensor that presents this accuracy as a percentage to meet this requirement if the stated fixed accuracy is not exceed at reasonable values for hourly precipitation accumulation?

Response: The Contractor may submit a sensor or product that uses a percentage-based accuracy, provided that the sensor or product meets the minimum fixed performance requirement described in the measurement parameters. All sensors will be evaluated based on how they perform against the functional requirements.

Question: Section 3.c.i.7 requires the Precipitation and Accumulation Detector to detect Sleet/Ice Pellets. Will a sensor that can identify Hail suffice to meet this requirement?

Response: The intent of the requirement for the Precipitation and Accumulation Detector is to detect precipitation types in accordance with NTCIP 1204 version 04.26b. The itemized list of precipitation types has been replaced with a reference to NTCIP 1204. All sensors will be evaluated based on how they perform against the functional requirements.

Question: Section 8.e lists Road Surface Temperature and Freezing Point as measurements under the Subsurface probe. These measurements are not able to be measured by a subsurface probe. Can they be removed from the subsurface probe requirements?

Response: The measurement parameters for the subsurface probe have been modified to indicate measurement of the subsurface temperature and to eliminate the reference to freezing point accuracy. See the revised Special Provision 654 for the Road Weather Information Station (RWIS) System Equipment.

Question: Are site specific site drawings, including elevations and/or plan views prepared by a Maine Prof Engineer (PE) required for any of the 17 RWIS locations.

Response: No specific site drawings are required of the Contractor for the RWIS locations. The Contractor is required to submit traffic control plans, which may include site specific information, in accordance with Standard Specification 652.

Question: Will the GC be required to pay any SwRI or Compass integration fees.

Response: The Contractor is no longer required to contract with or pay integration fees to Southwest Research Institute (SwRI) to integrate the RWIS equipment into the Compass ATMS, subject to all RWIS equipment proposed on the project shall be fully compatible with Compass ATMS. The Contractor remains responsible for integration of the RWIS data in the WSP Road and Weather software and the cameras in Axis Camera Station. For specifics on software

integration requirements, see the revised Special Provisions 654 for Intelligent Transportation Systems and for Road Weather Information Station (RWIS) System Equipment.

Question: Does the State of Maine have a point of contact for WSP that can be provided?

Response: Nikolay Damyanov, Weather Operations Manager (nikolay.damyanov@wsp.com) is our point of contact at WSP.

Question: What are the maintenance requirements after final acceptance?

Response: There are no defined maintenance requirements by the Contractor after Final System Acceptance. However, there are detailed Guarantee and Warranty requirements as defined in the Special Provisions 654 for Intelligent Transportation Systems (Base Specification).

Question: Item 626.251 is called out on sheet #22 with a qty of 90 lf but it is not on the bid tabs. Should this be a separate bid item?

Response: Yes, Item 626.251 has been included in the updated Schedule of Items.

Question: Have all the sites been field tested for acceptable/usable cellular modem service?

Response: None of the sites have been tested for cellular service. The Contractor shall complete a cellular coverage analysis at each RWIS location. See the revised Special Provisions 654 for Intelligent Transportation Systems and for Road Weather Information Station (RWIS) System Equipment Section 654.031.3.g for cellular service testing requirements.

Question: If the sites have not been field tested, are there any contingencies for lack of cellular service?

Response: If cellular service is inadequate at any location, MaineDOT will request antenna(s) to amplify the service signal or pursue service with an alternative cellular provider. In the absence of adequate cellular service as determined by the Contractor's cellular coverage analysis, MaineDOT will work with the Contractor to determine a viable communications connection.

Question: Can each RWIS site be tested independently for the 90 day test period requirement or will all 17 RWIS locations need to be tested concurrently over a 90 day test period?

Response: There are three testing steps as defined in Special Provision 654 Intelligent Transportation Systems. Each step must be completed in sequence prior to moving to the next step. Step 1 (Standalone and Subsystem Testing) may be completed independently at each RWIS location. Step 2 (Central Control Testing) may be completed independently at each RWIS location, however, the Contractor is encouraged to be prepared to test multiple locations on the same day. Step 3 (Operational Acceptance Testing) shall be completed at all sites concurrently. During the Operational Acceptance Test, MaineDOT personnel will validate system performance during real-life operations, which means that all sites shall be transmitting data concurrently. The

Operational Acceptance Test Period shall be 45 days (minimum) as described in the Special Provision 654, Section 654.05.4.

Question: Will payment be made on % completed or will each location need to be completed 100% prior to payment for each RWIS location?

Response: RWIS site payments will be made upon successful installation with operational power and communications.

Question: Can overhead electrical services be provided as an option to Underground services?

Response: The plans include aerial electrical service to a proposed service pole at all locations where service is proposed from across a roadway. All other locations require underground service to a meter and disconnect pedestal. MaineDOT will not consider aerial power feeds directly to the RWIS support poles.

Question: Can the state please confirm that all cellular data costs associated with transmitting data from the RWIS stations to Compass and MaineDOT's Road and Weather software will be the responsibility of others.

Response: Yes, MaineDOT will be responsible for all cellular data costs once the US Cellular SIM card has been provided to the Contractor.

Consider these changes and information prior to submitting your bid on **September 17, 2025**.

Sincerely,

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

Maine Department of Transportation

Proposal Schedule of Items

Proposal ID: 026140.00 **Project(s):** 026140.00, 027112.00

SECTION: 1 INITIAL GROUP

Alt Set ID: **Alt Mbr ID:**

Contractor: _____

Proposal Line Number	Item ID Description	Approximate Quantity and Units	Unit Price Dollars	 Cents	Bid Amount Dollars	 Cents
0010	527.33 TRUCK MOUNTED ATTENUATOR	1.000 EA				
0020	626.11 PRECAST CONCRETE JUNCTION BOX	22.000 EA				
0030	626.21 METALLIC CONDUIT 2 INCH	400.000 LF				
0040	626.21 METALLIC CONDUIT 3 INCH	260.000 LF				
0050	626.22 NON-METALLIC CONDUIT 2 INCH	1,280.000 LF				
0060	626.22 NON-METALLIC CONDUIT 3 INCH	1,300.000 LF				
0070	626.251 NON-METALLIC UNDER PAVEMENT CONDUIT (SCHEDULE 80 OR GREATER RATING)	90.000 LF				
0080	629.05 HAND LABOR, STRAIGHT TIME	70.000 HR				
0090	643.972 WOOD POLE	25.000 EA				
0100	652.30 FLASHING ARROW BOARD	1.000 EA				
0110	652.33 DRUM	30.000 EA				
0120	652.34 CONE	100.000 EA				

Maine Department of Transportation

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Contractor: _____

Proposal Line Number	Item ID Description	Approximate Quantity and Units	Unit Price Dollars	 Cents	Bid Amount Dollars	 Cents
0130	652.35 CONSTRUCTION SIGNS	260.000 SF				
0140	652.361 MAINTENANCE OF TRAFFIC CONTROL DEVICES	LUMP SUM	LUMP SUM			
0150	652.38 FLAGGER	1,350.000 HR				
0160	652.381 TRAFFIC OFFICER	80.000 HR				
0170	652.41 PORTABLE CHANGEABLE MESSAGE SIGN	2.000 EA				
0180	654.51 ELECTRICAL SERVICE CONNECTION AMITY	LUMP SUM	LUMP SUM			
0190	654.51 ELECTRICAL SERVICE CONNECTION BLAINE	LUMP SUM	LUMP SUM			
0200	654.51 ELECTRICAL SERVICE CONNECTION DENNYSVILLE	LUMP SUM	LUMP SUM			
0210	654.51 ELECTRICAL SERVICE CONNECTION DEXTER	LUMP SUM	LUMP SUM			
0220	654.51 ELECTRICAL SERVICE CONNECTION EUSTIS	LUMP SUM	LUMP SUM			
0230	654.51 ELECTRICAL SERVICE CONNECTION FARMINGTON	LUMP SUM	LUMP SUM			

