



STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION

ROY COOPER
GOVERNOR

J.R. "JOEY" HOPKINS
SECRETARY

May 20, 2024

Addendum No. 2

RE: Contract # C204913

WBS # 37405.3.1

STATE FUNDED

Forsyth County (R-2577A)

US-158 FROM MULTI-LANES NORTH OF US-421/I-40 BUSINESS TO SR-1965
(BELEWS CREEK ROAD)

May 28, 2024 Letting

To Whom It May Concern:

Reference is made to the proposal furnished to you on this project.

The following revisions have been made to the proposal.

Page No.	Revision
Proposal Cover	Note added that reads "Includes Addendum No. 2 Dated 05-20-2024".
G-8	The Project Special Provision entitled SPECIALTY ITEMS has been updated to reflect changes below.
TS-66 thru TS-96	The Project Unit Special Provisions entitled SIGNALS AND INTELLIGENT TRANSPORTATION SYSTEMS have been revised. Section 9.2D, Section 9.2F, Section 9.2H , Section 9.7, and Section 11.1 have been revised.

Please void the above listed existing Pages in your proposal and staple the revised Pages thereto.

On the item sheets the following pay item revisions have been made:

Mailing Address:
NC DEPARTMENT OF TRANSPORTATION
CONTRACT STANDARDS AND DEVELOPMENT
1591 MAIL SERVICE CENTER
RALEIGH, NC 27699-1591

Telephone: (919) 707-6900
Fax: (919) 250-4127
Customer Service: 1-877-368-4968

Location:
1020 BIRCH RIDGE DR.
RALEIGH, NC 27610

Website: www.ncdot.gov

<u>Item</u>	<u>Description</u>	<u>Old Quantity</u>	<u>New Quantity</u>
0273-6045000000-E SP	36" TEMPORARY PIPE	290 LF	DELETED
0288-6111000000-E SP	IMPERVIOUS DIKE	193 LF	563 LF
0359-7980000000-N SP	DYNAMIC MESSAGE SIGN (TYPE 1A)	2 EA	DELETED
0404-6045000000-E SP	48" TEMPORARY PIPE	NEW ITEM	143 LF
0405-6045000000-E SP	60" TEMPORARY PIPE	NEW ITEM	147 LF
0406-7980000000-N SP	DYNAMIC MESSAGE SIGN (TYPE 2C)	NEW ITEM	2 EA

The Contractor's bid must include these pay item revisions.

The electronic bidding file has been updated to reflect these revisions. Please download the Addendum File and follow the instructions for applying the addendum. Bid Express will not accept your bid unless the addendum has been applied.

The contract will be prepared accordingly.

Sincerely,

DocuSigned by:

 52C46046381F443...

Ronald E. Davenport, Jr., PE
 State Contract Officer

RED/cms
 Attachments

cc: Mr. Wiley W. Jones III, PE
 Mr. Pat Ivey, PE
 Mr. Ken Kennedy, PE
 Mr. Malcolm Bell

Mr. Forrest Dungan, PE
 Ms. Jaci Kincaid
 Mr. Jon Weathersbee, PE
 Project File (2)

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH, N.C.

PROPOSAL

INCLUDES ADDENDUM No. 2 DATED 05-20-2024

DATE AND TIME OF BID OPENING: **May 28, 2024 AT 02:00 PM**

CONTRACT ID C204913
WBS 37405.3.1

FEDERAL-AID NO. STATE FUNDED
COUNTY FORSYTH
T.I.P NO. R-2577A
MILES 5.804
ROUTE NO. US-158
LOCATION US-158 FROM MULTI-LANES NORTH OF US-421/I-40 BUSINESS TO SR-1965
 (BELEWS CREEK ROAD).

TYPE OF WORK GRADING, DRAINAGE, PAVING, SIGNALS, AND STRUCTURES.

NOTICE:

ALL BIDDERS SHALL COMPLY WITH ALL APPLICABLE LAWS REGULATING THE PRACTICE OF GENERAL CONTRACTING AS CONTAINED IN CHAPTER 87 OF THE GENERAL STATUTES OF NORTH CAROLINA WHICH REQUIRES THE BIDDER TO BE LICENSED BY THE N.C. LICENSING BOARD FOR CONTRACTORS WHEN BIDDING ON ANY NON-FEDERAL AID PROJECT WHERE THE BID IS \$30,000 OR MORE, EXCEPT FOR CERTAIN SPECIALTY WORK AS DETERMINED BY THE LICENSING BOARD. BIDDERS SHALL ALSO COMPLY WITH ALL OTHER APPLICABLE LAWS REGULATING THE PRACTICES OF ELECTRICAL, PLUMBING, HEATING AND AIR CONDITIONING AND REFRIGERATION CONTRACTING AS CONTAINED IN CHAPTER 87 OF THE GENERAL STATUTES OF NORTH CAROLINA. NOTWITHSTANDING THESE LIMITATIONS ON BIDDING, THE BIDDER WHO IS AWARDED ANY FEDERAL - AID FUNDED PROJECT SHALL COMPLY WITH CHAPTER 87 OF THE GENERAL STATUTES OF NORTH CAROLINA FOR LICENSING REQUIREMENTS WITHIN 60 CALENDAR DAYS OF BID OPENING.

BIDS WILL BE RECEIVED AS SHOWN BELOW:

THIS IS A ROADWAY & STRUCTURE PROPOSAL

5% BID BOND OR BID DEPOSIT REQUIRED

MAJOR CONTRACT ITEMS:

(2-19-02)(Rev. 1-16-24)

104

SP1 G28

The following listed items are the major contract items for this contract (see Article 104-5 of the *Standard Specifications*):

Line #	Description
8	Borrow Excavation
74	Asphalt Concrete Base Course, Type B25.0C
75	Asphalt Concrete Intermediate Course, Type I19.0C

SPECIALTY ITEMS:

(7-1-95)(Rev. 1-16-24)

108-6

SP1 G37

Items listed below will be the specialty items for this contract (see Article 108-6 of the *Standard Specifications*).

Line #	Description
112-126	Guardrail
127-129	Fencing
135-143	Signing
159-167	Long-Life Pavement Markings
168-169	Removable Tape
182-183	Permanent Pavement Markers
184-207	Lighting
208-257	Utility Construction
258-297, 404-405	Erosion Control
298-306	Planting
307-367, 406	Signals/ITS System
379-383	Drilled Piers

FUEL PRICE ADJUSTMENT:

(11-15-05)(Rev. 1-16-24)

109-8

SP1 G43

Page 1-82, Article 109-8, FUEL PRICE ADJUSTMENTS, add the following:

The base index price for DIESEL #2 FUEL is \$ **2.7635** per gallon. Where any of the following are included as pay items in the contract, they will be eligible for fuel price adjustment.

embedded DMS. Ensure the interior structure is constructed of aluminum. Ensure that exterior seams and joints, except the finish coated face pieces, are continuously welded using an inert gas welding method. Ensure that no internal frame connections or external skin attachments rely upon adhesive bonding. Ensure the sign housing meets the requirements of Section 3 of NEMA TS 4-2016.

Ensure that all drain holes and other openings in the sign housing are screened to prevent the entrance of insects. Ensure that the top of the housing includes multiple steel lifting eyebolts or equivalent hoisting points. Ensure hoist points are positioned such that the sign remains level when lifted. Ensure that the hoist points and sign frame allow the sign to be shipped, handled, and installed without damage. Ensure all external assembly and mounting hardware, including but not limited to; nuts, bolts, screws, and locking washers are corrosion resistant galvanized steel and are sealed against water intrusion. Ensure all exterior housing surfaces, excluding the sign face, and all interior housing surfaces are a natural aluminum mill finish. Ensure signs are fabricated, welded, and inspected in accordance with the requirements of the current ANSI/AWS Structural Welding Code-Aluminum. Do not place a manufacturer name, logo, or other information on the front face of the DMS or shield. Do not paint the stainless-steel bolts on the Z-bar assemblies used for mounting the enclosure.

D. Housing Requirements for Walk-in type DMS

Ensure the sign housing meets the requirements of Section 3.2.8 of NEMA TS 4-2016. Stitch weld the exterior housing panel material to the internal structural members to form a unitized structure. Ensure that exterior mounting assemblies are fabricated from aluminum alloy 6061-T6 extrusions a minimum of 3/16 inches thick. Ensure housing access is provided through an access door at each end of the sign enclosure that meets the requirements of NEMA TS 4-2016, Section 3.2.8.1. Ensure the access doors include a keyed tumbler lock and a door handle with a hasp for a padlock. Ensure the doors include a closed-cell neoprene gasket and stainless-steel hinges. Install one appropriately sized fire extinguisher within 12 inches of each maintenance door. Ensure the sign housing meets the requirements of NEMA TS 4-2016, Section 3.2.8.3 for service lighting. All service lighting should be LED, incandescent and fluorescent lamps are not permitted. Ensure that the sign housing includes LED emergency lighting that automatically illuminates the interior when the door is open in the event of a power outage. Emergency lighting must be capable of operation without power for at least 90 minutes. Ensure the sign housing meets the requirements of NEMA TS 4-2016, Section 3.2.9 for convenience outlets.

E. Housing Face Requirements for all DMS

Ensure the sign face meets the requirements of NEMA TS 4-2016, Section 3.1.3. Protect the DMS face with contiguous, weather-tight, removable panels. The DMS front face shall be constructed with multiple rigid panels, each of which supports and protects a full-height section of the LED display matrix. The panels shall be fabricated using aluminum sheeting on the exterior and polycarbonate sheeting on the interior of the panel. These panels must be a polycarbonate material that is ultraviolet protected and have an antireflection coating. Prime and coat the front side of the aluminum mask, which faces the viewing motorists, with automotive-grade semi-gloss black acrylic enamel paint or an approved equivalent. Guarantee all painted surfaces provide a minimum outdoor service life of 20 years. Design the panels so they will not warp nor reduce the legibility of the characters. Differential expansion of the DMS housing and the front panel must not cause damage to any DMS component or allow openings for moisture or dust. Glare from sunlight, roadway

lighting, commercial lighting, or vehicle headlights must not reduce the legibility or visibility of the DMS. Install the panels so that a maintenance person can easily remove or open them for cleaning.

