



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

Janet T. Mills  
GOVERNOR

Bruce A. Van Note  
COMMISSIONER

May 1, 2023  
Subject: Replacement of Road Weather  
Information Systems  
State WIN: 024211.00  
Location: **Statewide**  
**Amendment No. 2**

Dear Sir/Ms.:

Please make the following changes to the Bid Documents:

In the Bid Book:

**INSERT** with the attached page titled SPECIAL PROVISION SECTION 105 GENERAL SCOPE OF WORK [Cooperation Between Contractors] dated May 1, 2023, totaling 1 page.

**REMOVE** pages 65-77 titled SPECIAL PROVISION SECTION 654 INTELLIGENT TRANSPORTATION SYSTEMS [Road Weather Information System (RWIS) Equipment] dated April 4, 2023, totaling 13 pages and **REPLACE** with the attached SPECIAL PROVISION SECTION 654 INTELLIGENT TRANSPORTATION SYSTEMS [Road Weather Information System (RWIS) Equipment] dated April 28, 2023, totaling 14 pages.

In the Plan set:

**REMOVE** Sheet Number 2 of 7 titled GENERAL NOTES and **REPLACE** with the attached, revised Sheet Number 2 of 7 titled GENERAL NOTES.

**REMOVE** Sheet Number 4 of 7 titled DETAILS and **REPLACE** with the attached, revised Sheet Number 4 titled DETAILS.

**REMOVE** Sheet Number 7 of 7 titled PROSPECT SITE PLAN and **REPLACE** with the attached, revised Sheet Number 7 of 7 titled PROSPECT SITE PLAN.

The following questions have been received:

**Question:** What camera is preferred by the state?

**Response:** MaineDOT is willing to accept any camera model that meets the specifications in the contract documents.

**Question:** What cell router is preferred by the state?

**Response:** MaineDOT is willing to accept any cell router that meets the specifications in the contract documents, provided it is compatible with US Cellular.

**Question:** For section 4 of 654.031 RWIS Construction requirements (Software and Integration Requirements) section e - the RWIS alerts. Does the email come from the Road and Weather software? Is the request to have an additional software quoted that can provide the required alerts?

**Response:** The email alert is intended to come from a current MaineDOT Road and Weather software. No additional software is expected.

**Question:** Sheet 7 - Prospect RWIS location. Existing wood pole is too far from site to accommodate any manufacturer's non-invasive sensor. Will a secondary pole be installed here closer to the pavement? And where would this be located?

**Response:** The non-invasive pavement sensor is being excluded from the Prospect location. Instead, the plan and specification has been modified to include a pavement surface condition sensor for the Prospect location. See the replacement Special Provision 654.53 (Road Weather Information System (RWIS) Equipment) and the modifications to Plan Sheets 4 of 7 and 7 of 7.

**Question:** Sheet 2 - Mobile RWIS question 4. Mobile RWIS shall be integrated. Main proposal contradicts this. Says a 3rd party software may be used.

**Response:** Plan Sheet 2, Mobile RWIS Note 4 indicates that the Mobile RWIS data shall be integrated into the Road and Weather software. In accordance with Special Provision 654.54, the Mobile RWIS data shall be transmitted in near real time to at least one of the MaineDOT's existing Road and Weather software programs. MaineDOT expects the Contractor to integrate with the MaineDOT's existing software programs. Only if the Contractor has proven to MaineDOT's satisfaction that the Contractor is unable to integrate with at least one of MaineDOT's existing Road and Weather software programs will MaineDOT consider a functionally equivalent software to be proposed by the Contractor. MaineDOT is not required to accept any alternative software that MaineDOT determines is not functionally equivalent.

**Question:** Would a sensor measuring distance of 6 to 33 ft be acceptable for the non-invasive pavement sensor range specification, provided all other specifications can be met?

**Response:** The non-invasive pavement sensor shall meet the specifications given in the Contract Documents. If the Contractor believes that they have a sensor that is functionally equivalent, the Contractor may submit their alternative product for MaineDOT review. MaineDOT is not required to accept a product that does not strictly meet the requirements.

**Question:** Can MaineDOT please clarify how the installation should be priced?

1) Assuming the Contractor must complete the installation of the mobile units

or

2) assuming Maine will install, and any cost for the contractor to assist on-site would be negotiated post award?

**Response:** The Contractor should price the Mobile RWIS installations as though the Contractor is fully responsible for the installation of all five of the Mobile RWIS sensors. Special Provision 654.54, Section 654.031 is intended to require the Contractor to be on-site and install the Mobile RWIS sensors to the mobile platform in the presence of MaineDOT personnel. The MaineDOT personnel may elect to install one or more sensors with the Contractor providing on-site consultation and support.

**Question:** For either scenario (Contract install or support to Maine for the mobile RWIS). Will all 5 vehicles to be outfitted be brought to the same location, to limit the amount of contractor mobilizations required? If so can MaineDOT advise of the location?

**Response:** The five vehicles can be brought to the Region 2 office in Augusta, Maine for Mobile RWIS installation.

**Question:** Can Maine confirm what type of vehicle (truck, plow etc) the mobile sensors will be mounted on? To provide a reference for install complexity.

**Response:** The intent is for the equipment to be mounted to a Supervisor's vehicle, which is a pick-up truck.

**Question:** Central Control Testing - Can Maine confirm that this testing will be completed by MaineDOT personnel? As software access would be required to be granted to the contractor to verify/perform this testing, something that MaineDOT IT personnel have rejected in the past.

**Response:** Yes, MaineDOT will conduct the Central Control Testing, with consultation and supervision by the Contractor's representative. In accordance with Special Provision 654.04, Section 1.g.iii, the Contractor shall provide an on-site representative at the device locations to provide on-site verification.

**Question:** Can MaineDOT please clarify what the 80 hours of hand labor are meant to provide or cover within the scope of work?

**Response:** Item 629.05 Hand Labor, Straight Time is intended to be used for the Contractor's on-site support of the Mobile RWIS installations. See response above for additional detail about the Contractor's on-site support.