Maine Department of Transportation

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SECTION: 1 INITIAL GROUP

Alt Set ID: **Alt Mbr ID:**

Contractor: _____

Proposal Line Number	Item ID Description	Approximate Quantity and Units	Unit Price Dollars Cents	Bid Amount Dollars Cents
0240	654.51 ELECTRICAL SERVICE CONNECTION GILEAD	LUMP SUM	LUMP SUM	_____.____
0250	654.51 ELECTRICAL SERVICE CONNECTION GOULDSBORO	LUMP SUM	LUMP SUM	_____.____
0260	654.51 ELECTRICAL SERVICE CONNECTION GRAND ISLE	LUMP SUM	LUMP SUM	_____.____
0270	654.51 ELECTRICAL SERVICE CONNECTION JOHNSON MOUNTAIN TOWNSHIP	LUMP SUM	LUMP SUM	_____.____
0280	654.51 ELECTRICAL SERVICE CONNECTION MADISON	LUMP SUM	LUMP SUM	_____.____
0290	654.51 ELECTRICAL SERVICE CONNECTION OXFORD	LUMP SUM	LUMP SUM	_____.____
0300	654.51 ELECTRICAL SERVICE CONNECTION PALERMO	LUMP SUM	LUMP SUM	_____.____
0310	654.51 ELECTRICAL SERVICE CONNECTION PATTEN	LUMP SUM	LUMP SUM	_____.____
0320	654.51 ELECTRICAL SERVICE CONNECTION STANDISH	LUMP SUM	LUMP SUM	_____.____
0330	654.51 ELECTRICAL SERVICE CONNECTION T1 R9 WELS	LUMP SUM	LUMP SUM	_____.____
0340	654.51 ELECTRICAL SERVICE CONNECTION TOPSFIELD	LUMP SUM	LUMP SUM	_____.____

Proposal ID: 026140.00 **Project(s):** 026140.00, 027112.00

SECTION: 1 INITIAL GROUP

Alt Set ID: **Alt Mbr ID:**

Contractor: _____

Proposal Line Number	Item ID Description	Approximate Quantity and Units	Unit Price Dollars	 Cents	Bid Amount Dollars	 Cents
0350	654.53 ROAD WEATHER INFORMATION STATION AMITY	1.000 LS				
0360	654.53 ROAD WEATHER INFORMATION STATION BLAINE	1.000 LS				
0370	654.53 ROAD WEATHER INFORMATION STATION DENNYSVILLE	1.000 LS				
0380	654.53 ROAD WEATHER INFORMATION STATION DEXTER	1.000 LS				
0390	654.53 ROAD WEATHER INFORMATION STATION EUSTIS	1.000 LS				
0400	654.53 ROAD WEATHER INFORMATION STATION FARMINGTON	1.000 LS				
0410	654.53 ROAD WEATHER INFORMATION STATION GILEAD	1.000 LS				
0420	654.53 ROAD WEATHER INFORMATION STATION GOULDSBORO	1.000 LS				
0430	654.53 ROAD WEATHER INFORMATION STATION GRAND ISLE	1.000 LS				
0440	654.53 ROAD WEATHER INFORMATION STATION JOHNSON MOUNTAIN TOWNSHIP	1.000 LS				

Maine Department of Transportation

Proposal Schedule of Items

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SECTION: 1 INITIAL GROUP

Alt Set ID: **Alt Mbr ID:**

Contractor: _____

Proposal Line Number	Item ID / Description	Approximate Quantity and Units	Unit Price Dollars	Unit Price Cents	Bid Amount Dollars	Bid Amount Cents
0450	654.53 ROAD WEATHER INFORMATION STATION MADISON	1.000 LS				
0460	654.53 ROAD WEATHER INFORMATION STATION OXFORD	1.000 LS				
0470	654.53 ROAD WEATHER INFORMATION STATION PALERMO	1.000 LS				
0480	654.53 ROAD WEATHER INFORMATION STATION PATTEN	1.000 LS				
0490	654.53 ROAD WEATHER INFORMATION STATION STANDISH	1.000 LS				
0500	654.53 ROAD WEATHER INFORMATION STATION T1 R9 WELS	1.000 LS				
0510	654.53 ROAD WEATHER INFORMATION STATION TOPSFIELD	1.000 LS				
0520	656.75 TEMPORARY SOIL EROSION AND WATER POLLUTION CONTROL	LUMP SUM	LUMP SUM			
0530	659.10 MOBILIZATION	LUMP SUM	LUMP SUM			

Section: 1 **Total:** _____

Total Bid: _____

Standish/Oxford/Palermo/Gilead/Farmington/Gouldsboro/
Madison/Dennysville/ Dexter/Eustis/Johnson Mtn/Topsfield
WIN: 026140.00 (12 Locations)
September 5, 2025

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 Preconstruction Utility Conference, as defined in Subsection 104.4.6 of the Standard Specifications **is** required.

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 following table identifies all known utilities or railroads having facilities presently located within the limits of this project or intending to install facilities during project construction. The "Overview" below identifies the MaineDOT and Utility representatives to be contacted for utility coordination within the limits of each specified location.

Utilities have been notified and will be furnished a project specification.

The Contractor shall give all Utilities **ten (10) working days' notice** prior to beginning **ANY** work on this project.

OVERVIEW

MaineDOT Service Contact: Harold Tower: (207) 592-0763

Project Locations: ***Note: These locations concentrate near or at a pole with a transformer.*

RWIS 1: Standish; RWIS 2: Oxford; RWIS 3: Palermo; RWIS 4: Gilead; RWIS 5: Farmington; RWIS 6: Gouldsboro; RWIS 7: Madison; RWIS 8: Dennysville; RWIS 9: Dexter; RWIS 10: Eustis; RWIS 11: Johnson Mtn; RWIS 12: Topsfield

Utility	Aerial	Subsurface	Contact Person	Contact Phone
Central Maine Power Company	1,2,3,4,5, 7,9,10,11		Craig Bate	(207) 578-2062
Charter Comm. Inc./Spectrum	3,5,7,9,10		Frank Varrelmann	(207) 249-0733
Consolidated Communications (CCI)	1,2,3,5,6,7, 8,9,11,12	1, 3	Ryan Beliveau (2,5) Byran Kenison (1,3) Eric Nored (7,11) Travis Roberts (6,9) John Wilkinson (8,12)	(207) 274-3227 (207) 650-1022 (207) 462-9963 (207)944-2361 (207)907-0258
Dexter Utility District		9	Tom Crawford	(207) 924-7367
Eastern Maine Electric Cooperative	12		Bob Black	(207) 454-1559
Farmington Solar	5		Justin Lowe	(207) 578-4735
Firstlight	2,3,4,5,8,1 2		Jarrod Smith	(603) 396-100
Oxford Water District		2	Frank Britton	(207) 743-2414
Portland Water District		1	Joe Parent	(207) 232-3851
Somerset Telephone Company dba TDS Telecom	10		Nick Blanchet	(207) 399-7953
Versant Power	6, 8		David S. Perkins	(207) 949-3918

Temporary utility adjustments **are not** anticipated. If any unexpected utility relocations become necessary, they shall be scheduled in accordance 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 clearing and tree removal in areas where utilities are involved must be completed before the utilities are able to locate/relocate their facilities.

To provide proper fire protection, the existing fire hydrants shall not be disturbed until all necessary work has been accomplished to provide proper fire protection.

***** Specific information regarding the line voltage can be requested from* Central Maine Power Company; Eastern Maine Electric Cooperative; or Versant Power ****

AERIAL

Aerial Utility adjustments **are** anticipated at this time for the project. Though unexpected, if utility relocations become necessary, they will be scheduled in compliance with Section 104 of the Standard Specifications and will be done by the utilities after the Contractor has finished their work.

Multiple new electric and/or communication service accounts are required for this MaineDOT project. The contractor shall contact **MaineDOT's Harold Tower (207-592-0763)** to establish **each new account** with the appropriate power and communication companies.

The contractor shall allow a twenty-eight (28) day minimum duration for the establishment of all new accounts.