F. Housing Face Requirements for Walk-in type DMS

No exposed fasteners are allowed on the housing face. Ensure that display modules can be easily and rapidly removed from within the sign without disturbing adjacent display modules.

G. Sign Housing Ventilation System for all DMS

Install a minimum of one (1) temperature sensor that is mounted near the top of the DMS interior. The sensor(s) will measure the temperature of the air in the enclosure over a minimum range of -40°F to +176°F. Ensure the DMS controller will continuously monitor the internal temperature sensor output and report to the DMS control software upon request.

Design the DMS with systems for enclosure ventilation, face panel fog and frost prevention, and safe over-temperature shutdown.

Design the DMS ventilation system to be thermostatically controlled and to keep the internal DMS air temperature lower than +140°F, when the outdoor ambient temperature is +115°F or less.

The ventilation system will consist of two or more air intake ports located near the bottom of the DMS rear wall. Cover each intake port with a filter that removes airborne particles measuring 500 microns in diameter and larger. Mount one or more ventilation fans at each intake port. These fans will positively pressure the DMS enclosure.

Design the ventilation fans and air filters to be removable and replaceable from inside the DMS housing. To ease serviceability, mount the ventilation fans no more than four (4) feet from the floor of the DMS enclosure. Position ventilation fans so they do not prevent removal of an LED pixel board or driver board.

Provide each ventilation fan with a sensor to monitor its rotational speed, measured in revolutions per minute and report this speed to the sign controller upon request.

The ventilation system will move air across the rear of the LED modules in a manner such that heat is dissipated from the LED's. Design the airflow system to move air from the bottom of the enclosure towards the top to work with natural convection to move heat away from the modules.

Install each exhaust port near the top of the rear DMS wall. Provide one exhaust port for each air intake port. Screen all exhaust port openings to prevent the entrance of insects and small animals.

Cover each air intake and exhaust port with an aluminum hood attached to the rear wall of the DMS. Thoroughly seal all intakes and exhaust hoods to prevent water from entering the DMS. Provide a thermostat near the top of the DMS interior to control the activation of the ventilation system.

The DMS shall automatically shut down the LED modules to prevent damaging the LEDs if the measured internal enclosure air temperature exceeds a maximum threshold temperature. The threshold temperature shall be configurable and shall have a default factory setting of 140°F. The DMS provide an output to the controller to notify the Control Software when the DMS shuts down due to high temperature.

H. Sign Housing Ventilation System for Walk-in DMS

Ensure the sign includes a fail-safe ventilation subsystem that includes a snap disk thermostat that is independent of the sign controller. Preset the thermostat at 140°F. If the sign housing's interior reaches 140°F, the thermostat must override the normal ventilation system, bypassing the

sign controller and turning on all fans. The fans must remain on until the internal sign housing temperature falls below 115°F.

I. Sign Housing Photoelectric sensors

Install three photoelectric sensors with ½ inch minimum diameter photosensitive lens inside the DMS enclosure. Use sensors that will operate normally despite continual exposure to direct sunlight. Place the sensors so they are accessible and field adjustable. Point one sensor north or bottom of the sign. Place the other two, one on the back wall and one on the front wall of the sign enclosure. Alternate designs may be accepted, provided the sensor assemblies that are accessible and serviceable from inside the sign enclosure.

Provide controls so that the Engineer can field adjust the following:

- The light level emitted by the pixels in each Light Level Mode,
- The ambient light level at which each Light Level Mode is activated.

J. Display Modules

Manufacture each display module with a standard number of pixels which can be easily removed. Assemble the modules onto the DMS assemblies contiguously to form a continuous matrix to display the required number of lines, characters, and character height.

Design display modules that are interchangeable, self-addressable, and replaceable without using special tools. Provide plug-in type power and communication cables to connect to a display module. Ensure that the sign has a full matrix display area as defined in NEMA TS 4-2016, Section 1.6.

Design each module to display:

- All upper- and lower-case letters,
- All punctuation marks,
- All numerals 0 to 9,
- Special user-created characters or images.

Display upper-case letters and numerals over the complete height of the module. Optimize the LED grouping and mounting angle within a pixel for maximum readability.

Furnish two (2) spare display modules per each DMS installed for emergency restoration.

K. Discrete LEDs

Provide discrete LEDs with a nominal viewing cone of 30 degrees with a half-power angle of 15 degrees measured from the longitudinal axis of the LED. Make certain, the viewing cone tolerances are as specified in the LED manufacturer's product specifications and do not exceed +/- 3 degrees half-power viewing angle of 30 degrees.

Provide LEDs that are untinted, non-diffused, high output solid state lamps utilizing AlInGaP technology for Red and InGaN technology for Green and Blue. No substitutions will be allowed. Provide LEDs that emit a full color.

Provide LEDs with a MTBF (Mean Time Before Failure) of at least 100,000 hours of permanent use at an operating point of 140° F or below at a specific forward current of 20mA. Discrete LED

failure is defined as the point at which the LED's luminous intensity has degraded to 50% or less of its original level.

Obtain the LEDs used in the display from a single LED manufacturer. Obtain them from batches sorted for luminous output, where the highest luminosity LED is not more than fifty percent more luminous than the lowest luminosity LED when the LEDs are driven at the same forward current. Do not use more than two successive and overlapping batches in the LED display.

Individually mount the LEDs on circuit boards that are at least 1/16" thick FR-4 fiberglass, flat black printed circuit board in a manner that promotes cooling. Protect all exposed metal on both sides of the LED pixel board (except the power connector) from water and humidity exposure by a thorough application of acrylic conformal coating. Design the boards so bench level repairs to individual pixels, including discrete LED replacement and conformal coating repair is possible.

Operate the LED display at a low internal DC voltage not to exceed 24 Volts.

Design the LED display operating range to be -20° F to +140° F at 95% relative humidity, non-condensing.

Supply the LED manufacturer's technical specification sheet with the material submittals.

L. LED Power Supplies

Power the LED Display by means of multiple regulated switching DC power supplies that operate from 120 volts AC input power and have an output of 24 volts DC or less. Wire the power supplies in a redundant parallel configuration that uses multiple power supplies per display. Provide the power supplies with current sharing capability that allows equal amounts of current to their portion of the LED display. Provide power supplies rated such that if one supply fails the remaining supplies will be able to operate their portion of the display under full load conditions (i.e. all pixels on at maximum brightness) and at a temperature of 140° F.

Provide power supplies to operate within a minimum input voltage range of +90 to +135 volts AC and within a temperature range of -22° F to 140° F. Power supply output at 140° F must not deteriorate to less than 65% of its specified output at 70° F. Provide power supplies that are overload protected by means of circuit breakers, that have an efficiency rating of at least 75%, a power factor rating of at least .95, and are UL listed. Provide all power supplies from the same manufacturer and with the same model number for each Type of DMS. Design the power driver circuitry to minimize power consumption.

Design the field controller to monitor the operational status (normal or failed) of each individual power supply and be able to display this information on the Client Computer screen graphically. Color code power supply status, red for failed and green for normal. Provide power supply monitoring circuitry to detect power failure in the DMS and to automatically report this fault to the Control Software. This requirement is in addition to reporting power failure at the controller cabinet.

M. LED Pixels

A pixel is defined as the smallest programmable portion of a display module that consists of a cluster of closely spaced discrete LEDs. Design each pixel with either 66mm or 20mm spacing depending on the type of DMS called for in the plans.

Construct the pixels with strings of LEDs. It is the manufacturer's responsibility to determine the number of LEDs in each string to produce the candela requirement as stated herein.

Use continuous current to drive the LEDs at the maximum brightness level. Design the light levels to be adjustable for each DMS / controller so the Engineer may set levels to match the luminance requirements at each installation site.

Ensure each pixel produces a luminous intensity of 40 Cd when driven with an LED drive current of 20 mA per string.

Power the LEDs in each pixel in strings. Use a redundant design so that the failure of an LED in one string does not affect the operation of any other string within the pixel and does not lower the luminous intensity of the pixel more than 25% of the 40Cd requirement. Provide the sign controller with the ability to detect the failure of any LED string and identify which LED string has failed.

N. DMS Mini Controller

For Walk-In and Front Access DMS Types only, furnish and install a mini controller inside the DMS that is interconnected with the main controller using a fiber-optic cable. The mini controller will enable a technician to perform all functions available from the main controller. Provide the mini controller with a Display and keypad interface. Size the display screen to allow preview of an entire one-page message on one screen. Provide a 4 X 4 keypad.

O. DMS Enclosure Structure Mounting

Mount the DMS enclosure and interconnect system securely to the supporting structures. Design the DMS enclosure supports and structure to allow full access to the DMS enclosure inspection door. Mount the DMS enclosure according to the manufacturer's recommendations.

Furnish and install U-bolt connections of hanger beams to truss chords with a double nut at each end of the U-bolt. Bring the double nuts tight against each other by the use of two wrenches.

Submit plans for the DMS enclosure, structure, mounting description and calculations to the Engineer for approval. Have such calculations and drawings approved by a Professional Engineer registered in the state of North Carolina, and bear his signature, seal, and date of acceptance.

Provide removable lifting eyes or the equivalent on the DMS enclosure rated for its total weight to facilitate handling and mounting the DMS enclosure.

Design the DMS structure to conform to the applicable requirements of Section 906 of the *2024 Standard Specifications for Roads and Structures* and the section titled "DMS Pedestal Structure" of these Project Special Provisions.

P. DMS / DMS Controller Interconnect

Furnish and install all necessary cabling, conduit, and terminal blocks to connect the DMS and the DMS controller located in the equipment cabinet. Use approved manufacturer's specifications and the Project Plans for cable and conduit types and sizes. Use fiber-optic cable to interconnect sign and controller. Install fiber-optic interconnect centers in the sign enclosure and cabinet to securely install and terminate the fiber-optic cable. Submit material submittal cut sheets for the interconnect center.