**Question:** Paragraph 654.031 of the Mobile Road Weather Information System (RWIS) Equipment specification states that "The contractor shall be responsible for installing the mobile RWIS sensors to the mobile platform unless MaineDOT agrees to do so with consultation and support from the contractor". Note 2 on Sheet 2 of 7 states that "The contractor shall be available for consultation and support to MaineDOT for the installation of the mobile RWIS systems". This statement implies that MaineDOT will be performing the mobile RWIS sensor installation. Please clarify which entity, either MaineDOT or the contractor, performs the actual installation of the mobile RWIS sensors to the mobile platform

**Response:** The intent of the special provision is that MaineDOT will be responsible for installation of the Mobile RWIS mounting brackets that are supplied by the Contractor. The Contractor is wholly responsible for the actual installation of the Mobile RWIS sensors to the mobile platform. MaineDOT reserves the right, at our sole discretion, to perform the installation of one or more Mobile RWIS sensors to the mobile platform(s) with consultation, support and all mounting brackets, hardware, wiring and ancillary hardware necessary for the installation provided by the Contractor. See modification to Mobile RWIS Note 2 on Plan Sheet 2 of 7 to clarify the intent.

Consider these changes and information prior to submitting your bid on **May 3, 2023**.

Sincerely,



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

SPECIAL PROVISION  
SECTION 105  
GENERAL SCOPE OF WORK  
(Cooperation Between Contractors)

It is hereby brought to the RWIS Systems Contractor's attention that the Department plans to advertise and award the following project immediately adjacent to the RWIS Systems Prospect location:

Slope Stabilization project in Prospect, located 0.20 of a mile northerly of Switzer Spring Road, WIN 022966.00.

Project Manager: Doug Coombs, MaineDOT Highway Program  
Phone: 207-215-4051 (cell)  
Email: douglas.coombs@maine.gov

The Slope Stabilization project is anticipated to be under construction from August 2023 to November 2023. Northbound U.S. Route 1 traffic will be detoured onto the scenic turnout area as a part of this project. RWIS Systems will need to be accessed off the edge of pavement during the detour.

The RWIS Systems Contractor shall cooperate with the other Slope Stabilization Contractors. The RWIS Systems Contractor shall provide project access as necessary for other Department work as directed by the Resident.

The RWIS Systems Contractor shall coordinate all activities including traffic control with Project WIN 22966.00 to ensure safe travel for motorists. This shall be specifically addressed within the RWIS Systems Contractor's Traffic Control Plan (TCP). If conflicts arise in scheduling of intended construction traffic control measures for the RWIS Systems and Slope Stabilization projects, the needs of the Slope Stabilization project schedule will govern as deemed acceptable by the Resident.

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

**654.53 Road Weather Information Station:** This work shall consist of removing all existing weather sensors, cabinets, and other mounting hardware off of existing support structures (steel or wood). This work shall also include furnishing, installing, configuring, integrating, and testing a Road Weather Information System (RWIS). This RWIS shall include multiple weather sensors mounted to an existing steel structure or wood pole.

RWIS data shall be integrated into the Maine Department of Transportation (MaineDOT's) existing Road and Weather software as part of this project and transmit data from the field to the software in near real-time. MaineDOT uses both Wx Horizon and WSP for the Road and Weather software.

MaineDOT maintains RWIS manufactured by Vaisala and Campbell Scientific. Each vendor's RWIS is integrated into the MaineDOT's Advanced Transportation Management System (ATMS), New England Compass, as well as the existing Road and Weather software. The contact for New England Compass is David Garcia with the Southwest Research Institute (SWRI).

Integration into MaineDOT's Road and Weather software shall be the responsibility of the Contractor. MaineDOT has contracts for the Road and Weather software and will pay any associated licensing fees after the initial six months following System Acceptance.

**654.021 General:** The following specifications detail a typical RWIS as deployed in the State of Maine. If any of the following 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 Equipment may be considered functionally equivalent in accordance with Special Provision 103.

654.026 RWIS 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 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 sufficient memory to perform all tasks in this specification and to store a minimum of 30 consecutive days of diagnostic and site data.
  - c. The controller shall have internal/integral Ethernet communications and support direct Ethernet connections.
  - d. The controller shall provide a means for real-time clock synchronization and location definition at least once daily.
  - e. The controller shall have remote access capability for local maintenance purposes (WLAN, Wi-Fi, Bluetooth or equivalent).
  - f. The controller shall operate in the temperature range of -34°F to +150°F.
3. The RWIS Equipment shall include a Sensor Interface and Power Management system that shall satisfy the following requirements:
  - a. All sensor connectors shall be rated to IP66/IP68 or approved functional equivalent.
  - b. The controller shall include Ethernet interfaces for sensor and peripheral connections including at least two spare ports.
  - c. The controller shall have serial interfaces for sensor and peripheral connections including at least two spare ports.
  - d. The controller shall have centralized bus-bar for sensor grounding. The bus-bar shall be copper.
  - e. Sensor cables shall be connected to bus-bar for grounding.
  - f. The controller shall have surge arrestors that shall be field replaceable.
  - g. Where indicated on the Plans, the controller shall have the capability to operate with solar power technology (direct current).
  - h. Where indicated on the Plans, the controller shall have a battery charger.
4. The RWIS 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  $\pm 1$  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 shall include a battery backup that shall satisfy the following requirements:
    - i. The battery backup system shall provide sufficient power for all RWIS components for a minimum of 24 hours at full function in the absence of AC power. If sensors with heaters are provided, the heaters do not need to be functional for periods when AC power is unavailable.
    - ii. After an initial 24 hours without AC power, the battery backup system shall provide sufficient power for critical sensors (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 10 minutes.
    - iii. After 48 hours without AC power, the battery backup system shall not have discharged more than 50 percent of the rated capacity of the backup system.
    - iv. Backup batteries shall be sealed, spill-proof, and considered maintenance-free.
    - v. The battery backup system shall be Ethernet ready. The Contractor shall furnish and install an Ethernet patch cord to connect the battery-backup system to the Ethernet switch in the controller cabinet.
    - vi. The Contractor shall submit for approval a Technical Submittal calculation for the battery backup system that demonstrates compliance with the required hold-up time of the backup 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. Battery calculation shall be measured from 0°F. The Technical Submittal shall be in accordance with Special Provision 654.
6. The controller shall have a cabinet enclosure satisfying the following requirements:
- a. The controller enclosure shall not have external connectors for sensors and other equipment, which may cause excessive amount of corrosion and malfunctions.
  - 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-resistant and shall require mechanical tools to remove any bushings
  - c. The controller enclosure shall be made of bare aluminum or stainless steel.
  - d. The controller enclosure shall be equal to IP66 or NEMA-equivalent rating.
  - e. The controller enclosure door shall have wind-lock mechanism to maintain the door in an open position during maintenance.