The contractor shall provide the following information for all new accounts/each new location:

- the municipality (town/city); street name/nearest physical address;
- GPS coordinates for new service – if possible;
- nearest pole set number and pole number take off;
- nearest meter number;
- whether above and/or underground service;
- type of service requested;
- voltage and amperage;
- name, telephone number, and license number of the electrician performing the work;
- existing pole set number;
- the distance from the existing pole to the new control cabinet;
- follow-up contact person's telephone number(s) for utility company to contact for more information.

The contractor is responsible for providing a new pole set at each location, as per the contract. These new poles need to be set prior to a new service connection/activation.

Aerial utilities require **five (5) working days' notice** prior to any operations involving work around their lines.

Attention needs to be given to the existing aerial utilities service lines crossing the highway corridor. Each of the existing service lines provide a source of power and/or communication to the surrounding properties.

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.

MAINTAINING UTILITY LOCATION MARKINGS

The Contractor will 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.

SPECIAL PROVISION
SECTION 654
INTELLIGENT TRANSPORTATION SYSTEMS

654.01 Description: This work shall consist of the furnishing, configuring, integration, and testing of intelligent transportation systems (ITS) devices, equipment, and associated materials. This specification includes materials, integration, and warranty requirements for all ITS systems. Each specific ITS system or device will include its own specification that supplements the requirements of this specification.

654.02 General: All ITS equipment shall be new unless otherwise specified. Requests for substitution of any specified material shall be submitted in writing with all documentation (specifications, mill certifications, catalog cuts, shop drawings, etc.) to enable the Department to evaluate the equivalency of the substitution. Substitutes shall give equal or better service than the specified material or equipment.

654.025 Materials: The Contractor shall provide a complete Technical Submittal as outlined below for all ITS systems, devices, and equipment. The requirements for the ITS Technical Submittal shall meet the following requirements and additional requirements as indicated by the specific ITS system, device, or equipment specifications:

1. This specification includes the universal requirements for all ITS Technical Submittals; additional requirements for specific ITS systems, devices, and equipment may be found in other specifications.
2. The Contractor shall not proceed with manufacture or fabrication until the Resident has approved the submittals in accordance with Section 105.7.
    a. The Contractor shall provide drawings, manufacturer's specifications, and applicable catalog cuts for all materials and components for this work, submitted in accordance with Section 105.7.
    b. The Technical Submittal shall list all proposed equipment to be provided, including mounting hardware as applicable.
    c. The Contractor shall provide cabinet diagrams for all equipment cabinets showing installed hardware and wiring connections.
    d. The Contractor shall provide electric load calculations required for all power supply equipment to be installed.
        i. Where solar powered systems are required, the Contractor shall provide solar power calculations to indicate the size, quantity, and capacity of the solar panels and batteries to meet the required autonomy standards.
        ii. Where uninterruptable power supply (UPS) is specified, the Contractor shall provide calculations to indicate that the proposed power requirements of the system can be accommodated by the UPS equipment in accordance with the specifications.
    e. All specification documentation shall be clearly marked to identify the exact proposed model and all options to be supplied.

f. MaineDOT will give no guarantee as to the completeness of the Plan details and the Contractor shall be required to furnish, install, and test any other equipment and materials required to provide a complete and operational ITS device system.

3. Steel Support Pole Submittals. The submittal for device support poles shall include the following for approval in accordance with Section 105.7.:
    a. Design computations (AASHTO LRFD) for support structures or poles, for the wind speeds defined in ITS system or device specifications. All calculations shall be signed and stamped by a Professional Engineer licensed in the State of Maine. The submittal for above grade components shall be in accordance with Section 626.034
    b. Complete sets of shop drawings for the pole signed and stamped by a Professional Engineer licensed in Maine.
    c. Manufacturer's specifications and applicable catalog cuts for all materials and components.
    d. If not provided with the Contract Documents, the Contractor shall submit elevation and plan views showing the device support locations, foundations, and the proposed slopes plotted on cross-sections showing no interference with utilities, drainage pipes or structures and showing support of excavation if needed for construction of the foundation.
    e. The submittal shall include the foundation system that is selected for each pole location in accordance with Section 626.034.
    f. When more than one Engineer is responsible for the design of separate components (i.e. pole, attachment information), the Contractor shall make one submittal containing all of the components unless otherwise allowed by MaineDOT.
4. Training Materials. When a training requirement is included in an ITS specification, the Contractor shall furnish and provide a separate Training submittal. This training submittal shall include the following:
    a. Samples of all training materials including student handouts, presentation materials, and training agendas.
    b. The proposed date, time, and location for the training program.
    c. Resumes for the proposed qualified instructors.
5. Ethernet Cable. Where Ethernet cable is specified in the Contract Document, it shall be interpreted to mean shielded, weatherproof Category 6 (Cat6) cable of the length required for the application. The maximum length for a single Cat6 cable shall be 325 feet. Cat6 cable shall not be spliced. If any Cat6 cable will be exposed to the sun, the cable shall be UV protected.

654.03 Construction:

1. ITS Device Documentation Requirements.
    a. A minimum of 15 working days prior to configuration of the IP-addressable equipment, the Contractor shall formally request the assigned IP addresses from the MaineDOT Transportation Management Center (TMC).

b. All ITS Device documentation shall identify the specific manufacturer and model number as approved in the Technical Submittal.
c. IP addresses and login credentials will be assigned for each device by MaineDOT and returned to the Contractor.
d. The Contractor shall configure all devices with the correct IP addresses and login credentials assigned by MaineDOT.
e. The Contractor shall properly label all ports and outlets within device interfaces with the correct component connected to the port or outlet.

654.04 Software and Integration:

1. General Software and Integration
    a. All ITS devices furnished and integrated shall be fully compatible with the MaineDOT TMC's Advanced Transportation Management System (ATMS) known as New England Compass (Compass). This software was developed by the Southwest Research Institute (SwRI) and is used by the TMCs in Maine, New Hampshire, and Vermont.
    b. Where applicable, ITS devices and equipment shall also be fully compatible and integrated with specific equipment software (for example, Road and Weather software and Axis Camera Station software).
    c. Additional software and integration requirements are included in each of the specific ITS systems or device specifications.
2. New England Compass ATMS Integration
    a. Vaisala and Campbell Scientific RWIS equipment are currently integrated into Compass. If the Contractor proposes to supply other RWIS equipment or sensors, the equipment and sensors shall be fully compatible with Compass. MaineDOT will be responsible for coordinating and paying for integration efforts with SwRI directly.
    b. If there are any issues with device performance in the ATMS that are caused by a data feed change or other non-Compass deficiencies as determined by MaineDOT, the Contractor shall be fully responsible for correcting those issues.
3. RWIS-Specific Integration
    a. Road and Weather Software
        i. All RWIS provided for this project shall be integrated into MaineDOT's Road and Weather Software and operate in the program in the same manner as the existing RWIS, including reporting capabilities. MaineDOT uses WSP for Road and Weather Software.
        ii. The Contractor shall be responsible for the first six months of the Road and Weather Software licensing fees. After the initial six month period, the software licensing fees will be paid by MaineDOT.
        iii. If operational testing is not completed on or before May 1, 2026, the Contractor shall be responsible for the first twelve (12) months of the Road and Weather Software licensing fees. After the initial 12-month period, the software licensing fees will be paid by MaineDOT.
4. CCTV-Specific Integration
    a. CCTVs provided for this project shall be compatible with Axis Camera Station.
    b. The Contractor shall supply Axis Camera Station licenses for each CCTV.

c. The Contractor shall configure each CCTV so that they can be integrated into Axis Camera station by MaineDOT.