Q. DMS Controller and DMS Cabinet

Furnish and install one DMS controller with accessories per DMS in a protective cabinet. Controlling multiple DMS with one controller is allowed when multiple DMS are mounted on the

same structure. Mount the controller cabinet on the Sign support structure. Install cabinet so that the height from the ground to the middle of the cabinet is 4 feet. Ensure a minimum of 24" x 36" level concrete working surface under each cabinet that provides maintenance technicians with a safe working environment.

Provide the DMS controller as a software-oriented microprocessor and with resident software stored in non-volatile memory. The Control Software, controller and communications must comply with the NTCIP Standards identified in these Project Special Provisions. Provide sufficient non-volatile memory to allow storage of at least 500 multi-page messages and a test pattern program.

For DMS Type 4C installations provide a single controller that can control up to eight (8) signs simultaneously.

Furnish the controller cabinet with, but not limited to, the following:

- Power supply and distribution assemblies,
- Power line filtering hybrid surge protectors,
- Radio Interference Suppressor,
- Communications surge protection devices,
- Industrial-Grade UPS system and local disconnect,
- Microprocessor based controller,
- Display driver and control system (unless integral to the DMS),
- RJ45 Ethernet interface port,
- Local user interface,
- Interior lighting and duplex receptacle,
- Adjustable shelves as required for components,
- Temperature control system,
- All interconnect harnesses, connectors, and terminal blocks,
- All necessary installation and mounting hardware.

Furnish the DMS controller and associated equipment completely housed in a Caltrans 336S cabinet made from 5052 H32 sheet aluminum at least 1/8" thick. Use natural aluminum cabinets. Perform all welding of aluminum and aluminum alloys in accordance with the latest edition of AWS D1.2, Structural Welding Code – Aluminum. Continuously weld the seams using Gas Metal Arc Welding (GMAW).

Slant the cabinet roof away from the front of the cabinet to prevent water from collecting on it.

Do not place a manufacturer name, logo, or other information on the faces of the controller cabinet

Provide cabinets capable of housing the components and sized to fit space requirement. Design the cabinet layout for ease of maintenance and operation, with all components easily accessible. Submit a cabinet layout plan for approval by the Engineer.

Locate louvered vents with filters in the cabinet to direct airflow over the controller and auxiliary equipment, and in a manner that prevents rain from entering the cabinet. Fit the inside of the cabinet,

directly behind the vents, with a replaceable, standard size, commercially available air filter of sufficient size to cover the entire vented area.

Provide a torsionally rigid door with a continuous stainless-steel hinge on the side that permits complete access to the cabinet interior. Provide a gasket as a permanent and weather resistant seal at the cabinet door and at the edges of the fan / exhaust openings. Use a non-absorbent gasket material that will maintain its resiliency after long term exposure to the outdoor environment. Construct the doors so that they fit firmly and evenly against the gasket material when closed. Provide the cabinet door with louvered vents and air filters near the bottom as described in the paragraph above.

The cabinet shall contain a full-height standard EIA 19-inch rack. The rack shall be secured within the cabinet by mounts at the top and bottom.

The rack shall contain a minimum of one (1) pullout drawer. The drawer shall be suitable for storing manuals and small tools. The drawer shall be able to latch in the out position to function as a laptop/utility shelf.

Provide a convenient location on the inside of the door to store the cabinet wiring diagrams and other related cabinet drawings. Provide a Corbin #2 main door lock made of non-ferrous or stainless-steel material. Key all locks on the project alike and provide 1 key per lock to the Engineer. In addition, design the handle to permit padlocking.

Provide the interior of the cabinet with ample space for housing the controller and all associated equipment and wiring. Provide ample space in the bottom of the cabinet for the entrance and exit of all power, communications, and grounding conductors and conduit.

Arrange the equipment to permit easy installation of the cabling through the conduit so that they will not interfere with the operation, inspection, or maintenance of the unit. Provide adjustable metal shelves, brackets, or other support for the controller unit and auxiliary equipment. Leave a 3-inch minimum clearance from the bottom of the cabinet to all equipment, terminals, and bus bars.

Provide power supply monitoring circuitry to detect power failure and to automatically report the occurrence to the Control Software.

Install two LED light strips with shields, one in the top of the cabinet and the other under the bottom shelf. Design both lights to automatically turn on when the cabinet door is opened and turn off when the door closes.

Mount and wire a 120V (+10%) GFCI duplex receptacle of the 3-wire grounding type in the cabinet in a location that presents no electrical hazard when used by service personnel for the operation of power tools and work lights.

No cabinet resident equipment may utilize the GFCI receptacle. Furnish one spare non-GFCI duplex receptacle for future equipment.

Mount a bug-proof and weatherproof thermostatically controlled fan and safety shield in the top of the cabinet. Size the fan to provide at least for two air exchanges per minute. Fuse the fan at 125% of the capacity of the motor. The magnetic field of the fan motor must not affect the performance of the control equipment. Use a fan thermostat that is manually adjustable to turn on between 80° F and 160° F with a differential of not more than 10° F between automatic turn on and turn off. Mount it in an easily accessible location, but not within 6 Inches of the fan.

Install additional fans and/or heaters as needed to maintain the temperature inside the cabinet within the operating temperature range of the equipment within the cabinet as recommended by equipment manufacturer(s).

1. Wiring

The requirements stated herein apply wherever electrical wiring is needed for any DMS system assemblies and subassemblies such as controller cabinet, DMS enclosure, electrical panel boards etc.

Neatly arrange and secure the wiring inside the cabinet. Where cable wires are clamped to the walls of the control cabinet, provide clamps made of nylon, metal, plastic with rubber or neoprene protectors, or similar. Lace and jacket all harnesses or tie them with nylon tie wraps spaced at 6 inches maximum to prevent separation of the individual conductors.

Individually and uniquely label all conductors. Ensure all conductor labels are clearly visible without moving the conductor. Connect all terminal conductors to the terminal strip in right angles. Remove excess conductor before termination of the conductor. Mold the conductor in such a fashion as to retain its relative position to the terminal strip if removed from the strip. Do not run a conductor across a work surface with the exception of connecting to that work surface. No conductor bundles can be support by fasteners that support work surfaces. Install all connectors, devices and conductors in accordance to manufactures guidelines. Comply with the latest NEC guideline in effect during installation. No conductor or conductor bundle may hang loose or create a snag hazard. Protect all conductors from damage. Ensure all solder joints are completed using industry accepted practices and will not fail due to vibration or movement. Protect lamps and control boards from damage.

No splicing will be allowed for feeder conductors and communication cables from the equipment cabinet to the DMS enclosure.

Insulate all conductors and live terminals so they are not hazardous to maintenance personnel.

Route and bundle all wiring containing line voltage AC and / or shield it from all low voltage control circuits. Install safety covers to prevent accidental contact with all live AC terminals located inside the cabinet.

Use industry standard, keyed type connectors with a retaining feature for connections to the controller.

Label all equipment and equipment controls clearly.

Supply each cabinet with one complete set of wiring diagrams that identify the color-coding or wire tagging used in all connections. Furnish a water-resistant packet adequate for storing wiring diagrams, operating instructions, and maintenance manuals with each cabinet.

2. Power Supply and Circuit Protection

Design the DMS and controller for use on a system with a line voltage of 120V + 10% at a frequency of 60 Hz \pm 3 Hz. Under normal operation, do not allow the voltage drop between no load and full load of the DMS and its controller to exceed 3% of the nominal voltage.

Blackout, brownout, line noise, chronic over-voltage, sag, spike, surge, and transient effects are considered typical AC voltage defects. Protect the DMS system equipment so that these defects do not damage the DMS equipment or interrupt their operation. Equip all cabinets with devices to protect the equipment in the cabinet from damage due to lightning and external circuit power and current surges.

3. Circuit Breakers

Protect the DMS controller, accessories, and cabinet utilities with thermal magnetic circuit breakers. Provide the controller cabinet with a main circuit breaker sized according to the NEC. Use appropriately sized branch circuit breakers to protect the controller, sign display and accessories and for servicing DMS equipment and cabinet utilities.

Provide a subpanel in the sign enclosure with a main and branch circuit breakers sized appropriately per NEC.

Provide a detailed plan for power distribution within the cabinet and the sign. Label all breaker and conductor with size and loads. Have the plans signed and sealed by a NC registered PE and submit the plans for review and approval.

4. Surge Suppressor

Install and clearly label filtering hybrid power line surge protectors on the load side of the branch circuit breakers in a manner that permits easy servicing. Ground and electrically bond the surge protector to the cabinet within 2 inches.

Provide power line surge protector that meets the following requirements:

Peak surge current occurrences	20 minimum
Peak surge current for an 8 x 20 microsecond waveshape	50,000 Amperes
Energy Absorption	> 500 Joules
Clamp voltage	240 Volts
Response time	<1 nanosecond
Minimum current for filtered output	15 Amperes for 120VAC*
Temperature range	-40°F to +158°F

*Capable of handling the continuous current to the equipment

5. Transients and Emissions

DMS and DMS controller will be designed in such a way to meet the latest NEMA TS-4 for Transients and Emissions.

6. Transient Protection

The RS232 and Ethernet communication ports in the DMS sign controller shall be protected with surge protection between each signal line and ground. This surge protection shall be integrated internally within the controller.

7. Lightning Arrester

Protect the system with an UL approved lightning arrester installed at the main service disconnect that meets the following requirements:

Type of design	Silicon Oxide Varistor
Voltage	120/240 Single phase, 3 wires

Maximum current	100,000 Amps
Maximum energy	3000 Joules per pole
Maximum number of surges	Unlimited
Response time one milliamp test	5 nanoseconds
Response time to clamp 10,000 amps	10 nanoseconds
Response time to clamp 50,000 amps	25 nanoseconds
Leak current at double the rated voltage	None
Ground Wire	Separate

8. Uninterruptible Power Supply (UPS)

Furnish UPS with external temperature monitoring that will shut off when running on battery power and the maximum operating temperature for the ethernet switch is reached.