- f. The cabinet enclosure shall include a generator transfer switch. The switch shall be an external manual 30-amp, 125-volt switch with a confirmation pilot light. The confirmation pilot light shall be illuminated when hardwire power is live in the cabinet.
7. The RWIS sensors and equipment shall be installed on the existing support structures. The Contractor is not required to replace or repair the existing support structures. If the Contractor determines that an existing support structure is not adequate to support the new RWIS sensors and equipment, the Contractor shall stop work and notify the Resident in writing detailing the concerns with the existing support structure.

654.027 RWIS 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
- Present Weather Detector (may include visibility, precipitation and accumulation sensors if the single sensor can meet the functional requirements)
- Visibility Sensor if the Present Weather Detector does not meet functional requirements of visibility measurement
- Precipitation and Accumulation Sensor if the Present Weather Detector does not meet functional requirements of precipitation and accumulation measurement
- 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 (including ice) 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. Measurement Parameters:
    - 1) The wind speed sensor shall have a measurement range of 0 to 150 miles per hour (mph).
    - 2) Wind speed shall be user selectable in units of miles per hour (mph) and meters per second (mps).
    - 3) 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.
    - 4) Wind direction shall be measured in degrees. Wind direction resolution shall be +/- 3 degrees.
    - 5) Wind speed and direction shall be reported as instantaneous value and rolling average value to a customized average time.

- 6) Wind speed and direction minimum and maximum values shall be available over a customized time period (i.e. 10 minutes).
  - 7) 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 single 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 or front 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 detection 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 may be integrated into a single sensor unit that operates as a Present Weather Detector or may be provided as independent sensors.
  - 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:
    - 1) The sensor shall detect the following types of precipitation:
      1. Rain
      2. Freezing Rain
      3. Drizzle
      4. Freezing Drizzle
      5. Mixed Rain/Snow
      6. Snow
      7. Sleet/Ice Pellets
    - 2) 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 in Maine field-conditions.

- 3) 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 in Maine field-conditions.

#### 4. 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:
  - 1) AT detector shall provide instantaneous and rolling one minute average values. The AT detector shall hold the previous five observations.
  - 2) AT detector shall have rolling 24-hour minimum and maximum temperature values.
  - 3) AT detector shall have an accuracy of 0.5°F over the range of 0°F to +100°F.
  - 4) RH detector shall provide rolling one minute average values from the previous six observations.
  - 5) RH detector shall have an accuracy of two (2) percent and shall be reported to the nearest 0.1 percent (i.e. 90.8%).
  - 6) RH detectors shall provide a means (either directly or via software) to measure dew point temperature and frost point temperature.
  - 7) RH detector shall provide active measurements that maintain accuracy within 2% in condensing conditions.

#### 5. Barometric Pressure Sensor

- a. The sensor shall be a silicon capacitive absolute pressure sensor designed for barometric pressure measurement.
- b. Measurement Parameters:
  - 1) The sensor shall conduct readings every 5 seconds and report the instantaneous readings.
  - 2) The sensor shall measure in units of inches of mercury (Hg).

- 3) The sensor shall have an operational range of 18.0-31.0 inches Hg with a resolution of 0.03 inches Hg.
  - 4) The sensor shall have an accuracy of  $\pm 0.12$  inches Hg over the temperature range of 0°F to +140°F.
6. Non-Invasive Pavement Sensors
- a. Sensors shall be able to 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 Luft NIRS, Viasala DSC/DST, or equivalent.
  - b. If a pavement sensor cannot meet the accuracy requirements for all of the measurements in part a. above, additional supplemental sensors shall be furnished and installed to meet the accuracy requirements.
  - c. These 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 in operation within the MaineDOT license for New England Compass ATMS.
  - f. Measurement Parameters:
    - 1) The pavement surface state sensor shall have an operational range of -40°F to +140°F and 0-100 percent RH.
    - 2) The pavement surface state sensor shall be capable of remote readings at the range of 6.5 feet to 48 feet.
    - 3) 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
    - 4) 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
    - 5) The pavement surface temperature sensor shall measure the pavement surface temperature every 60 seconds and have a resolution of 0.5°F.
    - 6) 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.

7. Subsurface Pavement Sensor
  - a. The sensor shall be a probe specifically designed for subsurface temperature measurement.
  - b. The sensor probe shall be water-tight and weather-resistant.
  - c. The sensor probe shall have an operational range of -40°F to +120°F.
  - d. Measurement Parameters:
    - 1) Temperature reading shall have an accuracy of +/- 1°F with a resolution of 0.5°F.
    - 2) Freezing point shall have an accuracy of +/- 1°F.
  
8. Pavement Surface Condition Sensor
  - 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:
    - 1) Dry
    - 2) Wet
    - 3) Snowy
    - 4) Icy
  - f. The sensor shall be able to measure surface wetness to a minimum of 0.25 inches.
  - g. Measurement Parameters:
    - 1) Temperature reading shall have an accuracy of +/- 1°F with a resolution of 0.5°F.
    - 2) 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 location that shall provide streaming video adjacent to the RWIS. 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.

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

The Contractor shall remove and salvage to MaineDOT all existing RWIS weather sensors, cabinets, wiring, communication equipment and other hardware. The Contractor shall not damage the existing structure with the removal of the existing equipment. The Contractor shall be responsible for damages done to the existing structure during the removal process. The Contractor shall salvage all existing equipment to MaineDOT at the MaineDOT Region 2 facility, located at 66 Industrial Drive in Augusta, Maine.

The Contractor shall install, configure, integrate, and test the RWIS data into the Road and Weather software. The RWIS Equipment shall continuously measure and record RWIS data. The system data shall be available to MaineDOT in near real-time.

1. Power Requirements
  - a. Each RWIS location shall be supplied with adequate power to meet the site and sensor design loads. The existing power is AC.
  - b. The Contractor shall submit calculations for full power operations and reduced power operations (low power/survival mode) for review and approval as part of the Section 654 Technical Submittal. The power calculations shall indicate the average and peak power requirements for each powered device and sensor, including heater elements associated with the equipment. These power calculations shall be the basis for review of battery backup requirements under Section 654.026.5.
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.
  - b. After removing existing equipment and installing new equipment, the Contractor shall test the existing resistance to ground. If the existing installation does not meet the minimum grounding required, the Contractor

shall install and connect additional ground rods to meet the minimum grounding.

- c. 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 as required to meet the minimum grounding requirement.
- d. The Contractor shall install ground rod(s) for the solar panel support pole to achieve a minimum of 25 ohms to ground.
- e. 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.
- f. The RWIS grounding system shall be bonded to the controller enclosure bus-bar and any steel support structure in accordance with National Electric Code (NEC) requirements.