654.05 Testing Requirements:

1. General Requirement: ITS Device and System Testing
    a. In addition to the requirements of this specification, all installations of ITS devices and equipment, fiber optic cable, and wireless communication equipment will be subjected to rigorous testing before the work will be accepted by MaineDOT.
    b. The Contractor shall submit testing plans to MaineDOT for review and acceptance. Successful completion of device testing shall be considered a requirement of the Contract. The Contractor shall provide all equipment, materials and labor required to perform each test, including laptop computers, internet connections, software, and Maintenance of Traffic.
    c. The Contractor shall coordinate with the MaineDOT TMC no less than 7 days prior to scheduling any equipment or systems testing.
    d. 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.
    e. If MaineDOT decides that any material used in the construction of this project is defective or otherwise unsuitable, the workmanship does not conform to the requirements of the contract, and/or the equipment does not meet the performance specifications required in the Contract Documents, the Contractor shall replace such defective or deficient parts and material at no cost to MaineDOT.
    f. The Contractor shall conduct all tests in the presence of the Resident. Testing shall be scheduled only on weekdays, and subject to approval of MaineDOT.
    g. Completed test results shall be packaged and submitted to MaineDOT within 14 calendar days of test completion. No test phase shall begin until all prior test phases have been completed, and test results have been approved by MaineDOT.
    h. As part of the system and device testing, the Contractor shall provide to MaineDOT a complete set of maintenance and user manuals along with all wiring and assembly schematics and diagrams. This shall including any material safety data sheets (MSDS), prepared by the manufacturer and any toxic substances (coatings, liquids, or other) used. Maintenance information shall include troubleshooting directions, maintenance schedule recommendations, and calibration recommendations/directions. All necessary equipment to complete calibrations shall be included.
    i. The Contractor shall provide any test specific software required to complete the test.
2. Testing Step 1 – Standalone and Subsystem Testing
    a. Standalone testing and Subsystem testing can be completed together for this project.
    b. Standalone testing shall be performed on site at the ITS device or system. The purpose of the Standalone tests is to exercise all in-field functional operations of

the equipment or device as installed. The Contractor shall demonstrate compliance with the requirements for the equipment defined in the specifications during this testing period. If a unit fails to pass the stand-alone test, the Contractor shall correct the problem or replace the part/device/system and retest until satisfactory results are achieved.

c. Subsystem testing shall be performed for ITS devices and systems that are connected to a communication network other than a cellular modem. The purpose of the Subsystem test is to exercise the ITS device or system over the communication network locally, before making a final connection to the required software. If a unit fails to pass the subsystem test, the Contractor shall correct the problem, troubleshoot the communication system, or replace the part/device/system and retest until satisfactory results are achieved.

3. Testing Step 2 – Central Control Testing
    a. Central Control Testing shall be conducted after Standalone and Subsystem testing are deemed to be complete.
    b. Central Control Testing shall be performed at the TMC in Augusta and on non-Compass software. The purpose of the Central Control Test is to exercise all remote functionality and control of all ITS components at a TMC workstation, simulating normal use.
    c. The Contractor shall have a representative at each device location to provide on-site validation of device functionality during Central Control Testing, as required by the Resident or the MaineDOT TMC.
    d. If a device within the system fails to pass the central control test, the Contractor shall correct the problem or replace the part/device/equipment/system and retest until satisfactory results are achieved.
        i. Upon successful completion of the Central Control Test, the Contractor shall request in writing the initiation of the Operational Acceptance Test Period.
4. Testing Step 3 - Operational Acceptance Test Period
    a. An Operational Acceptance Test Period will be required for all ITS components. This test period shall commence upon successful completion of the Central Control Test. The purpose of the Operational Testing Period is to validate consistent system performance during real-life operations.
    b. During the Operational Testing Period, the ITS shall perform as expected by MaineDOT at all times. Any system errors will suspend the testing period.
    c. The Operational Acceptance Test Period shall be 45 days. In the event that there is a single failure associated with any ITS component or data transmission, the test shall be suspended while the Contractor resolves the failure (either by fixing the sensor or replacing the sensor). Upon successful repair/replacement, the test shall continue to the end of the 45 days, or a minimum of ten days, whichever is longer. Upon the failure of any second sensor or equipment, the Operational Test period shall be restarted for an additional 30 days upon each repair/replacement.
    d. It is imperative that the RWIS operational testing be conducted during inclement winter weather. A valid Operational Testing Period shall be defined as occurring between December 1st and April 30th. The Operational Test

should include a minimum of 20 days that occur during that time. If the Operational Test cannot be achieved between December 1st and April 30th, the Supplemental Warranty condition shall apply.

5. The completion of the Operational Test period and the submission of all test reports shall be documented as the date of Final System Acceptance, provided all other work has been completed to the satisfaction of the Resident.

654.06 Guarantees and Warranties:

1. The Contractor shall unconditionally guarantee all system and subsystem modules including all cabinets, equipment, hardware, and software installed to be free of defects.
2. It shall be the Contractor's responsibility to secure all guarantees that are customarily issued by the equipment manufacturers for the specific equipment included in the Contract. The form in which such guarantees are delivered to the Contractor shall include the provision that they are subject to transfer to MaineDOT and shall be accompanied by proper validation of such fact. Transfer of guarantees shall coincide with the Guarantee Period specified below.
3. The length of warranty will be one (1) year from the date of equipment turn-over to MaineDOT for each ITS device. Additionally, the Contractor shall guarantee availability of compatible replacement equipment for a seven-year time period from the same date.
    a. Supplemental Warranty: In the event the Operational Test cannot be completed in accordance with Section 654.05 above, the customary warranty period shall be extended to include a minimum of two (2) winter maintenance periods following System Acceptance. A winter maintenance period shall be considered November 1st to April 30th. For example, if the Operational Test does not include a minimum of 20 days between December 1st and April 30th with System Acceptance occurring in May 2026, the warranty period shall be extended to April 30, 2028.
4. The warranty shall cover all parts, labor, transportation, shipping, tools, equipment mobilization, maintenance of traffic, and incidentals necessary to repair or replace any system component, device, equipment or sensor that fails to perform as required by the Contract Documents.
5. The warranty shall include technical support available via telephone and email 24 hours per day, 7 days per week, 365 days per year for the warranty period.
6. The terms of any equipment warranties stipulated by the equipment manufacturers shall be provided with product data included in the Technical Submittal, specified in Section 654.025. The terms of any equipment manufacturer's warranties will not relieve the Contractor from any of the guarantee requirements of this contract.
7. The Contractor shall be responsible for repair or replacement during the guaranty/warranty period. Repair is defined as all activities that shall be performed for the system to remain in, or return to, operation as observed at the time of installation (by others). Replacement is defined as providing the same or better model of the equipment or device under warranty. The work consists of the repair of defective devices that fail during the normal course of operation, and does not include repairs or

replacements made necessary due to damage resulting from vandalism, traffic accidents, or acts of God.

8. The Contractor shall provide on-site warranty service of the equipment within 48-hours of notification by MaineDOT. If the Contractor is unable to affect a repair to the equipment within seven (7) calendar days of notification, temporary equipment meeting all the original equipment specifications may be requested by MaineDOT and shall be provided and installed at no cost to MaineDOT. The Contractor shall then either fix or replace the broken device or equipment at their discretion.
9. A log of all guarantee work performed by the Contractor during the Guarantee Period shall be maintained by the Contractor. The log shall include, as a minimum, the following information:
    a. Date and time defect reported
    b. Entity reporting the defect
    c. Description of the reported defect
    d. Technician responding to reported defect
    e. Arrival time at the site of the technician
    f. Technician performing defect repair or replacement
    g. Description of observed defect
    h. Corrective actions taken
    i. Model and serial number of any module repaired or replaced
    j. Date and time defect rectified
10. The Contractor shall maintain records, which show the itemized material and equipment cost incurred to provide response maintenance during the guarantee period. These records shall be provided to the TMC within 15 working days of the warranty work. These records will not be used as a Basis of Payment to the Contractor. The Contractor shall assure that these cost records are as complete and accurate as practicable. MaineDOT may perform an audit to verify the accuracy of the cost records.
11. When a guarantee is available on repaired or replacement components, a written and signed guarantee shall accompany the manufacturer's billing invoice. The TMC representative or inspecting agent will sign and retain the original and provide a copy to the maintaining agency and a copy to the manufacturer.
12. If the same component requires repair more than twice during the warranty period, the Contractor shall replace the component rather than provide a third repair at no additional cost to the Department.