Install UPS with RJ-45 ethernet network monitoring ports that can be disabled via the UPS software/firmware.

Contractor is responsible for supplying a UPS and batteries that can adequately power the cabinet load plus an additional 20% for a **minimum** of 4 hours. Contractor shall request the power requirements for any department supplied equipment prior to submitting UPS for approval. Allow eight (8) weeks for the department to supply equipment power requirements. Provide to the Engineer for Approval, a submittal package with Engineering Calculations consisting of, as a minimum, schematic drawing, technical data sheets, and supporting documentation. Ensure the documentation demonstrates, in theory, that the battery(ies) will provide for continuous operation for a minimum of four (4) consecutive hours with no additional charging.

Furnish and install one rack mounted UPS in each new cabinet that meet the following **minimum** specifications:

Output

Nominal Output Voltage	120V
Output Voltage Distortion	Less than 5% at full load
Output Frequency (sync to mains)	57 - 63 Hz for 60 Hz nominal
Crest Factor	up to 5:1
Waveform Type	Sine wave
Output Connections	(4) NEMA 5-15R

Input

Nominal Input Voltage	120V
Input Frequency	50/60 Hz +/- 3 Hz (auto sensing)
Input Connections	NEMA 5-15P
Input voltage range for main operations	82 - 144V

Input voltage adjustable range for mains operation 75 -154 V

Battery Type

Maintenance-free sealed Lead-Acid battery with suspended electrolyte, leak-proof.

Typical recharge time 2 hours

Communications & Management

Interface Port(s) DB-9 RS-232, USB,RJ-45 Ethernet

Control panel LED status display with load and battery bar-graphs

Surge Protection and Filtering

Surge energy rating 480 Joules

Environmental

Operating Environment -32 - 165 °F

Operating Relative Humidity 0 - 95%

Conformance

Regulatory Approvals FCC Part 15 Class A, UL 1778

9. Controller Communications Interface

Provide the controller with the following interface ports:

- An EIA/TIA-232E port for remote communication using NTCIP,
- An 10/100 Ethernet port for remote communication using NTCIP,
- An EIA/TIA-232E port for onsite access using a laptop,
- An EIA/TIA-232E auxiliary port for communication with a field device such as a UPS,
- Fiber-optic ports for communication with the sign,

10. Controller Local User Interface

Provide the controller with a Local User Interface (LUI) for at least the following functions:

- On / Off Switch: controls power to the controller,
- Control Mode Switch: for setting the controller operation mode to either remote or local mode,
- Display and Keypad: Allow user to navigate through the controller menu for configuration (display, communications parameter, etc.) running diagnostics, viewing peripherals status, message creation, message preview, message activation, etc. Furnish a display with a minimum size of 240x64 dots with LED back light.

Protected access to the LUI with an alphanumeric and PIN passwords. Allow the user to select a preferred method of password protection. Default and hardcoded passwords are not allowed.

11. Controller Address

Assign each DMS controller a unique address. Preface all commands from the Control Software with a particular DMS controller address. The DMS controller compares its address with the address transmitted; if the addresses match, then the controller processes the accompanying data.

12. Controller Functions

Design the DMS controller to continuously control and monitor the DMS independent of the Control Software. Design the controller to display a message on the sign sent by the Control Software, a message stored in the sign controller memory, or a message created on site by an operator using the controller keypad.

Provide the DMS controller with a watchdog timer to detect controller failures and to reset the microprocessor, and with a battery backed up clock to maintain an accurate time and date reference. Set the clock through an external command from the Control Software or the Local User Interface.

13. DMS Controller Memory

Furnish each DMS controller with non-volatile memory. Use the non-volatile memory to store and reprogram at least one test pattern sequence and 500 messages containing a minimum of two pages of 45 characters per page. The Control Software can upload messages into and download messages from each controller's non-volatile memory remotely.

Messages uploaded and stored in the controller's non-volatile memory may be erased and edited using the Control Software and the controller. New messages may be uploaded to and stored in the controller's non-volatile memory using the Control Software and the controller.

R. Equipment List

Provide a general description of all equipment and all information necessary to describe the basic use or function of the major system components. Include a general "block diagram" presentation. Include tabular charts listing auxiliary equipment, if any is required. Include the nomenclature, physical and electrical characteristics, and functions of the auxiliary equipment unless such information is contained in an associated manual; in this case include a reference to the location of the information.

Include a table itemizing the estimated average and maximum power consumption for each major piece of equipment.

S. Physical Description

Provide a detailed physical description of size, weight, center of gravity, special mounting requirements, electrical connections, and all other pertinent information necessary for proper installation and operation of the equipment.

T. Parts List

Submit a parts list that contains all information needed to describe the characteristics of the individual parts, as required for identification to the Engineer. Include a list of all equipment within a group and a list of all assemblies, sub-assemblies, and replacement parts of all units. Arrange this data in a table, in alpha numerical order of the schematic reference symbols, which gives the associated description, manufacture's name, and part number, as well as alternate manufacturers and part numbers. Provide a table of contents or other appropriate grouping to identify major components, assemblies, etc.

U. Character Set Submittal

Submit an engineering drawing of the DMS character set including at a minimum, 26 upper case and lower case letters, 10 numerals, 9 punctuation marks (. , ! ? - ' " ; :) 12 special characters (# & * + / () [] < > @) and arrows at 0, 45, 90, 135, 180, 225, 270, and 315 degrees.

V. Wiring Diagrams

Submit a wiring diagram for each DMS and each controller cabinet, as well as interconnection wiring diagrams for the system as a whole to the Engineer.

W. Routine of Operation

Describe the operational routine, from necessary preparations for placing the equipment into operation to securing the equipment after operation. Show appropriate illustrations with the sequence of operations presented in tabular form wherever applicable. Include in this section a total list of the test instruments, aids and tools required to perform necessary measurements and measurement techniques for each component, as well as set up, test, and calibration procedures.

X. Maintenance Procedures

Specify and submit the recommended preventative maintenance procedures and checks at pre-operation, monthly, quarterly, semiannual, annual, and "as required" periods to assure equipment operates reliably to the Engineer. List specifications (including tolerances) for all electrical, mechanical, and other applicable measurements and / or adjustments.

Y. Repair Procedures

Include in this section all data and step by step procedures necessary to isolate and repair failures or malfunctions, assuming the maintenance technicians are capable of analytical reasoning using the information provided in the sections titled "Wiring Diagrams", "Routine of Operation" and "Maintenance Procedures"

Describe accuracy, limits, and tolerances for all electrical, physical, or other applicable measurements. Include instructions for disassembly, overhaul, and reassembly, with shop specifications and performance requirements.

Give detailed instructions only where failure to follow special procedures would result in damage to equipment, improper operation, danger to operating or maintenance personnel, etc. Include such instructions and specifications only for maintenance that specialized technicians and engineers in a modern electromechanical shop would perform. Describe special test set up, component fabrication, and the use of special tools, jigs, and test equipment.

Z. Warranty

Ensure that the DMS system and equipment has a manufacturer's warranty covering all defects and failures for a minimum of five (5) years from the date of final acceptance by the Engineer. This warranty will cover all parts, labor, shipping, and any other costs associated with the repair of the DMS.

9.3. CONSTRUCTION METHODS

A. Description

This article establishes practices and procedures and gives minimum standards and requirements for the installation of DMS systems, auxiliary equipment and the construction of related structures.

Provide electrical equipment described in this specification that conforms to the standards of NEMA, UL, or Electronic Industries Association (EIA), wherever applicable. Provide connections between DMS equipment and DMS sign housing and electric utilities that conform to NEC standards.

Provide stainless steel screws, nuts, and locking washers in all external locations. Do not use self-tapping screws unless specifically approved by the Engineer. Use parts made of corrosion resistant materials, such as plastic, stainless steel, brass, or aluminum. Use construction materials that resist fungus growth and moisture deterioration. Separate dissimilar metals by an inert dielectric material.

B. Layout

The Regional ITS engineer or Division Traffic Engineer will establish the actual location of each DMS assembly. It is the Contractor's responsibility to ensure proper elevation, offset, and orientation of all DMS assemblies. The location of service poles as well as conduit lengths shown in the Project Plans, are approximate based on available project data. Make actual field measurements to place conduit and equipment at the required location.

C. Construction Submittal

When the work is complete, submit "as built" plans, inventory sheets, and any other data required by the Engineer to show the details of actual construction and installation and any modifications made during installation.

The "as built" plans will show: the DMS, controller, and service pole locations; DMS enclosure and controller cabinet wiring layouts; Wiring Diagrams, Parts list; coordinates of the DMS and devices; and wire and conduit routing. Show horizontal and vertical locations of all underground conduits and cables dimensioned from fixed objects.

Include detailed drawings that identify the routing of all conductors in the system by cable type, color code, and function. Clearly label all equipment in the DMS system, controller cabinet, and DMS enclosure.

D. Conduit

Install the conduit system in accordance with Section 1715 of the *Standard Specifications* and NEC requirements for an approved watertight raceway.

Make bends in the conduit so as not to damage it or change its internal diameter. Install watertight and continuous conduit with as few couplings as standard lengths permit.

Clean conduit before, during, and after installation. Install conduit in such a manner that temperature changes will not cause elongation or contraction that might damage the system.

Attach the conduit system to and install along the structural components of the Sign structure assemblies with beam clamps or stainless-steel strapping or inside the structure if there is available space. Install strapping according to the strapping manufacturer's recommendations and according to NEC requirements. Do not use welding or drilling to fasten conduit to structural components. Space the fasteners at no more than 4 feet for conduit 1.5 inches and larger or 6 feet for conduit smaller than 1.25 inches. Place fasteners no more than 3 feet from the center of bends, fittings, boxes, switches, and devices.

Flexible conduit will only be allowed when the conduits transition from the horizontal structure segment to the horizontal truss segment and from the horizontal truss segment to the rear entrance of the DMS when installing the DMS communications and feeder cables. The maximum length of flexible conduit allowed at each transition will be 5 feet.