### 3. Communication Requirements

- a. The Contractor shall furnish and install a cellular modem compatible with the RWIS and with the MaineDOT communications system.
- b. The communication system shall support 4G-LTE and shall be configurable to support 5G when available.
- c. The modem shall support SIM card activation by the following three wireless carriers:
  - i. US Cellular
  - ii. Verizon
  - iii. AT&T
- d. The cellular modem shall be supplied, configured and activated by the Contractor to be provisioned for data communications to allow for a complete RWIS deployment for MaineDOT. The Contractor shall coordinate all cellular activation with MaineDOT and the Engineer.
- e. The RWIS shall transmit weather sensor data to MaineDOT's Road and Weather software in operation.
- f. The Contractor shall provide all necessary equipment, cables, hardware, and ancillary equipment to capture the RWIS sensor data and transmit the data to the Road and Weather software at the MaineDOT TMC.
- g. 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.

### 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. 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. The RWIS shall be fully compatible with the current MaineDOT Road and Weather software.
- b. If the Contractor proposes to supply equipment that is not fully compatible with the current Road and Weather software, the Contractor shall be required to fully integrate the non-compatible equipment into the Road and Weather software so that the new equipment operates in the programs in the same manner as the existing RWIS.
- c. The Contractor shall be responsible for the cost of integration and 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.
- d. The Contractor shall ensure that the Road and Weather software reporting functions include and incorporate the new RWIS sites installed on this project.
- e. The RWIS shall have the capability of generating alerts, watches, or warning. The user shall have the ability to set no less than two levels of alarms, both an audible and visual alarm, displayed on the operator's screen when viewing the Road and Weather software. The system shall have the ability to inform automatically via email when alarm criteria is met.
- f. RWIS data integration shall be accomplished with minimal interruption to the existing MaineDOT Traffic Management Center (TMC) operations or the existing Road and Weather software in use at the TMC.
- g. The RWIS shall be integrated into New England Compass ATMS. Once the RWIS is integrated and has active communication with the MaineDOT Transportation Management Center (TMC) through New England Compass ATMS, the Contractor's responsibility for integration is complete.
- h. The CCTV shall be fully compatible with the current MaineDOT Axis Camera Station software.
- i. If the Contractor proposes to supply equipment that is not fully compatible with the current Axis Camera Station software, the Contractor shall be required to fully integrate the non-compatible equipment into the Axis Camera Station software. All Axis Camera Station Software licensing fees will be paid for by MaineDOT.
- j. The Contractor shall ensure that the Axis Camera Station software reporting functions include and incorporate the new CCTV sites installed on this project.

- k. The CCTV shall be integrated into New England Compass ATMS. Once the camera is integrated and has active communication with the MaineDOT Transportation Management Center (TMC) through New England Compass ATMS, the Contractor's responsibility for integration of the CCTV is complete.

#### 6. System Testing

- a. All RWIS sensors and equipment shall be tested prior to final acceptance in three stages: Stand-Alone Testing, Central Control Testing, and Operational Testing, in accordance with Special Provision 654. Subsystem testing will not be required.
- b. Supplemental Testing Requirements
  - i. Stand-Alone Testing - If a sensor or unit fails to pass the stand-alone test, the Contractor shall correct the problem or replace the sensor or unit and retest until satisfactory results are achieved.
  - ii. Central Control Test Requirements – This test should be performed at the TMC in Augusta in the MaineDOT Road and Weather software, Axis Camera Station and New England Compass ATMS. This test shall verify that all the RWIS sensors and equipment and transmitting data to the appropriate software in accordance with the Contract Documents. This test may be conducted remotely upon written request by the Contractor.
  - iii. Operational Testing – The RWIS must demonstrate successful transmission of data and be fully integrated with the TMC operations. If there is a single failure associated with any RWIS component or data transmission, the test shall be suspended while the Contractor fixes or replaces the sensor. Upon successful repair/replacement, the test shall continue to the end of the 30 days, or a minimum of seven days, whichever is longer. Upon the failure of any second sensor or equipment, the Operational Test period shall be restarted for the full 30 days upon repair/replacement. 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.
- c. The Contractor shall ensure the RWIS is connected to the Road and Weather software at MaineDOT TMC and shall ensure that the RWIS sensors can be viewed and controlled via the software.
- d. SwRI will perform an acceptance test of the RWIS using the Compass software after configuration to ensure the RWIS sensors are operating normally. Acceptance testing will be witnessed by MaineDOT. Beyond acceptance testing, the Contractor and SwRI are not responsible for any other testing of the RWIS integration into the New England Compass ATMS.

- e. The Contractor shall ensure the CCTV is connected to the Axis Camera Station software at MaineDOT TMC and shall ensure that the CCTV can be viewed and controlled via the software.
- f. SwRI will perform an acceptance test of the CCTV using the Compass software after configuration to ensure the cameras are operating normally. Acceptance testing will be witnessed by MaineDOT. Beyond acceptance testing, the Contractor and SwRI are not responsible for any other testing of the CCTV integration.
- g. MaineDOT reserves the right to examine and test/retest any and all test steps for the project as Quality Assurance. If MaineDOT determines that any test procedure does not show the result indicated by the final test results, the Contractor shall update and/or repair the defect at no additional cost to the Department.
- h. As part of the final testing, the Contractor shall provide to MaineDOT a complete set of maintenance and user manuals along with all the wiring and assembly schematics/diagrams, 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 recommendation/directions. All necessary equipment to complete calibrations shall be included.

## 7. Training

- a. The Contractor shall provide training for maintenance and calibration of all provided equipment. This training shall be consistent with the user manuals and directions provided.
- b. If the Contractor elects to provide new or modified Road and Weather software, the Contractor shall provide a training program consisting of the furnishing of educational training in the operation of the new software.
- c. The training shall be scheduled after Stand-Alone Testing but prior to the end of the Operational Testing period.
- d. The Contractor shall provide qualified instructors familiar with the operation of the software to conduct the training. Training shall consist of hands-on demonstrations as feasible.
- e. 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.
- f. Training will be conducted at the MaineDOT Main Office in Augusta, Maine. The Contractor shall coordinate a specific classroom facility with the Resident at least three weeks prior to the training date.
- g. The training session shall be up to four (4) hours and shall accommodate up to 10 people. Typical training topic areas include:
  - i. An overview of the software and its operation.
  - ii. New/modified features of the software.