654.07 Method of Measurement:

The development and submission of ITS Technical Submittals will not be measured, but shall be considered incidental to the ITS system, device or equipment installed.

Guarantees/Warranties will not be measured, but shall be considered incidental to the ITS system, device or equipment provided.

Configuration and integration of ITS equipment and devices will not be measured, but shall be considered incidental to the equipment being provided.

SPECIAL PROVISION
SECTION 654
INTELLIGENT TRANSPORTATION SYSTEMS
(Road Weather Information Station (RWIS) System Equipment)

Special Provision 654 ITS BASE SPECIFICATION is amended as follows:

654.01 Description

The following paragraphs are added:

This work shall consist of furnishing, installing, integrating and testing a Road Weather Information Station (RWIS) system. This RWIS system shall include multiple weather sensors mounted to a new wood pole.

MaineDOT currently maintains RWIS systems manufactured by Vaisala and Campbell Scientific. Both of these vendor's RWIS systems have previously been integrated into both New England Compass (Compass) and the existing Road and Weather software. MaineDOT will work with SwRI to integrate the RWIS system data into Compass, but the Contractor shall provide RWIS and camera equipment that are compatible with Compass without significant development. The Contractor shall be responsible for the full integration and function of new RWIS data into MaineDOT's Road and Weather software. MaineDOT has an existing contract for the Road and Weather software and will pay any associated licensing fees after the initial six months, subject to the testing requirements.

654.02 General

The following paragraph is added:

654.021 RWIS, General:

The following specifications detail a typical RWIS system as currently deployed in the State of Maine. If any of the following hardware-specific requirements listed in the following sections cannot be met by a willing Bidder, but the Contractor believes that strict conformance to the given requirement is unnecessary or may be accomplished differently, the Contractor shall provide a list of the requirements that cannot be strictly met along with a justification for how the Contractor's proposed RWIS System Equipment may be considered functionally equivalent in accordance with Special Provision 103.

654.025 Materials

The following paragraphs are added:

654.026 RWIS System Equipment – General

1. All software and data interfaces shall be designed to reflect the latest NTCIP and Traffic Management Data Dictionary Standards. Specifically, the system shall support NTCIP 1204 v03.08 protocol.
2. The RWIS System shall include a controller (controller or Data Logger) that shall satisfy the following requirements:
   a. The controller shall have a modern processor, manufactured within the previous 12 months.
   b. The controller shall have internal/integral Ethernet communications and support direct Ethernet connections.
   c. The controller shall provide a means for real-time clock synchronization and location definition at least once daily.
   d. If the controller has remote access capability for local maintenance purposes (WLAN, WiFi, Bluetooth or equivalent), this feature shall be turned off or disabled.
   e. The controller shall keep records and show calibration history of the attached sensors.
   f. The controller shall operate in the temperature range of -34°F to +150°F.

3. The RWIS System Equipment shall include a Sensor Interface and Power Management system that shall satisfy the following requirements:
   a. All sensor connectors shall be MIL-SPEC circular connectors rated to IP66/IP68.
   b. The controller shall include Ethernet interfaces for sensor and peripheral connections including at least two spare ports.
   c. Ethernet connections shall support Power over Ethernet (PoE) functionality.
   d. The controller shall have serial interfaces for sensor and peripheral connections without extension modules including at least two spare ports.
   e. The controller shall have centralized bus-bar for sensor grounding. The bus-bar shall be copper.
   f. Sensor cables shall be connected to bus-bar for grounding.
   g. The controller shall have built-in surge arrestors that shall be field replaceable.
   h. Where indicated on the Plans, the controller shall have the capability to operate with solar power technology (direct current).
   i. Where indicated on the Plans, the controller shall have a battery charger.

4. The RWIS System shall include a Power Supply that shall satisfy the following basic requirements:
   a. Where public utility power is provided, the Power Supply shall withstand an alternating current (AC) range of 89VAC to 135VAC
   b. Power shall have in-built surge protection against transients.
   c. Power shall be at least 240W to ensure sensor heating under all conditions.
   d. Power supply shall have stable output of ±1 percent.
   e. Power supply shall allow parallel connection when additional power is required.

5. The AC Supply shall satisfy the following requirements:
   a. The controller AC supply shall have surge protection level at least 6kV/3kA. Surge protection units shall be field replaceable.
   b. AC Supply shall include a main disconnect circuit breaker for maintenance purposes.
   c. Where AC power systems are employed, the RWIS System shall include a Battery Back-Up that shall satisfy the following requirements:
      i. The battery back-up system shall provide sufficient power for all RWIS system components for a minimum of 24 hours at full function (excluding any sensor heaters or cabinet heater) in the absence of AC power.
      ii. At the end of the initial 24 hours without AC power, the battery back-up system shall provide sufficient power for critical sensors and heaters (as defined by the manufacturer) for an additional 24 hours. This low power or survival mode may include less frequent polling of the sensor data but not less than once every ten (10) minutes.
      iii. At the end of 48 hours without AC power, the battery back-up system shall not have discharged more than 50 percent of the rated capacity of the battery back-up system.
      iv. Back-up batteries shall be sealed and spill proof and shall be considered maintenance-free.
      v. Batteries shall be capable of charging at temperatures from -34°F to +150°F without damage and without degradation of the charging life.
      vi. The battery back-up system shall be Ethernet ready with the capability to be monitored remotely.
      vii. The Contractor shall submit for approval a Technical Submittal calculation for the battery back-up system that demonstrates compliance with the required hold-up time of the back-up system. This calculation shall include the manufacturer's specified loads for each sensor, the controller, and other pieces of equipment to be powered during the full function period and the low power/survival mode period. The battery calculation shall be measured from 0°F. The Technical Submittal shall be submitted in accordance with Special Provision 654.

6. The RWIS System Equipment shall include a communications system that shall satisfy the following requirements:

   a. The controller shall support at least two parallel communication lines out from the station, with one communication line being a cellular modem.
   b. The controller shall be native Ethernet, allowing Ethernet communications via cellular modem.
   c. The controller shall support cellular communication with modern networks: 4G/LTE/5G. See 654.031.3 for additional details.
   d. The controller cellular communication shall support dual SIM usage for data transmission purposes.
   e. The controller shall support an RJ-45 port.

f. Where the controller includes a WLAN for local remote access, the controller shall have user definable time-out for WLAN broadcasting to prevent unintentional use of WLAN.
   i. The controller WLAN shall have the ability to be used as a hotspot.
   ii. The controller WLAN shall have the ability to be used as a client.
g. The controller shall have two Ethernet networks: one for internal communications and second for external communications.
h. The controller's internal network shall be Ethernet based with the capability of being monitored remotely.

7. The controller shall include a cabinet enclosure that shall satisfy the following requirements:

   a. The controller enclosure shall not have external connectors for sensors and other equipment.
   b. All entries to the controller enclosure shall be completely encased in conduit with appropriate bushings to prevent insect and moisture entry. The sensor cable inlets shall be vandal-proof.
   c. The controller enclosure material shall be made of bare aluminum or stainless steel.
   d. The controller enclosure shall be equal to IP66 or NEMA 4 or NEMA 4X rating.
   e. The controller enclosure door shall have wind lock mechanism to maintain the door in an open position during maintenance.

8. The RWIS System shall include a lightning dissipater that shall satisfy the following requirements:
   a. The Contractor shall furnish a lightning dissipater consisting of a series of at least four spot dissipaters in a candelabra arrangement with a single mounting assembly.
   b. The lightning dissipater system shall include surge suppressor devices of the type recommended by the lightning dissipater manufacturer and shall properly interface with the pole mounted dissipater, and the size and type of cables used for communication and control of any installed equipment.
   c. The lightning dissipater shall be attached to the pole using manufacturer-recommended clamps. These clamps shall rigidly hold the lightning dissipater to the support pole in winds up to 100 mph.
   d. The lightning dissipater and its mounting structure shall not interfere with the operation of any other sensors and shall avoid sight line obstruction of the CCTV equipment.