Do not exceed the appropriate fill ratio on all cable installed in conduit as specified in the NEC.

E. Wiring Methods (Power)

Do not pull permanent wire through a conduit system until the system is complete and has been cleaned.

Color-code all conductors per the NEC. Use approved marking tape, paint, sleeves or continuous colored conductors for No.8 AWG and larger. Do not mark a white conductor in a cable assembly any other color.

Do not splice underground circuits unless specifically noted in the Project Plans.

F. Equipment and Cabinet Mounting

Mount equipment securely at the locations shown in the Project Plans, in conformance with the dimensions shown. Install fasteners as recommended by the manufacturer and space them evenly. Use all mounting holes and attachment points for attaching DMS enclosures and controller cabinets to the structures.

Drill holes for expansion anchors of the size recommended by the manufacturer of the anchors and thoroughly clean them of all debris.

Provide cabinets with all strapping hardware and any other necessary mounting hardware in accordance with these Project Special Provisions and the Project Plans.

Seal all unused conduit installed in cabinets at both ends to prevent water and dirt from entering the conduit and cabinet with approved sealing material.

Install a ground bushing attached inside the cabinet on all metal conduits entering the cabinet. Connect these ground bushings to the cabinet ground bus.

Install a level concrete technician pad measuring a minimum 4 inches thick, 36 inches wide and 36 inches long at the front door of the DMS equipment cabinet as shown on the Typical Details sheet within the Project Plans.

G. Work Site Clean-Up

Clean the site of all debris, excess excavation, waste packing material, wire, etc. Clean and clear the work site at the end of each workday. Do not throw waste material in storm drains or sewers.

9.4. GENERAL TEST PROCEDURE

Test the DMS and its components in a series of functional tests and ensure the results of each test meet the specified requirements in the presence of the Engineer. These tests should not damage the equipment. The Engineer will reject equipment that fails to fulfill the requirements of any test. Resubmit rejected equipment after correcting non-conformities and re-testing; completely document all diagnoses and corrective actions. Modify all equipment furnished under this contract, without additional cost to the Department, to incorporate all design changes necessary to pass the required tests.

Provide electronic copies of all test procedures and requirements to the Engineer for review and approval at least 30 days prior to the testing start date.

Only use approved procedures for the tests. Include the following in the test procedures:

- A step-by-step outline of the test sequence that demonstrates the testing of every function of the equipment or system tested
- A description of the expected nominal operation, output, and test results, and the pass / fail criteria
- An estimate of the test duration and a proposed test schedule
- A data form to record all data and quantitative results obtained during the test
- A description of any special equipment, setup, manpower, or conditions required by the test

Provide all necessary test equipment and technical support. Use test equipment calibrated to National Institute of Standards and Technology (NIST) standards. Provide calibration documentation upon request.

Conform to these testing requirements and the requirements of these specifications. It is the Contractor's responsibility to ensure the system functions properly even after the Engineer accepts the CCTV test results.

Provide electronic copies of the quantitative test results and data forms containing all data taken, highlighting any non-conforming results and remedies taken, to the Engineer for approval. An authorized representative of the manufacturer must sign the test results and data forms.

9.5. COMPATIBILITY TESTS

Compatibility Tests are applicable to DMS that the Contractor wishes to furnish but are of a different manufacturer or model series than the existing units installed in the Region. If required, the Compatibility Test shall be completed and accepted by the Engineer prior to approval of the material submittal.

The Compatibility Test shall be performed in a laboratory environment at a facility chosen by the Engineer based on the type of unit being tested. Provide notice to the Engineer with the material submitted that a Compatibility Test is requested. The notice shall include a detailed test plan that will show compatibility with existing equipment. The notice shall be given a minimum of 15 calendar days prior to the beginning of the Compatibility Test.

The Contractor shall provide, install, and integrate a full-functioning unit to be tested. The Department will provide access to existing equipment to facilitate these testing procedures. The Engineer will determine if the Compatibility Test was acceptable for each proposed device. To prove compatibility the Contractor is responsible for configuring the proposed equipment at the applicable Traffic Operations Center (TOC) with the accompaniment of an approved TOC employee.

9.6. OPERATIONAL FIELD TEST (ON-SITE COMMISSIONING)

Final DMS locations must be field verified and approved by the Engineer. Perform the following local operational field tests at the DMS assembly field site in accordance with the test plans in the presence of the ITS Design Unit and a representative of the DMS manufacturer. The Contractor is responsible for providing a laptop for camera control and positioning during the test. After completing the installation of the camera assemblies, including the camera hardware, power supply, and connecting cables, the contractor shall:

A. Local Field Testing

Furnish all equipment and labor necessary to test the installed camera and perform the following tests before any connections are made.

- Verify that physical construction has been completed.
- Inspect the quality and tightness of ground and surge protector connections.
- Check the power supply voltages and outputs, check connection of devices to power source.
- Verify installation of specified cables and connection between the DMS and control cabinet,
- Make sure cabinet wiring is neat and labeled properly; check wiring for any wear and tear; check for exposed or loose wires.
- Perform the DMS assembly manufacturer's initial power-on test in accordance with the manufacturer's recommendation.
- Set the DMS control address.

B. Central Operations Testing

- Interconnect the DMS’s communication interface device with one of the following methods as depicted on the plans:
 - communication network’s assigned Ethernet switch and assigned fiber-optic trunk cable and verify a transmit/receive LED is functioning and that the DMS is fully operational at the TOC.

AND/OR

- to the DOT furnished cellular modem and verify a transmit/receive LED is functioning and that the DMS is fully operational at the TOC.
- Review DMS date and time and DMS controller information.
- Run DMS diagnostics and review results.
- Run DMS pixel test and review results.
- Run test message.
- Run test schedule.
- Program burn-in scenario.

Approval of Operational Field Test results does not relieve the Contractor to conform to the requirements in these Project Special Provisions. If the DMS system does not pass these tests, document a correction or substitute a new unit as approved by the Engineer. Re-test the system until it passes all requirements.

9.7. MEASUREMENT AND PAYMENT

Dynamic Message Sign (Type 2C) will be measured and paid as the actual type and number of DMS furnished, installed, and accepted. Each DMS consists of a LED Dynamic Message Sign, spare display modules, warranty, strapping hardware, controller, UPS, controller cabinet, concrete technician pad, conduit, fittings, couplings, sweeps, conduit bodies, wire, flexible conduit, feeder conductors and communications cable between the controller cabinet and the DMS enclosure, connectors, circuit protection equipment, photo-electric sensors, tools, materials, all related testing, cost of labor, cost of transportation, incidentals, and all other equipment necessary to furnish and install the DMS system.

Payment will be made under:

Pay Item	Pay Unit
Dynamic Message Sign (Type 2C).....	Each

10. NTCIP REQUIREMENTS

This section defines the NTCIP requirements for the DMSs covered by these Project Special Provisions and Project Plans.

10.1. References

A. Standards

This specification references several standards through their NTCIP designated names. The following list provides the full reference to the current version of each of these standards.

Implement the most recent version of the standard including any and all Approved or Recommended Amendments to these standards for each NTCIP Component covered by these project specifications. Refer to the NTCIP library at www.ntcip.org for information on the current status of NTCIP standards.

Abbreviated Number	Title
NTCIP 1201	<i>Global Object (GO) Definitions</i>
NTCIP 1203	<i>Object Definitions for Dynamic Message Signs</i>
NTCIP 2101	<i>SP-PMPP/232 Subnet Profile for PMPP over RS-232</i>
NTCIP 2104	<i>SP-Ethernet Subnet Profile for Ethernet</i>
NTCIP 2201	<i>TP-Null Transport Profile</i>
NTCIP 2202	<i>Internet Transport Profile (TCP/IP and UDP/IP)</i>
NTCIP 2301	<i>AP for Simple Transportation Management Framework</i>

B. Features

Each DMS shall be required to support the following optional features, conformance groups and all functional requirements and objects that apply herein.

Feature	Reference
Time Management	NTCIP 1201 v3
Timebase Event Schedule	NTCIP 1201 v3
PMPP	NTCIP 1201 v3
Determine Sign Display Capabilities	NTCIP 1203 v03
Manage Fonts	NTCIP 1203 v03
Manage Graphics	NTCIP 1203 v03
Schedule Messages for Display	NTCIP 1203 v03

Change Message Display Based on and Internal Event	NTCIP 1203 v03
Control External Devices	NTCIP 1203 v03
Monitor Sign Environment	NTCIP 1203 v03
Monitor Door Status	NTCIP 1203 v03
Monitor Controller Software Operations	NTCIP 1203 v03
Monitor Automatic Blanking of Sign	NTCIP 1203 v03
Report	NTCIP 1103 v03

C. Objects

The following table represents objects that are considered optional in the NTCIP standards but are required by this specification. It also indicated modified objects value ranges for certain objects. Each DMS shall provide the full, standard object range support (FSORS) of all the objects required by these specifications unless otherwise stated below.