- iii. Interactions of the Road and Weather software.
  - iv. Producing reports using the Road and Weather software.
8. Supplemental Warranty Requirement: The Contractor shall secure from SwRI on behalf of MaineDOT a written acknowledgement that the new RWIS devices with their CCTV cameras will be covered under their existing New England Compass ATMS Contract 2022-097-ATMS-NE Compass. Coverage under the warranty begins after successful acceptance testing in Compass. Thereafter, the warranty requirements of this section and Special Provision 654 shall not apply to the integration of the RWIS and CCTV into the New England Compass ATMS.

654.061 Method of Measurement: Road Weather Information System (RWIS) equipment will be measured for payment by each complete in place per site, satisfactorily installed, tested, operational, and accepted.

654.07 Basis of Payment: Road Weather Information System (RWIS) equipment will be paid for at the contract each 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 and external hardware; battery backup system and maintenance of existing utility power; communication equipment; grounding; integration and software modifications; SwRI integration into New England Compass ATMS; 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. Payment will be made under the following:

<u>Pay Item</u>	<u>Pay Unit</u>
654.5301 Permanent Road Weather Information System, No Support Pole	EA

GENERAL NOTES:

1. ALL WORK SHALL CONFORM TO THE LATEST EDITION OF THE MAINE DEPARTMENT OF TRANSPORTATION (MAINEDOT) STANDARD SPECIFICATIONS.
2. CONSTRUCTION SHALL BE IN CONFORMANCE WITH THE LATEST EDITION OF THE MAINEDOT STANDARD DETAILS AND THE MAINEDOT BEST MANAGEMENT PRACTICES FOR EROSION AND SEDIMENT CONTROL (LATEST EDITION AND REVISIONS) UNLESS OTHERWISE INDICATED IN THESE PLANS.
3. NO FORMAL SURVEY WAS CONDUCTED FOR THE CONSTRUCTION OF THIS PROJECT. CONDUITS AND PULL BOXES WERE NOT ASSIGNED GPS COORDINATES. DESIGN WAS BASED ON AERIAL PHOTOGRAPHY, AND FIELD INVESTIGATION CONDUCTED BY MAINEDOT AND VHB. UNDERGROUND CONDUIT WAS IDENTIFIED AND FLAGGED BY MAINEDOT UTILITIES. VHB SURVEY LOCATED THE POINTS AND INCORPORATED THE CONDUIT LOCATIONS IN THE PLANS.
4. ALL NON-PAVED AREAS DISTURBED DURING CONSTRUCTION SHALL BE LOAMED AND SEEDED, UNLESS OTHERWISE DIRECTED BY THE RESIDENT. ALL PAVED AREAS DISTURBED DURING CONSTRUCTION SHALL BE REPAIRED BY THE CONTRACTOR. COSTS FOR REPAIR OF DISTURBED AREAS SHALL BE INCIDENTAL TO OTHER CONTRACT ITEMS.

EXISTING EQUIPMENT:

1. THE CONTRACTOR SHALL CAREFULLY REMOVE AND STORE ALL EQUIPMENT AND SHALL SALVAGE THE REMOVED EQUIPMENT TO THE MAINEDOT AT THE MAINEDOT REGION 2 FACILITY, LOCATED AT 66 INDUSTRIAL DRIVE AUGUSTA, ME. THE CONTRACTOR SHALL CONTACT COLBY FORTIER-BROWN 207-441-5079 TO COORDINATE THE DELIVERY OF EQUIPMENT.
2. THE CONTRACTOR SHALL TEST EXISTING EARTH TO GROUND RESISTANCE AT EACH HARDWARE AND CABINET LOCATION TO ENSURE A MINIMUM OF 25 OHMS IS MET. IF ANY LOCATION DOES NOT MEET THE MINIMUM GROUNDING REQUIREMENTS, THE CONTRACTOR SHALL INSTALL AND CONNECT ADDITIONAL GROUND RODS TO MEET THE 25 OHMS OR THE MANUFACTURER'S GROUNDING RECOMMENDATION, WHICHEVER IS MORE STRINGENT. GROUND RODS AND CONNECTIONS SHALL FOLLOW ALL NEC GUIDELINES AND SHALL BE INCIDENTAL TO OTHER CONTRACT ITEMS.
3. THE CONTRACTOR SHOULD LEAVE ONE COPY OF AS-BUILT PLANS, WIRING DIAGRAMS, CABINET BLOCK DIAGRAMS, AND EQUIPMENT MANUALS IN EACH EQUIPMENT CABINET.

TEMPORARY TRAFFIC CONTROL:

1. ALL TRAFFIC CONTROL EQUIPMENT, DEVICES, AND TEMPORARY TRAFFIC CONTROLS SHALL CONFORM TO THE 2009 EDITION OF THE FEDERAL HIGHWAY ADMINISTRATION (FHWA) MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES (MUTCD), CHAPTER 6 AND THE LATEST EDITION OF THE MAINEDOT STANDARD DETAILS.
2. ALL TEMPORARY TRAFFIC CONTROL SIGNS, SIGN SUPPORT STRUCTURES, CHANNELIZING DEVICES, FLASHING ARROW PANELS (FAP), PORTABLE CHANGEABLE MESSAGE SIGNS (PCMS) AND OTHER TRAFFIC CONTROL EQUIPMENT ALONG THE ROADSIDE SHALL MEET OR EXCEED MANUAL FOR ASSESSING SAFETY HARDWARE (MASH) 2016, TEST LEVEL 3 (TL-3) IF MANUFACTURED AFTER DECEMBER 31, 2019. ALL OTHER TRAFFIC CONTROL EQUIPMENT SHALL MEET OR EXCEED NCHRP 350 TL-3.
3. ALL TEMPORARY TRAFFIC CONTROL SIGNS SHALL HAVE ASTM D4956 TYPE VII, TYPE VIII OR TYPE IX SUPER HIGH INTENSITY OR PRISMATIC FLUORESCENT RETROREFLECTIVE SHEETING AND SHALL BE MAINTAINED IN LIKE-NEW CONDITION. ALL ORANGE CONSTRUCTION SIGNS SHALL BE FLUORESCENT ORANGE WITH TYPE IX SHEETING. PLACEMENT OF CONSTRUCTION SIGNS SHALL BE ADJUSTED TO AVOID OBSTRUCTING EXISTING SIGNS AND TO ENSURE PROPER SIGHT LINES TO THE CONSTRUCTION SIGNS AS DETERMINED BY THE RESIDENT.
4. ANY SIGNS, EQUIPMENT, OR DEVICES FOUND TO BE DAMAGED OR UNSERVICEABLE SHALL BE REPLACED AT THE CONTRACTOR'S EXPENSE.
5. ALL SHOULDER AND LANE CLOSURES SHALL REQUIRE APPROVAL OF THE RESIDENT A MINIMUM OF TWO WORKING DAYS IN ADVANCE OF THE CLOSURE.
6. IF WORK IS TO BE CONDUCTED AT NIGHT, THE CONTRACTOR SHALL SUBMIT A LIGHTING PLAN FOR NIGHT WORK TO THE RESIDENT FOR APPROVAL.