654.027 RWIS System Sensors: The Contractor shall furnish, install, integrate and test environmental and weather sensors that shall measure several environmental characteristics. The following sensor equipment shall be included:

- Wind Speed and Direction Sensor
- Visibility Sensor

- Precipitation and Accumulation Sensor
- Present Weather Detector (may include visibility, precipitation and accumulation sensors if the single combination sensor can meet the functional requirements for each of the individual sensors)
- Air Temperature and Humidity Sensor
- Barometric Pressure Sensor
- Road Surface Sensors (Non-Invasive, Pavement Surface Condition Sensor and Subsurface Probe)
- Closed Circuit Television (CCTV) Camera

1. Wind Speed and Direction Sensor
    a. The sensor shall measure both wind speed and wind direction.
    b. The sensor shall be weather resistant and have an operational temperature of -40°F to +140°F.
    c. The sensor shall fully compensate for the effect of temperature, humidity and pressure.
    d. If a mechanical wind sensor is provided, the sensor shall be black to take advantage of thermal warming from the sun and have an ice resistant coating applied to all external surfaces.
    e. Measurement Parameters:
        i. The wind speed sensor shall have a measurement range of 0 to 150 miles per hour (mph).
        ii. Wind speed shall be user selectable in units of miles per hour (mph) and meters per second (mps).
        iii. Wind speed resolution shall be to the whole integer for the selected unit (i.e. 5 mph or 3 mps) and accuracy shall be within one (1) percent of actual.
        iv. Wind direction shall be measured in degrees. Wind direction resolution shall be +/- 3 degrees.
        v. Wind speed and direction shall be reported as instantaneous value and rolling average value to a customized average time.
        vi. Wind speed and direction minimum and maximum values shall be available over a customized time period (i.e. 10 minutes).
        vii. Wind speed shall be available as 3-second gust values.

2. Visibility Sensor (or visibility function of Present Weather Sensor)
    a. The visibility sensor may be integrated into a combination sensor unit that operates as a Present Weather Detector. If they are separate units, the visibility sensor shall meet the requirements of parts b. through g. below.
    b. The sensor shall have a measurement range of up to 10 miles with an accuracy of +/- 10 percent.
    c. The sensor shall utilize back scatter optical technology.
    d. The sensor shall have an operational temperature range of -40°F to +131°F.

e. The sensor shall have an operating humidity range of 0-100 percent relative humidity.
f. The sensor shall be IP66 rated.
g. The sensor shall be capable of accurate visibility measurement through the following weather conditions:
    1. Clear visibility
    2. Fog
    3. Mist
    4. Haze (from smoke or other particulates)
    5. Rain
    6. Freezing rain
    7. Snow

3. Precipitation and Accumulation Detector (or precipitation function of Present Weather Sensor)
    a. The precipitation detector should be provided as an independent sensor. The Contractor may propose a combination sensor unit that operates as a Present Weather Detector with precipitation detector, subject to MaineDOT approval.
    b. The precipitation sensor shall meet the requirements of c. below, regardless whether it is part of a Present Weather Sensor or if it is a stand-alone sensor.
    c. Measurement Parameters:
        i. The sensor shall detect the types of precipitation as defined by NTCIP 1204:
        ii. The sensor shall be capable of measuring rain precipitation accumulation rate to an accuracy of 0.05 inches per hour measured over a 10 minute time period. This accuracy shall be met under Maine field conditions.
        iii. The sensor shall be capable of measuring snow accumulation and amount of new snow since previous readings. Snow accumulation sensitivity shall be at least 0.5 inches per hour with an accuracy of +/- 10 percent. This accuracy shall be met under Maine field conditions.

4. Present Weather Detector
    a. If a Present Weather Detector is provided to provide the functionality of the Visibility, Precipitation and Accumulation Detector, it shall be mounted according to the manufacturer's recommendations, with consideration paid to mounting height, north-facing directionality, and obstruction of other sensors.
    b. The Present Weather Detector submittal shall include a testing plan that identifies how all of the functionality will be tested to meet or exceed the performance specifications listed for visibility, precipitation, and accumulation. This testing shall be conducted after installation during Maine winter field conditions (December-March). The test plan quality

will be a factor in determining if the proposed Present Weather Detector is an acceptable product.

5. Air Temperature and Humidity Sensor
    a. The sensor shall contain a radiation shield to protect the sensor from solar radiation influence and from precipitation. The radiation shield shall contain no moving parts.
    b. The sensor shall combine air temperature detector (AT), relative humidity detector (RH), and dew point detector (DP) into a single unit. Alternatively, dew point may be calculated by the controller or via the Road and Weather software.
    c. The sensor shall have integral surge protection.
    d. The sensor shall be IP66 rated.
    e. The AT detector shall have an operational range of -40°F to +140°F.
    f. The RH detector shall have an operational range of 0-100 percent RH.
    g. Measurement Parameters:
        i. AT detector shall provide instantaneous and rolling one minute average values. The AT detector shall hold the previous five observations.
        ii. AT detector shall have rolling 24-hour minimum and maximum temperature values.
        iii. AT detector shall have an accuracy of 0.5°F over the range of 0°F to +100°F.
        iv. RH detector shall provide rolling one minute average values from the previous six observations.
        v. RH detector shall have an accuracy of two (2) percent and shall be reported to the nearest 0.1 percent (i.e. 90.8%).
        vi. RH detectors shall provide a means (either directly or via software) to measure dew point temperature and frost point temperature.
        vii. RH detector shall provide active measurements that maintain accuracy within 2% in condensing conditions.

6. Barometric Pressure Sensor
    a. The sensor shall be a silicon capacitive absolute pressure sensor designed for barometric pressure measurement.
    b. Measurement Parameters:
        i. The barometric pressure sensor shall conduct readings every 5 seconds and report the instantaneous readings.
        ii. The barometric pressure sensor shall measure in units of inches of mercury (Hg).
        iii. The barometric pressure sensor shall have an operational range of 18.0-31.0 inches Hg with a resolution of 0.03 inches Hg.
        iv. The barometric pressure sensor shall have an accuracy of +/- 0.12 inches Hg over the temperature range of 0°F to +140°F.

7. Non-Invasive Pavement Sensors

a. There shall be sensors that can measure the pavement surface temperature, ambient air temperature, relative humidity, pavement surface state, and friction coefficient remotely, without penetrating the roadway. The non-invasive sensors shall be OTT NIRS, Viasala DSC/DST, or equivalent.
b. If a pavement sensor cannot meet the accuracy requirements for all of the measurements in part a., additional supplemental sensors shall be furnished and installed to meet the accuracy requirements.
c. Any other non-invasive sensors shall have no moving parts.
d. Non-invasive sensors shall collect data samples from the road surface in accordance with the performance standards established in this specification.
e. The data generated by the non-invasive sensors shall be compatible with the current Road and Weather software currently in operation within the MaineDOT license for New England Compass ATMS.
f. Measurement Parameters:
    i. The pavement surface state sensor shall have an operational range of -40°F to +140°F and 0-100 percent RH.
    ii. The pavement surface state sensor shall be capable of remote readings at the range of 6.5 feet to 48 feet.
    iii. The pavement surface state sensor shall identify the condition of the pavement remotely with the following surface states:
        1. Dry
        2. Moist
        3. Wet
        4. Snow/Frost
        5. Ice
        6. Slush
    iv. The pavement surface state sensor shall measure the depth of precipitation on the pavement surface as shown below, all at a resolution of 0.01 millimeters:
        1. Water/Rain at 0.0 - 2.0 millimeters
        2. Ice at 0.0 – 2.0 millimeters
        3. Snow at 0.0 to 10.0 millimeters
    v. The pavement surface temperature sensor shall measure the pavement surface temperature every 60 seconds and have a resolution of 0.5°F.
    vi. The pavement surface friction sensor shall estimate the friction coefficient (grip factor) at the range 0.01 to 1.00 at a resolution of 0.01 units.