Object	Reference	Requirement
moduleTable	NTCIP 1201 – 2.2.3	Shall contain at least one row with moduleType equal to 3 (software) The moduleMake specifies the name of the manufacturer, the moduleModel specifies the manufacturer's name of the component and the moduleVersion indicates the model version number of the component.
maxTimeBaseScheduleEntries	NTCIP 1201 – 2.4.3.1.	Shall be at least 28
maxDayPlans	NTCIP 1201 – 2.4.4.1	Shall be at least 20
maxDayPlanEvents	NTCIP 1201 – 2.4.4.2	Shall be at least 12
maxGroupAddresses	NTCIP 1201 – 2.7.1	Shall be at least 1
maxEventLogConfigs	NTCIP 1103 – A.7.4	Shall be at least 50
eventConfigMode	NTCIP 1103 – A.7.5.3	The DMS shall support the following Event Configurations: onChange, greaterThanValue, smallerThanValue
eventConfigLogOID	NTCIP 1103 – A.7.5.7	FSORS
eventConfigAction	NTCIP 1103 – A.7.5.8	FSORS
maxEventLogSize	NTCIP 1103 – A.7.6	Shall be at least 20
maxEventClasses	NCTIP 1103 – A.7.2	Shall be at least 16
eventClassDescription	NTCIP 1103 – A.7.3.4	FSORS
communityNamesMax	NTCIP 1103 – A.7.8	Shall be at least 3
numFonts	NTCIP 1203 – 5.4.1	Shall be at least 12

maxFontCharacters	NTCIP 1203 – 5.4.3	Shall be at least 255
defaultFlashOn	NTCIP 1203 – 5.5.3	The DMS shall support flash “on” times ranging from 0.1 to 9.9 seconds in 0.1 second increments
defaultFlashOnActive	NTCIP 1203 – 5.5.4	The DMS shall support flash “on” times ranging from 0.1 to 9.9 seconds in 0.1 second increments
defaultFlashOff	NTCIP 1203 - 5.5.5	The DMS shall support flash “off” times ranging from 0.1 to 9.9 seconds in 0.1 second increments
defaultFlassOffActive	NTCIP 1203 – 5.5.6	The DMS shall support flash “off” times ranging from 0.1 to 9.9 seconds in 0.1 second increments
defaultBackgroundColor	NTCIP 1203 – 5.5.2	The DMS shall support the black background color
defaultForegroundColor	NTCIP 1203 - 5.5.2	The DMS shall support the amber foreground color
defaultJustificationLine	NTCIP 1203 - 5.5.9	The DMS shall support the following forms of line justification: left, center, and right
defaultJustificationPage	NTCIP 1203 - 5.5.11	The DMS shall support the following forms of page justification: top, middle, and bottom
defaultPageOnTime	NTCIP 1203 - 5.5.13	The DMS shall support page “on” times ranging from 0.1 to 25.5 seconds in 0.1 second increments
defaultPageOffTime	NTCIP 1203 - 5.5.15	The DMS shall support page “off” times ranging from 0.0 to 25.5 seconds in 0.1 second increments
defaultCharacterSet	NTCIP 1203 - 5.5.21	The DMS shall support the eight bit character set
dmsMaxChangeableMsg	NTCIP 1203 - 5.6.3	Shall be at least 100.
dmsMessageMultiString	NTCIP 1203 - 5.6.8.3	The DMS shall support any valid MULTI string containing any subset of those MULTI tags listed in Table 3 (below)
dmsControlMode	NTCIP 1203 - 5.7.1	Shall support at least the following modes: local, central, and centralOverride
dmsSWReset	NTCIP 1203 - 5.7.2	FSORS

dmsMessageTimeRemaining	NTCIP 1203 - 5.7.4	FSORS
dmsShortPowerRecoveryMessage	NTCIP 1203 - 5.7.8	FSORS
dmsLongPowerRecoveryMessage	NTCIP 1203 - 5.7.9	FSORS
dmsShortPowerLossTime	NTCIP 1203 - 5.7.14	FSORS
dmsResetMessage	NTCIP 1203 - 5.7.11	FSORS
dmsCommunicationsLossMessage	NTCIP 1203 - 5.7.12	FSORS
dmsTimeCommLoss	NTCIP 1203 - 5.7.13	FSORS
dmsEndDurationMessage	NTCIP 1203 - 5.7.15	FSORS
dmsMultiOtherErrorDescription	NTCIP 1203 - 5.7.20	If the vendor implements any vendor-specific MULTI tags, the DMS shall provide meaningful error messages within this object whenever one of these tags generates an error
dmsIllumControl	NTCIP 1203 - 5.8.1	The DMS shall support the following illumination control modes: Photocell, and Manual
dmsIllumNumBrightLevels	NTCIP 1203 - 5.8.4	Shall be at least 100
dmsIllumLightOutputStatus	NTCIP 1203 - 5.8.9	FSORS
numActionTableEntries	NTCIP 1203 - 5.9.1	Shall be at least 200
watcdogFailureCount	NTCIP 1203 - 5.11.1.5	FSORS
dmsStatDoorOpen	NTCIP 1203 - 5.11.1.6	FSORS
fanFailures	NTCIP 1203 - 5.11.2.3.1	FSORS
fanTestActivation	NTCIP 1203 - 5.11.2.3.2	FSORS
tempMinCtrlCabinet	NTCIP 1203 - 5.11.4.1	FSORS
tempMaxCtrlCabinet	NTCIP 1203 - 5.11.4.2	FSORS
tempMinSignHousing	NTCIP 1203 - 5.11.4.5	FSORS
tempMaxSignHousing	NTCIP 1203 - 5.11.4.6	FSORS

D. MULTI Tags

Each DMS shall support the following message formatting MULTI tags. The manufacturer may choose to support additional standard or manufacturer specific MULTI tags.

Code	Feature
f1	field 1 - time (12hr)
f2	field 2 - time (24hr)
f8	field 8 - day of month

Code	Feature
f9	field 9 – month
f10	field 10 - 2 digit year
f11	field 11 - 4 digit year
fl (and /fl)	flashing text on a line by line basis with flash rates controllable in 0.5 second increments.
fo	Font
jl2	Justification – line – left
jl3	Justification – line – center
jl4	Justification – line – right
jl5	Justification – line – full
jp2	Justification – page – top
jp3	Justification – page – middle
jp4	Justification – page – bottom
mv	moving text
nl	new line
np	new page, up to 2 instances in a message (i.e., up to 3 pages/frames in a message counting first page)
pt	page times controllable in 0.5 second increments.

E. Documentation

Supply software with full documentation, including a USB flash drive containing ASCII versions of the following MIB files in Abstract Syntax Notation 1 (ASN.1) format:

- The relevant version of each official standard MIB Module referenced by the device functionality.
- If the device does not support the full range of any given object within a Standard MIB Module, a manufacturer specific version of the official Standard MIB Module with the supported range indicated in ASN.1 format in the SYNTAX and/or DESCRIPTION fields of the associated OBJECT TYPE macro. Name this file identical to the standard MIB Module, except that it will have the extension ".man".
- A MIB Module in ASN.1 format containing any and all manufacturer-specific objects supported by the device with accurate and meaningful DESCRIPTION fields and supported ranges indicated in the SYNTAX field of the OBJECT-TYPE macros.
- A MIB containing any other objects supported by the device.

Allow the use of any and all of this documentation by any party authorized by the Department for systems integration purposes at any time initially or in the future, regardless of what parties are involved in the systems integration effort.

F. NTCIP Acceptance Testing

Test the NTCIP requirements outlined above by a third party testing firm. Submit to the Engineer for approval a portfolio of the selected firm. Include the name, address, and a history of the selected firm in performing NTCIP testing along with references. Also provide a contact person's name and phone number. Submit detailed NTCIP testing plans and procedures, including a list of hardware and software, to the Engineer for review and approval 10 days in advance of a scheduled testing date. Develop test documents based on the NTCIP requirements of these Project Special Provisions.

The acceptance test will use the NTCIP Exerciser, and/or other authorized testing tools and will follow the guidelines established in the ENTERPRISE Test Procedures. Conduct the test in North Carolina on the installed system in the presence of the Engineer. Document and certify the results of the test by the firm conducting the test and submit the Engineer for review and approval. In case of failures, remedy the problem and have the firm retest in North Carolina. Continue process until all failures are resolved. The Department reserves the right to enhance these tests as deemed appropriate to ensure device compliance.

10.2. Measurement and Payment

There will be no direct payment for the work covered by this section.

Payment for this work will be covered in the applicable sections of these Project Special Provisions at the contract unit price for “Dynamic Message Sign ()” and will be full compensation for all work listed above.

11. DMS PEDESTAL STRUCTURE

11.1. DESCRIPTION

This section includes all design, fabrication, furnishing, and erection of the DMS pedestal structure, platforms, walkways, ladders for access to the DMS inspection doors, and attachment of the DMS enclosures to the structure in accordance with the requirements of these Project Special Provisions and the Project Plans. Fabricate the supporting DMS assemblies from tubular steel. Furnish pedestal type DMS assemblies as shown in the Project Plans.

Provide pedestal DMS structures with a minimum clearance from the high point of the road to the bottom of the DMS enclosure of 25 feet for Walk-In DMS.

Design the new DMS assemblies (including footings), DMS mounting assemblies, maintenance platforms, and access ladders and submit shop drawings for approval. Assume a maximum deadload of 5400 pounds for all designs. A Professional Engineer that is registered in the state of North Carolina will prepare such computations and drawings. These must bear his signature, seal, and date of acceptance.

The provisions of Section 900 of the *Standard Specifications* apply to all work covered by this section.

The Standard Provisions SP09R005 and SP09R007 found at the link below apply to all work covered by this section.

<https://connect.ncdot.gov/resources/Specifications/Pages/2024-Specifications-and-Special-Provisions.aspx>

It is the Contractor’s responsibility to verify DMS S-dimension elevation drawings for the DMS locations and provide them with the DMS shop drawings for the Engineer’s approval.

11.2. MATERIALS

Use materials that meet the requirements of:

- Section 906 of the *2024 Standard Specification for Roads and Structures*.
- Standard Provision SP09R005 *Foundations and Anchor Rod Assemblies for Metal Poles*.
- Standard Provision SP09R007 *Overhead and Dynamic Message Sign Foundations*.

11.3. CONSTRUCTION METHODS

A. General

Construct DMS structures and assemblies in accordance with the requirements of:

- Section 906 of the *2024 Standard Specification for Roads and Structures*.
- Standard Provision SP09R005 *Foundations and Anchor Rod Assemblies for Metal Poles*.
- Standard Provision SP09R007 *Overhead and Dynamic Message Sign Foundations*.

B. DMS Maintenance Platform (Walkway)

Provide a maintenance platform (walkway), a minimum of three feet wide with open skid resistant surface and safety railing on the DMS assemblies for access to one of the DMS inspection doors as shown on the plans. Provide platforms with fixed safety railings along both sides from the beginning of the platform to the inspection door. No gap is allowed between walkway and inspection door or along any part of the safety rails.