GUARDRAIL PROTECTION:

1. IF THE CONTRACTOR ELECTS TO REMOVE A SEGMENT OF GUARDRAIL FOR ACCESS TO THE WORK AREA, THE CONTRACTOR SHALL RESET THE GUARDRAIL AT THE END OF THE WORKDAY. ALTERNATIVELY, THE CONTRACTOR SHALL PROTECT THE TEMPORARY BLUNT END WITH A SUITABLE CRASH CUSHION. CRASH CUSHIONS INSTALLED FOR THE CONTRACTOR'S CONVENIENCE WILL NOT BE PAID FOR BUT WILL BE CONSIDERED INCIDENTAL TO THE MAINTENANCE OF TRAFFIC CONTROL DEVICES ITEM.

MOBILE ROAD WEATHER INFORMATION SYSTEM (RWIS):

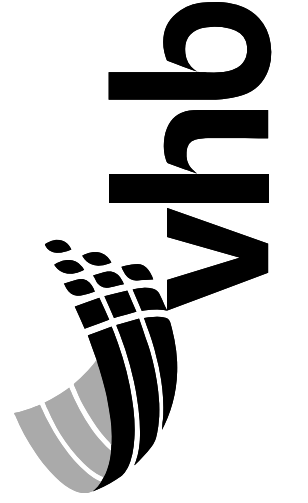
1. IN CONJUNCTION WITH THIS PROJECT THE CONTRACTOR SHALL FURNISH FIVE (5) MOBILE ROAD WEATHER INFORMATION SYSTEMS.
2. THE CONTRACTOR SHALL INSTALL THE MOBILE RWIS AS SPECIFIED IN THE SPECIAL PROVISION 654.54. 2
3. THE CONTRACTOR SHALL FURNISH ALL MANUFACTURER-RECOMMENDED MOUNTING BRACKETS.
4. THE CONTRACTOR SHALL CONFIGURE AND INTEGRATE THE MOBILE RWIS SYSTEM DATA INTO THE ROAD AND WEATHER SOFTWARE.
5. FOLLOWING SUCCESSFUL INSTALLATION, THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE CONFIGURATION AND CALIBRATION OF THE SENSORS IN ACCORDANCE WITH MANUFACTURER RECOMMENDATIONS.
6. THE CONTRACTOR IS RESPONSIBLE FOR TESTING THE MOBILE RWIS SYSTEMS AS SPECIFIED IN THE SPECIAL PROVISION 654.54 AND SPECIAL PROVISION 654.
7. THE CONTRACTOR IS RESPONSIBLE FOR TRAINING MAINEDOT STAFF ON THE MOBILE RWIS SYSTEMS AS SPECIFIED IN SPECIAL PROVISION 654.54.

Date: \$date\$

Username: \$user\$

Division: \$wkgroup\$

Filename: \$file\$



STATE OF MAINE  
DEPARTMENT OF TRANSPORTATION

PROJECT NO. 2421100

WIN  
024211.00

ITS PLANS

PROJ. MANAGER	J. DOSTIE	BY	DATE
DESIGN-DETAILED	DJS	JAR	\$date\$
CHECKED-REVIEWED	DJS	MDS	\$date\$
DESIGN-DETAILED			
DESIGN-DETAILED		ADDENDUM 2	4/28/23
REVISIONS 1			
REVISIONS 2			
REVISIONS 3			
REVISIONS 4			
FIELD CHANGES			