8. Subsurface Probe
    a. The sensor shall be a probe specifically designed for outdoor use.
    b. The sensor shall measure air, soil, and water temperature.
    c. The sensor probe shall be water-tight and weather-resistant.
    d. The sensor probe shall have an operational range of -40°F to +140°F.
    e. Measurement Parameters:

i. Subsurface temperature shall have an accuracy of +/- 1°F with a resolution of 0.5°F.

9. Pavement Surface Condition Sensor (where required by the Plans)
    a. The sensor shall be specifically designed for pavement surface temperature, surface wetness and surface salinity measurement.
    b. The sensor shall be water-tight and weather-resistant.
    c. The sensor shall have an operational range of -40°F to +160°F.
    d. The sensor shall be able to detect and measure surface salinity (chlorides).
    e. The sensor shall be able to measure the following pavement surface states:
        i. Dry
        ii. Wet
        iii. Wet - Chemical
        iv. Snowy
        v. Icy
    f. The sensor shall be able to measure surface wetness to a minimum of 0.25 inches.
    g. Measurement Parameters:
        i. Temperature reading shall have an accuracy of +/- 1°F with a resolution of 0.5°F.
        ii. Water layer thickness reading shall have an accuracy of +/- 0.05 inches with a resolution of 0.01 inches.
    h. The sensor shall be hardwire cabled per manufacturer recommendations.

654.028 Closed Circuit Television (CCTV) Camera System: The Contractor shall furnish, install, integrate and test a digital closed circuit television (CCTV) camera at the RWIS System location that shall provide streaming video adjacent to the RWIS system. The CCTV camera shall be connected to the controller and shall be remotely controlled via the RWIS communication system.

1. The CCTV camera shall be digital, IP addressable and Ethernet ready.
2. The CCTV camera shall be Underwriter's Laboratory (UL) approved. The UL certification shall be provided with the technical submittal.
3. The CCTV shall have the capability to be viewed, controlled and tested locally at the controller utilizing a laptop computer with the manufacturer's software. This shall include the capability to locally retrieve operational status and fault data for the camera.
4. The CCTV shall have a minimum resolution of HDTV 800 x 600.
5. The CCTV shall be capable of streaming video with H.264 and/or Motion JPEG video compression format.
6. The CCTV shall be capable of time triggered FTP.
7. The CCTV shall be powered by an industrial grade Power Over Ethernet Injector (POEI). The POEI shall provide operating power and Ethernet data to the CCTV.
8. The CCTV shall be housed in an environmentally hardened enclosure suitable for continuous outdoor use. The CCTV shall have an operating range of -40°F to +100°F, minimum.

9. The CCTV housing shall be IP66-rated.

654.03 Construction

The following paragraphs are added:

654.031 RWIS System Construction Requirements

The Contractor shall install the RWIS system equipment in accordance with the Plans. The Contractor shall be responsible for all other work to provide a fully functional, operational, and integrated RWIS system at the locations identified in the Plans.

The Contractor shall install, configure, integrate, and test the RWIS System data into the Compass ATMS and its Road and Weather software. The RWIS System Equipment shall continuously measure and record RWIS System data. The system data shall be available to MaineDOT in the Compass ATMS mapping feature and other related internal programs.

1. Power Requirements
    a. Each RWIS location shall be supplied with adequate power to meet the site and sensor design loads.
    b. Where AC power is provided by others, the Contractor shall coordinate the power connections at the meter and disconnect.

2. Grounding System Requirements
    a. All RWIS sites shall be grounded to a minimum of 25 ohms to ground. If other national, state, or local grounding requirements are more stringent than those of the manufacturer, the applicable national, state, or local code shall apply. All metallic enclosures, lightning arrestors, and instrument mounting brackets shall be bonded to this system.
    b. The Contractor shall install solid copper or copper clad ground rod (minimum ¾-inch x 10-foot) along with #4 AWG ground wire and fittings at the base of the RWIS equipment pole. The Contractor shall install additional ground rods required to meet the minimum grounding requirement.
    c. The ground wire shall be exothermically welded to each ground rod installed with all ground rods attached to every other ground rod via the ground wire.
    d. The RWIS grounding system shall be bonded to the controller enclosure bus-bar and the steel support structure in accordance with National Electric Code (NEC) requirements.
    e. The lightning dissipater shall be offset from the support pole and provide protection for the site above any installed equipment without interfering with the functionality of any equipment or sensors.

3. Communication Requirements

a. The Contractor shall furnish and install a cellular modem compatible with the RWIS system and with the MaineDOT communications system.
b. The communication system shall support 4G/LTE and shall be configurable to support 5G if available.
c. The modem shall be able to support US Cellular, Verizon, and AT&T service plans. Switching between the three may be achievable with firmware updates.
d. The RWIS system shall transmit weather sensor data to Compass and MaineDOT's Road and Weather software currently in operation.
e. The Contractor shall provide all necessary equipment, cables, hardware, and ancillary equipment to capture the RWIS sensor data and transmit the data to Compass and to the Road and Weather software at the MaineDOT TMC.
f. The communication system shall allow for configuration control and trouble-shooting of the RWIS equipment through both a local onsite connection and through a remote connection to the controller.
g. The Contractor shall complete and submit to the Resident a cellular coverage analysis prior to installing any RWIS equipment to determine the signal strength, coverage quality and network reliability at each RWIS location. The Contractor shall provide at a minimum the following results for each RWIS location based on the cellular coverage analysis:
    i. Reference Signal Received Power (RSRP)
    ii. Reference Signal Received Quality (RSRQ)
    iii. Signal to Noise Ratio (SINR)
    iv. Upload Speed in Mbps
    v. Download Speed in Mbps

4. Pavement Sensor Installation
    a. The Contractor shall install the pavement surface sensor in accordance with the manufacturer's recommendations. The pavement surface sensor shall be installed flush with the pavement surface.
    b. The Contractor shall sawcut the pavement at the width recommended by the manufacturer, and shall install the cable from the controller to the installation location of the pavement surface sensor as shown in the Contract Documents.
    c. The sawcut shall be backfilled with a sealant that is included in the MaineDOT Qualified Products List.
    d. The sawcut shall be laid out with angles of no greater than 45 degrees.
    e. Where the sawcut ends at the pavement edge, the cable shall be encased in a conduit system. Cable shall be continuously contained in a sawcut with sealant or a conduit system.
    f. The sensor cable from below ground to the controller shall be protected when mounted to the RWIS support pole.

5. Software and Integration Requirements
    a. All RWIS, including CCTVs, shall be fully compatible with New England Compass. MaineDOT will be responsible for integration.

b. All RWIS, including CCTVs, shall be fully integrated into MaineDOT's Road and Weather Software.
c. CCTVs shall be integrated into Axis Camera Station if hardwire communications is provided.
d. Specific Integration Requirements are identified in Special Provision Section 654 (ITS base specification), 654.04, Software and Integration Requirements.

6. Sawing Bituminous Pavement
   a. Sawcutting bituminous pavement shall be with a power-driven saw with an abrasive blade of sufficient width to provide the required cuts.
   b. The sawcut shall be vertical and not exceed two inch depth.
   c. Debris from the sawing operation shall be removed and disposed of by the Contractor before reopening the roadway to traffic.

7. System Testing
   a. All RWIS shall pass Standalone Testing, Subsystem Testing, Central control Testing, and Operational Testing prior to work being deemed complete.
   b. Specific System Testing Requirements are identified in Special Provision Section 654 (ITS base specification), 654.05, Testing Requirements.
   c. Failure of the Present Weather Detector to strictly meet the performance standards for the component sensors (visibility, precipitation, and accumulation) shall be grounds for equipment rejection after installation. It shall then be the Contractor's responsibility to replace the combined sensor with individual sensors that can meet the performance requirements. Replacement of the Present Weather Detector with component sensors shall be accomplished at no additional cost to MaineDOT.