Ensure the design, fabrication and installation of the access platforms on new DMS structures complies with the following:

- A. The top of the platform grading surface is vertically aligned with the bottom of the DMS door,
- B. The DMS door will open 90-degrees from its closed position without any obstruction from the platform or safety handrails,
- C. The platform is rigidly and directly connected to the walkway brackets and there is no uneven surface between sections,
- D. Install a 4" x 4" safety angle parallel to and along both sides of the platform and extend it the entire length of the platform. Design the safety angle to withstand loading equivalent to the platform,
- E. Ensure the platform design allows full access to the DMS enclosure inspection door with no interference or obstructions.

C. DMS Access Ladder

Provide a fixed ladder, of the same material as the pedestal structures, leading to and ending at the access platform. Equip the ladder with a security cover (ladder guard) and lock to prohibit access by unauthorized persons. Furnish the lock to operate with a Corbin #2 key and furnish two keys per lock. Design the rungs on 12-inch center to center typical spacing. Start the first ladder rung no more than 18 inches above the landing pad. Attach the security cover approximately 6 feet above the finished ground. Design the ladder and security cover as a permanent part of the DMS assembly and include complete design details in the DMS assembly shop drawings. Fabricate the ladder and cover to meet all OSHA requirements and applicable state and local codes, including but not limited to providing a ladder cage.

Furnish and install a level concrete pad a minimum of 4 inches deep, 24 inches wide, and 36 inches long to service as a landing pad for accessing the ladder. Design the landing pad to be directly below

the bottom rung. Access to the ladder shall not be obstructed by the DMS foundation. Provide pre-formed or cast-in place concrete pads.

11.4. MEASUREMENT AND PAYMENT

DMS Pedestal Structure will be measured and paid as the actual number of dynamic message sign pedestal structure assemblies furnished, installed, and accepted. Payment includes all design, fabrication, construction, transportation, and attachment of the complete relocated dynamic message sign assemblies, supporting structure, hardware, access platform, direct tension indicators, preparing and furnishing shop drawings, additional documentation, incidentals, and all other equipment and features necessary to furnish the system described above.

DMS Access Ladder will be measured and paid as the actual number of DMS access ladders, platform, walkway furnished, installed and accepted. Payment includes design, fabrication, transportation, attachment to the DMS assembly as described above, lock with two keys each, and concrete pad.

Overhead Footings will be measured and paid in cubic yards and will be full compensation for all materials and labor required in *Overhead and Dynamic Message Sign Foundations (SP09 R007) and Foundations and Anchor Rod Assemblies for Metal Poles (PS09 R005)* referred in the link above. Payment will be made according to PS09 R007

The contract unit price for Overhead Footings will be full compensation for providing labor, tools, equipment and foundation materials, stabilizing or shoring excavations, supplying and placing concrete, reinforcing steel, conduit, anchor rod assemblies and any incidentals necessary to construct sign foundations. Subsurface investigations required by the Engineer will be paid as extra work in accordance with Article 104-7 of the *2024 Standard Specifications for Roads and Structures*.

Payment will be made under:

Pay Item	Pay Unit
DMS Pedestal Structure	Each
DMS Access Ladder	Each

12. ELECTRICAL SERVICE FOR ITS DEVICES

12.1. DESCRIPTION

Install new electrical service equipment as shown in the plans. Installation of all new electrical service pedestals, poles, and meter base/disconnect combination panels shall be the first item of work on this project to expedite the power service connections. Comply with the National Electrical Code (NEC), the National Electrical Safety Code (NESC), the Standard Specifications, the Project Special Provisions, and all local ordinances. All work involving electrical service shall be coordinated with the appropriate utility company and the Engineer.

Obtain the maximum available ground fault current from the utility company. Print this information on a durable label and adhere to the dead front of the disconnect.

12.2. MATERIAL

A. Meter Base/Disconnect Combination Panel

Furnish and install new meter base/disconnect combination panels as shown in the Plans. Provide meter base/disconnect combination panels that have a minimum 125A main service disconnect and a minimum of eight (8) additional spaces. Furnish a single pole 15A circuit breaker at CCTV locations. Furnish a double pole 50A circuit breakers at single DMS locations. Furnish a double pole 100A circuit breakers at dual DMS locations. Furnish each with a minimum of 10,000 RMS symmetrical amperes short circuit current rating in a lockable NEMA 3R enclosure. Ensure meter base/ disconnect combination panel is listed as meeting UL Standard UL-67 and marked as being suitable for use as service equipment. Ensure circuit breakers are listed as meeting UL-489. Place barriers so that no uninsulated, ungrounded service busbar or service terminal is exposed to inadvertent contact by persons or maintenance equipment while servicing load terminations. Fabricate enclosure from galvanized steel and electrostatically apply dry powder paint finish, light gray in color, to yield a minimum thickness of 2.4 mils. All exterior surfaces must be powder coated steel. Provide ground bus and neutral bus with a minimum of four terminals and a minimum wire capacity range of number 8 through number 3/0 AWG.

Furnish NEMA Type 3R combinational panels rated 100 Ampere minimum for overhead services and 200 Ampere minimum for underground services that meet the requirements of the local utility. Provide meter base with sockets' ampere rating based on sockets being wired with a minimum of 167 degrees F insulated wire. Furnish 4 terminal, 600 volt, single phase, 3-wire meter bases that comply with the following:

- Line, Load, and Neutral Terminals accept 4/0 AWG and smaller Copper/Aluminum wire
- With or without horn bypass
- Made of galvanized steel
- Listed as meeting UL Standard US-414
- Overhead or underground service entrance specified.

Furnish 1.5” watertight hub for threaded rigid conduit with meter base.

At the main service disconnect, furnish and install UL-approved lightning arrestors that meet the following requirements:

Type of design	Silicon Oxide Varistor
Voltage	120/240 Single Phase, 3 wire
Maximum current	100,000 amps
Maximum energy	3000 joules per pole
Maximum number of surges	Unlimited
Response time one milliamp test	5 nanoseconds
Response time to clamp 10,000 amps	10 nanoseconds
Response time to clamp 50,000 amps	25 nanoseconds

Leak current at double the rated voltage	None
Ground wire	Separate

B. 3-Wire Copper Service Entrance Conductors

Furnish 3-wire stranded copper service entrance conductors with THWN rating. Provide conductors with black, red, and white insulation that are intended for power circuits at 600 Volts or less and comply with the following:

- Listed as meeting UL Standard UL-83
- Meets ASTM B-3 and B-8 or B-787 standards.

See the Plans for wire sizes and quantities.

C. 3-Wire Copper Feeder Conductors

Furnish 3-wire stranded copper feeder conductors with THWN rating for supplying power to ITS field equipment cabinets. Provide conductors with black or red, white, and green insulation that are intended for power circuits at 600 Volts or less and comply with the following:

- Listed as meeting UL Standard UL-83
- Meets ASTM B-3 and B-8 or B-787 standards.

See the Plans for wire sizes and quantities.

D. 4-Wire Copper Feeder Conductors

Furnish 4-wire stranded copper feeder conductors with THWN rating for supplying power to DMS field equipment cabinets. Provide conductors with black, red, white, and green insulation that are intended for power circuits at 600 Volts or less and comply with the following:

- Listed as meeting UL Standard UL-83
- Meets ASTM B-3 and B-8 or B-787 standards.

See the Plans for wire sizes and quantities.

E. Grounding System

Furnish 5/8"x10' copper clad steel grounding electrodes (ground rods), #4 AWG solid bare copper conductors. Comply with the NEC, Standard Specifications, these Project Special Provisions, and the Plans.

12.3. CONSTRUCTION METHODS

A. General

Coordinate with the Engineer and the utility company to de-energize the existing service temporarily prior to starting any modifications.

Permanently label cables at all access points using nylon tags labeled with permanent ink. Ensure each cable has a unique identifier. Label cables immediately upon installation. Use component name and labeling scheme approved by the Engineer.

B. Meter Base/Disconnect Combination Panel

Install meter base/disconnect combination panels with lightning arrestors as called for in the Plans. At all new DMS locations, route the feeder conductors from the meter base/disconnect to the DMS equipment cabinet in conduit. At all new CCTV locations, route the feeder conductors from the meter base/disconnect to the CCTV equipment cabinet in conduit. Provide rigid galvanized conduit for above ground and PVC for below ground installations.

C. 3-Wire Copper Service Entrance Conductors

At locations shown in the Plans, furnish and install 3-wire THWN stranded copper service entrance conductors in 1.25 inch rigid galvanized risers as shown in the plans. Install a waterproof hub on top of the electrical service disconnect for riser entrance/exit. Size the conductors as specified in the Plans. Comply with the Standard Specifications and Standard Drawings and all applicable electrical codes.

D. 4-Wire Copper Feeder Conductors

At locations shown in the Plans, install 4-wire THWN stranded copper feeder conductors to supply 240/120 VAC to the DMS field equipment cabinets. Size the conductors as specified in the Plans. Comply with the Standard Specifications and Standard Drawings and all applicable electrical codes.

E. 3-Wire Copper Feeder Conductors

At locations shown in the Plans, install 3-wire THWN stranded copper feeder conductors to supply 120 VAC to the CCTV field equipment cabinets. Size the conductors as specified in the Plans. Comply with the Standard Specifications and Standard Drawings and all applicable electrical codes.

F. Grounding System

Install ground rods as indicated in the Plans. Connect the #4 AWG grounding conductor to ground rods using an irreversible mechanical crimping method. Test the system to ensure a ground resistance of 20-ohms or less is achieved. Drive additional ground rods as necessary or as directed by the Engineer to achieve the proper ground resistance.

12.4. MEASUREMENT AND PAYMENT

Meter base/disconnect combination panel will be measured and paid as the actual number of complete and functional meter base/disconnect combination panel service locations furnished, installed and accepted. Breakers, lightning arrestors, exposed vertical conduit runs to the cabinet, and any remaining hardware, fittings, and conduit bodies to connect the electrical service to the cabinet will be considered incidental to meter base/disconnect combination panels.