STATEWIDE  
RWIS INSTALLATIONS

GENERAL NOTES

SHEET NUMBER

2

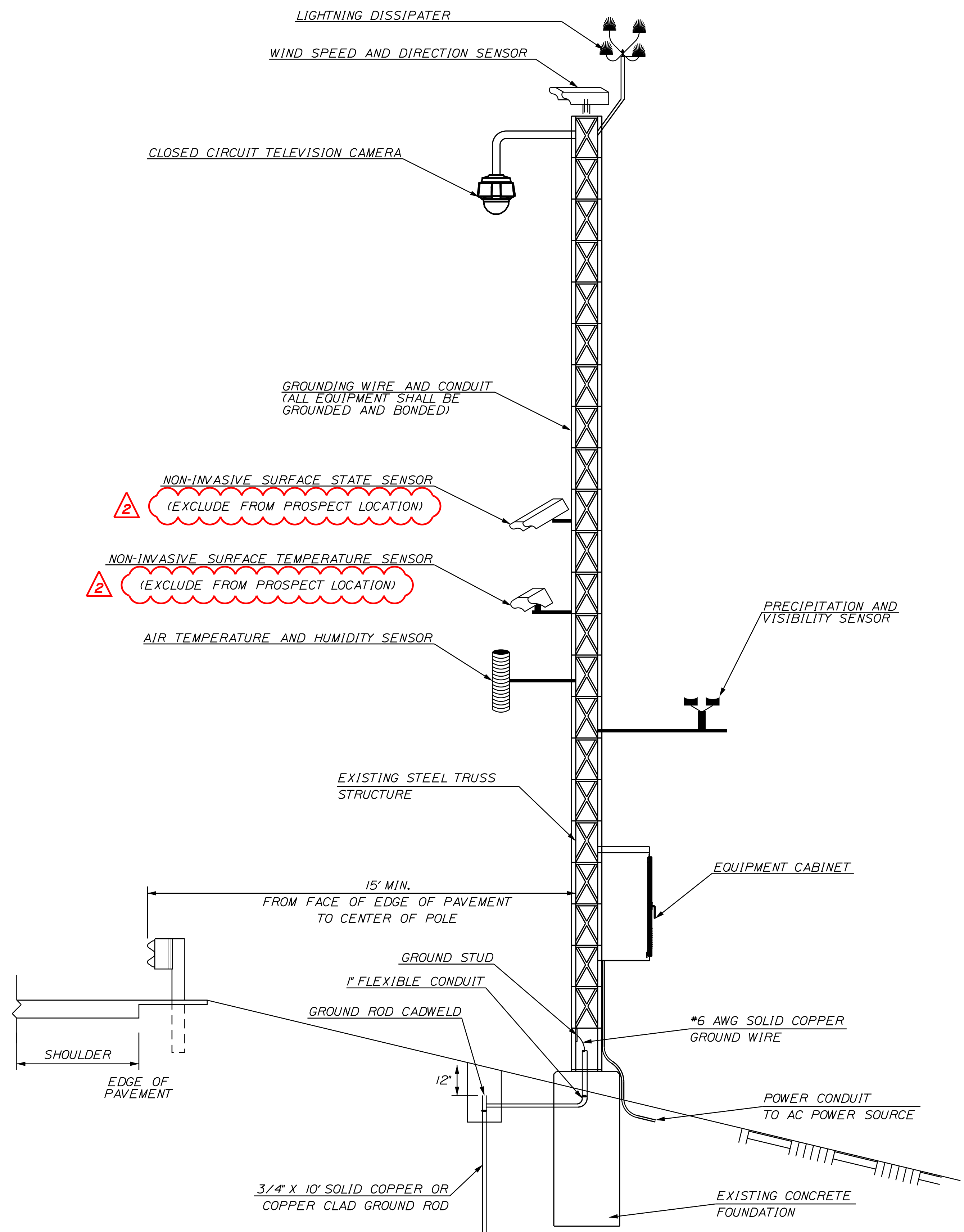
OF 7

Date: \$date\$

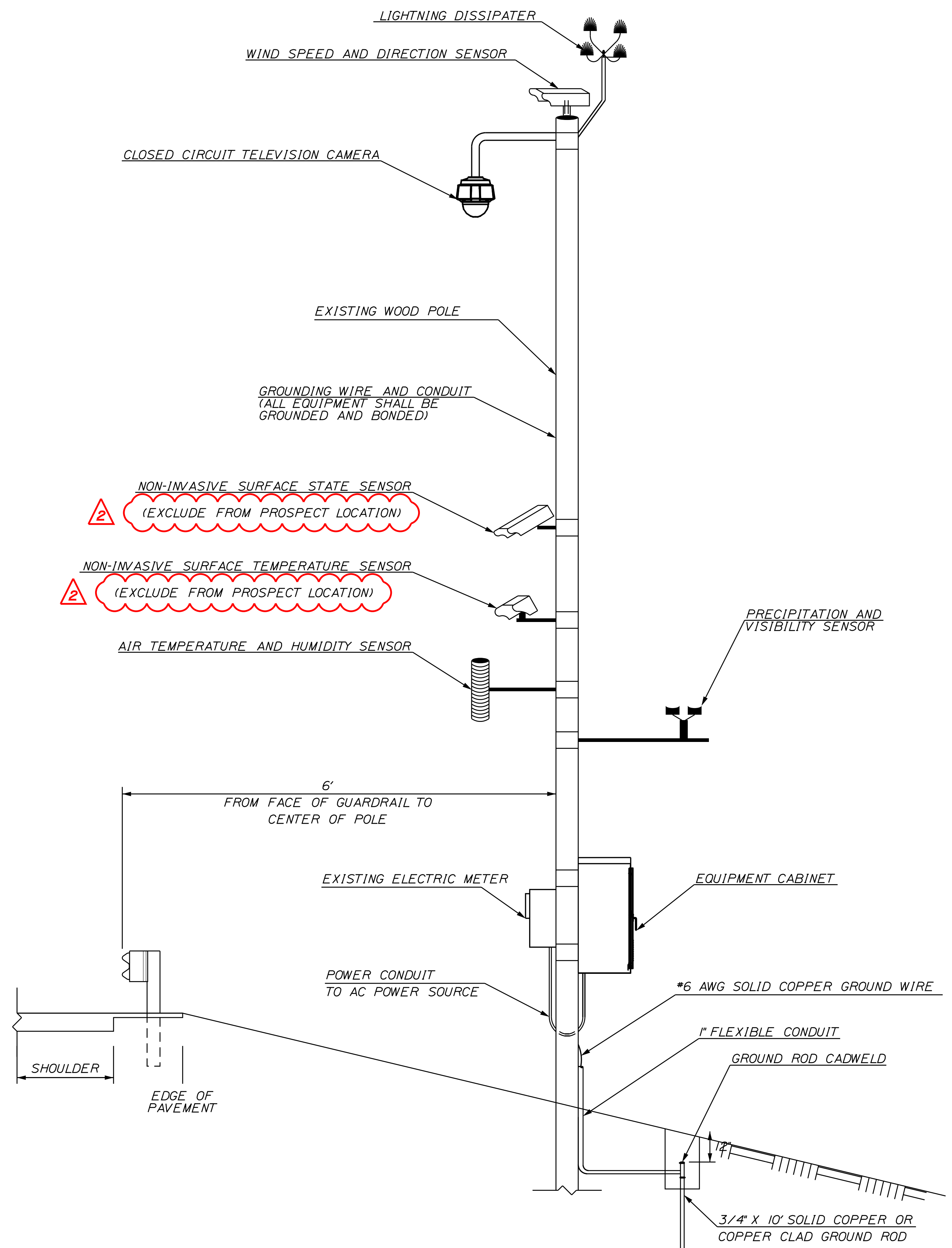
Username: \$user\$

Division: \$wkgroup\$

Filename: \$file\$



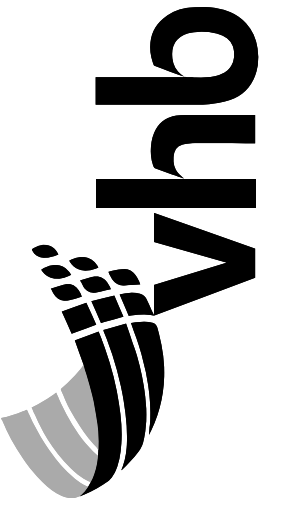
ROAD WEATHER INFORMATION STATION STEEL TRUSS STRUCTURE DETAIL  
NOT TO SCALE



ROAD WEATHER INFORMATION STATION WOOD POLE DETAIL  
NOT TO SCALE

NOTES:

1. HEIGHT OF EQUIPMENT PER MANUFACTURER'S STANDARDS AND RECOMMENDATION.
2. BAROMETER LOCATED IN EQUIPMENT CABINET.
3. NON-INVASIVE SURFACE STATE SENSOR AND NON-INVASIVE SURFACE TEMPERATURE SENSOR MAY BE ONE UNIT OR TWO SEPARATE UNITS.
4. PRECIPITATION SENSOR AND VISIBILITY SENSOR MAY BE ONE UNIT OR TWO SEPARATE UNITS.
5. SUBSURFACE TEMPERATURE PROBES SHALL BE INSTALLED PER THE MANUFACTURER'S RECOMMENDATIONS.