8. Training
   a. If the Contractor provides new RWIS equipment or RWIS equipment from a manufacturer that offers maintenance certification, the Contractor shall provide a maintenance and calibration training program.
   b. The training shall be scheduled after Stand-Alone Testing but prior to the end of the Operational Testing period.
   c. The Contractor shall provide qualified instructors familiar with the operation of the equipment to conduct the training. Training shall consist of hands-on demonstrations as feasible. If applicable, the training shall result in certification.
   d. The Contractor shall develop and supply all necessary manuals, displays, class notes, visual aids, and other instructional materials as required to conduct the training program. The Contractor shall supply sufficient materials for up to 10 participants, plus one spare copy of all materials.
   e. Training will be conducted at the MaineDOT Region 2 Office in Augusta, Maine. The Contractor shall coordinate a specific classroom facility with the Resident at least three weeks prior to the training date.

f. The training session shall be no longer than one day and shall accommodate up to 10 people.

654.07 Method of Measurement

The following paragraphs are added:

Road Weather Information Station (RWIS) equipment will be measured for payment by the lump sum complete in place per site, satisfactorily installed, tested, operational, and accepted.

654.08 Basis of Payment:

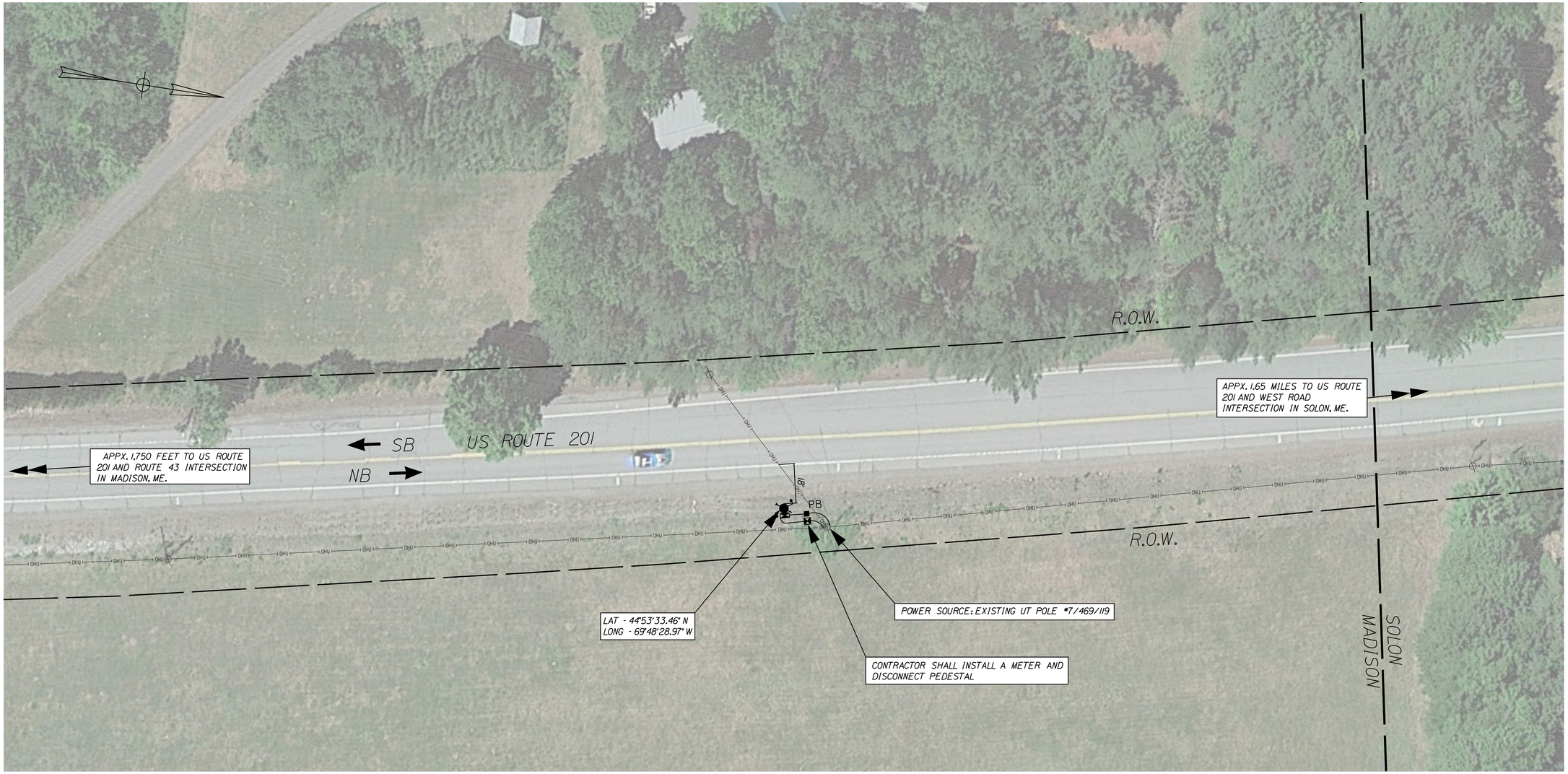
Road Weather Information Station (RWIS) equipment will be paid for at the contract lump sum price for each location. Such price will be full compensation for furnishing and installing all materials, including but not limited to the sensors; CCTV camera; controller and enclosure cabinets with all internal hardware; communication equipment; grounding; lightning dissipater; sawcutting pavement; integration and software modifications; system testing; training; warranties and guaranties; and all appurtenances and incidentals required for a complete and functional installation and for furnishing all assembly hardware, tools, labor, and testing necessary for completing the installation.

Connection to the electrical power service will be paid for in accordance with Special Provision 654 Electrical Service Connection.

Wood poles for mounting the RWIS equipment will be paid for in accordance with Special Provision 643 Wood Pole.

Payment will be made under the following:

Pay Item		Pay Unit
654.53	Road Weather Information Station	Lump Sum



* - RIGHT-OF-WAY INFORMATION FROM STATE PROJECT 993 SHEET 6 - APRIL 1952

LIST OF MAJOR ITEMS

ITEM NO.	EQUIPMENT AND WORK ITEMS	QUANTITY
626.11	PRECAST CONCRETE JUNCTION BOX	1 EA
626.21	METALLIC CONDUIT (2-INCH)	25 LF
626.21	METALLIC CONDUIT (3-INCH)	15 LF
626.22	NON-METALLIC CONDUIT (2-INCH)	20 LF
626.22	NON-METALLIC CONDUIT (3-INCH)	30 LF
643.972	WOOD POLE	1 EA
654.51	ELECTRICAL SERVICE CONNECTION: MADISON	1 LS
654.53	ROAD WEATHER INFORMATION SYSTEM: MADISON	1 LS

2

NOTES

1. THE CONTRACTOR SHALL INSTALL THE SUBSURFACE PROBE PER THE MANUFACTURER'S RECOMMENDATIONS.
2. THE CONTRACTOR SHALL PROVIDE A METAL CONDUIT RISER ON THE EXISTING UTILITY POLE FOR SECONDARY POWER SERVICE CONNECTION THAT EXTENDS A MINIMUM OF 7' ABOVE GRADE.
3. THE CONTRACTOR SHALL PROVIDE A SECOND METAL CONDUIT RISER ON THE EXISTING UTILITY POLE FOR FUTURE COMMUNICATION CONNECTION.

25 0 25 50
1" = 25'-0"

STATE OF MAINE
DEPARTMENT OF TRANSPORTATION

PROJECT NO. 2614000 & 2711200

WIN
026140.00 & 027112.00

ITS PLANS

vhb

	J. DOSTIE	BY	DATE
PROJ. MANAGER			
DESIGN-DETAILED	DJS	DJS	05/2025
CHECKED-REVIEWED	DJS	MDS	05/2025
DESIGN2-DETAILED2			
DESIGN3-DETAILED3			
REVISIONS 1			
REVISIONS 2			
REVISIONS 3			
REVISIONS 4			
FIELD CHANGES			

STATEWIDE
RWIS INSTALLATIONS

RWIS - MADISON
SITE PLAN

SHEET NUMBER
16
OF 26

Username: dschandel Date:9/2/2025
Division: HIGHWAY
Filename: 016_Solon_RWIS_01.dgn