PROJ. MANAGER	J. DOSTIE	DATE
DESIGN-DETAILED	DJS	3/10/23
CHECKED-REVIEWED	JAR	3/10/23
DESIGN-DETAILED	MDS	4/28/23
DESIGN-DETAILED	ADDENDUM 2	4/28/23
REVISIONS 1		
REVISIONS 2		
REVISIONS 3		
REVISIONS 4		
FIELD CHANGES		

STATEWIDE  
RWIS INSTALLATIONS  
DETAILS

SHEET NUMBER

4

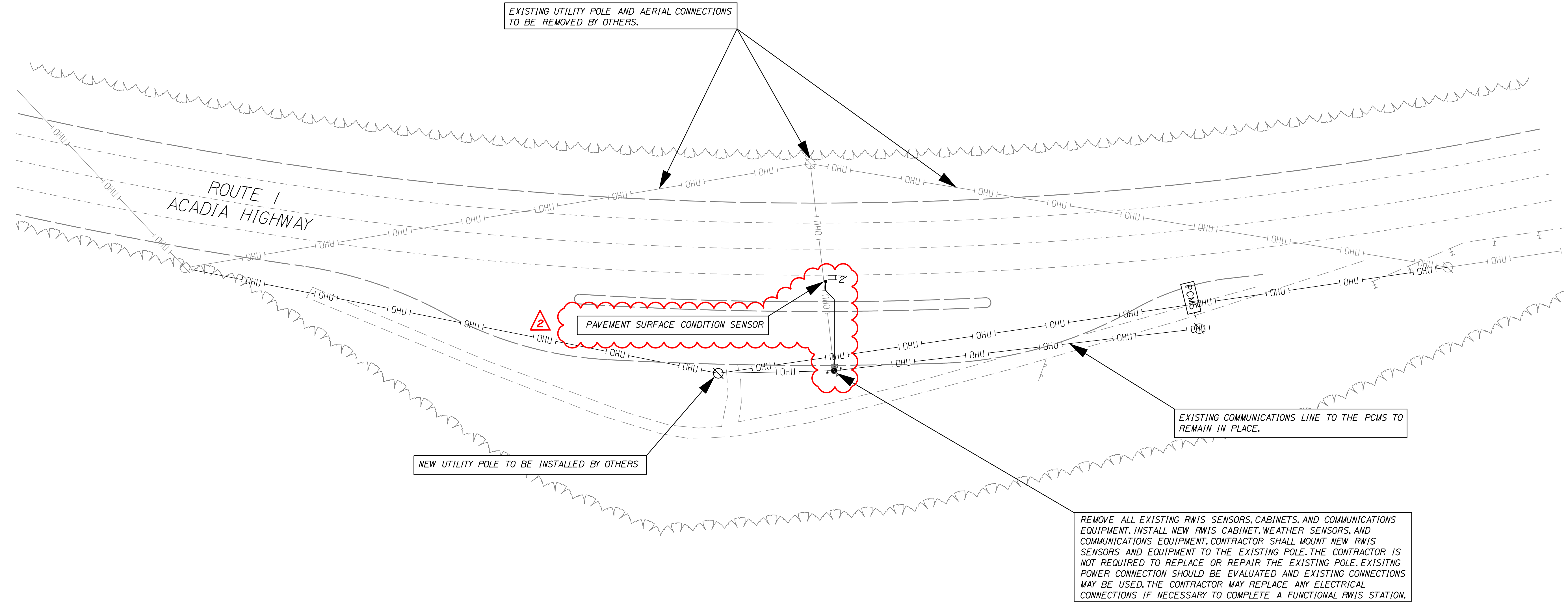
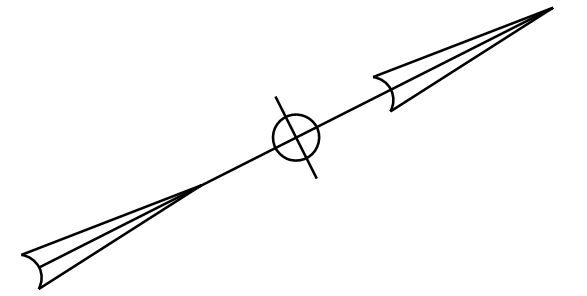
OF 7

Date: \$date\$

Username: \$user\$

Division: \$wkgroup\$

Filename: \$file\$

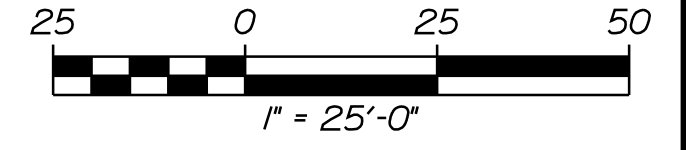


LIST OF MAJOR ITEMS

ITEM NO.	EQUIPMENT AND WORK ITEMS	QUANTITY
654.5301	ROAD WEATHER INFORMATION SYSTEM	1 LS

NOTES

1. THE CONTRACTOR SHALL INSTALL THE SUBSURFACE PROBE PER THE MANUFACTURER'S RECOMMENDATIONS.
2. PAVEMENT SURFACE CONDITION SENSOR SHALL BE INSTALLED IN THE ROUTE 1 PAVEMENT AND NOT IN THE PARKING AREA. SENSOR SHALL BE INSTALLED IN THE ROUTE 1 NORTHBOUND SHOULDER 2 FEET FROM THE NORTHBOUND EDGE LINE.



STATE OF MAINE  
DEPARTMENT OF TRANSPORTATION  
PROJECT NO. 2421100  
WIN  
024211.00  
ITS PLANS



PROJ. MANAGER	J. DOSTIE	BY	DATE
DESIGN-DETAILED	DJS	JAR	3/15/23
CHECKED-REVIEWED	DJS	MDS	3/15/23
DESIGN-DETAILED			
DESIGN-DETAILED			
REVISIONS 1			4/28/23
REVISIONS 2			
REVISIONS 3			
REVISIONS 4			
FIELD CHANGES			

STATEWIDE  
RWIS INSTALLATIONS  
PROSPECT  
SITE PLAN

SHEET NUMBER

7

OF 7