3-Wire copper service entrance conductors will be incidental to furnish and installing the meter base/disconnect combination panel. All other required feeder conductors will be paid for separately.

4-Wire copper feeder conductors will be measured and paid as the actual linear feet of 4-wire THWN stranded copper feeder conductors furnished, installed and accepted. Payment is for all four conductors. Measurement will be for the actual linear footage of combined conductors after all

terminations are complete. No separate payment will be made for each individual conductor. No separate payment will be made for different wire sizes. No payment will be made for excess wire in the cabinets.

3-Wire copper feeder conductors will be measured and paid as the actual linear feet of 3-wire THWN stranded copper feeder conductors furnished, installed and accepted. Payment is for all three conductors. Measurement will be for the actual linear footage of combined conductors after all terminations are complete. No separate payment will be made for each individual conductor. No separate payment will be made for different wire sizes. No payment will be made for excess wire in the cabinets.

5/8" X 10' grounding electrode (ground rod) will be measured and paid as the actual number of 5/8" copper clad steel ground rods furnished, installed and accepted. No separate payment will be made for irreversible mechanical crimping tool as this will be considered incidental to the installation of the ground rod.

#4 solid bare grounding conductor will be measured and paid as the actual linear feet of #4 AWG solid bare copper grounding conductor furnished, installed and accepted. Measurement will be along the approximate centerline from the base of the electrical service disconnect to the last grounding electrode.

Payment will be made under:

Pay Item	Pay Unit
Meter Base/Disconnect Combination Panel	Each
3-Wire Copper Service Entrance Conductors.....	Linear Foot
4-Wire Copper Feeder Conductors	Linear Foot
3-Wire Copper Feeder Conductors	Linear Foot
5/8" X 10' Grounding Electrode.....	Each
#4 Solid Bare Grounding Conductor	Linear Foot

13. OBSERVATION PERIOD FOR ITS DEVICES

13.1. 30-DAY OBSERVATION PERIOD

The 30-Day Observation Period shall be considered part of work to be completed by the project completion date.

Upon successful completion of all project work the 30-day Observation Period may commence. Examples of project work includes but is not limited to:

- Installation of all project devices and communications infrastructure.
- Field Acceptance Testing of all devices.
- Central System Testing of all devices and network communications.
- Correction of all deficiencies and punch list items. (including minor construction items)

This observation consists of a 30-day period of normal, day-to-day operations of the field equipment in operation with new or existing central equipment without any failures. The purpose of

this period is to ensure that all components of the system function in accordance with the Plans and these Project Special Provisions.

Respond to system or component failures (or reported failures) that occur during the 30-day Observation Period within twenty-four (24) hours. Correct any failures within forty-eight (48) hours (includes time of notification). Any failure that affects a major system component as defined below for more than forty-eight (48) hours will suspend the timing of the 30-day Observation Period beginning at the time when the Contractor is was notified that the failure occurred. After the cause of such failures has been corrected, timing of the 30-day Observation Period will resume. System or component failures that necessitate a redesign of any component or a failure in any of the major system components exceeding a total of three (3) occurrences will terminate the 30-day Observation Period for that system. The 30-day Observation Period will be restarted from day zero when the redesigned components have been installed and/or the failures corrected. The major system components are:

- CCTV Cameras and Central Operations
- Dynamic Message Sign (DMS) and Central equipment/Operations
- Portable Changeable Message Sign (PCMS)
- Communications infrastructure (examples: Fiber, Radios, Ethernet Switches, Core Switches, etc.)
- Any other ITS Devices not named above (examples: DSRC radios, Radar and Out-of-Street Detection, etc.)

13.2. FINAL ACCEPTANCE

Final system acceptance is defined as the time when all work and materials described in the Plans and these Project Special Provisions have been furnished and completely installed by the Contractor; all parts of the work have been approved and accepted by the Engineer; and successful completion of the 30-day observation period.

The completed System will be ready for final acceptance upon the satisfactory completion of all acceptance tests as detailed in their respective Section of the Project Special provisions; the rectification of all punch-list discrepancies; and the submittal of all project documentation including as-built plans.

13.3. MEASUREMENT AND PAYMENT

There will be no payment for this item of work as it is incidental to the project as a whole and to the item of work in which it is associated.

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Line #	Item Number	Sec #	Description	Quantity	Unit Cost	Amount
ROADWAY ITEMS						
0001	0000100000-N	800	MOBILIZATION	Lump Sum	L.S.	
0002	0000400000-N	801	CONSTRUCTION SURVEYING	Lump Sum	L.S.	
0003	0001000000-E	200	CLEARING & GRUBBING .. ACRE(S)	Lump Sum	L.S.	
0004	0008000000-E	200	SUPPLEMENTARY CLEARING & GRUBBING	3 ACR		
0005	0015000000-N	205	SEALING ABANDONED WELLS	14 EA		
0006	0022000000-E	225	UNCLASSIFIED EXCAVATION	153,120 CY		
0007	0036000000-E	225	UNDERCUT EXCAVATION	12,900 CY		
0008	0106000000-E	230	BORROW EXCAVATION	147,990 CY		
0009	0134000000-E	240	DRAINAGE DITCH EXCAVATION	18,330 CY		
0010	0141000000-E	240	BERM DITCH CONSTRUCTION	4,300 LF		
0011	0156000000-E	250	REMOVAL OF EXISTING ASPHALT PAVEMENT	19,050 SY		
0012	0163000000-E	250	REMOVAL OF EXISTING CONCRETE PAVEMENT	48,230 SY		
0013	0177000000-E	250	BREAKING OF EXISTING ASPHALT PAVEMENT	3,035 SY		
0014	0185000000-E	250	BREAKING OF EXISTING CONCRETE PAVEMENT	7,905 SY		
0015	0194000000-E	265	SELECT GRANULAR MATERIAL, CLASS III	1,700 CY		
0016	0195000000-E	265	SELECT GRANULAR MATERIAL	3,700 CY		
0017	0196000000-E	270	GEOTEXTILE FOR SOIL STABILIZATION	6,200 SY		

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Line #	Item Number	Sec #	Description	Quantity	Unit Cost	Amount
0018	0199000000-E	SP	TEMPORARY SHORING	3,377 SF		
0019	0248000000-N	SP	GENERIC GRADING ITEM TYPE 1 BRIDGE APPROACH FILL, STA 140+39.50 -L- LT	Lump Sum	L.S.	
0020	0248000000-N	SP	GENERIC GRADING ITEM TYPE 1 BRIDGE APPROACH FILL, STA 140+39.50 -L- RT	Lump Sum	L.S.	
0021	0255000000-E	SP	GENERIC GRADING ITEM HAULING AND DISPOSAL OF PETROLEUM CONTAMINATED SOIL	100 TON		
0022	0318000000-E	300	FOUNDATION CONDITIONING MATERIAL, MINOR STRUCTURES	6,020 TON		
0023	0321000000-E	300	FOUNDATION CONDITIONING GEOTEXTILE	18,910 SY		
0024	0342000000-E	310	*** SIDE DRAIN PIPE (30")	16 LF		
0025	0343000000-E	310	15" SIDE DRAIN PIPE	2,608 LF		
0026	0344000000-E	310	18" SIDE DRAIN PIPE	1,076 LF		
0027	0345000000-E	310	24" SIDE DRAIN PIPE	56 LF		
0028	0366000000-E	310	15" RC PIPE CULVERTS, CLASS III	5,976 LF		
0029	0372000000-E	310	18" RC PIPE CULVERTS, CLASS III	11,612 LF		
0030	0378000000-E	310	24" RC PIPE CULVERTS, CLASS III	2,888 LF		
0031	0384000000-E	310	30" RC PIPE CULVERTS, CLASS III	1,484 LF		
0032	0390000000-E	310	36" RC PIPE CULVERTS, CLASS III	792 LF		
0033	0396000000-E	310	42" RC PIPE CULVERTS, CLASS III	300 LF		
0034	0402000000-E	310	48" RC PIPE CULVERTS, CLASS III	132 LF		

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Line #	Item Number	Sec #	Description	Quantity	Unit Cost	Amount
0035	0414000000-E	310	60" RC PIPE CULVERTS, CLASS III	76 LF		
0036	0426000000-E	310	72" RC PIPE CULVERTS, CLASS III	104 LF		
0037	0448200000-E	310	15" RC PIPE CULVERTS, CLASS IV	23,696 LF		
0038	0448300000-E	310	18" RC PIPE CULVERTS, CLASS IV	1,272 LF		
0039	0448400000-E	310	24" RC PIPE CULVERTS, CLASS IV	940 LF		
0040	0448500000-E	310	30" RC PIPE CULVERTS, CLASS IV	688 LF		
0041	0448600000-E	310	36" RC PIPE CULVERTS, CLASS IV	472 LF		
0042	0576000000-E	310	*** CS PIPE CULVERTS, ***** THICK (36", 0.079")	76 LF		
0043	0576000000-E	310	*** CS PIPE CULVERTS, ***** THICK (42", 0.109")	132 LF		
0044	0576000000-E	310	*** CS PIPE CULVERTS, ***** THICK (48", 0.109")	32 LF		
0045	0582000000-E	310	15" CS PIPE CULVERTS, 0.064" THICK	920 LF		
0046	0588000000-E	310	18" CS PIPE CULVERTS, 0.064" THICK	832 LF		
0047	0594000000-E	310	24" CS PIPE CULVERTS, 0.064" THICK	88 LF		
0048	0600000000-E	310	30" CS PIPE CULVERTS, 0.079" THICK	100 LF		
0049	0636000000-E	310	*** CS PIPE ELBOWS, ***** THICK (15", 0.064")	42 EA		
0050	0636000000-E	310	*** CS PIPE ELBOWS, ***** THICK (18", 0.064")	26 EA		
0051	0636000000-E	310	*** CS PIPE ELBOWS, ***** THICK (24", 0.064")	4 EA		

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Line #	Item Number	Sec #	Description	Quantity	Unit Cost	Amount
0052	0636000000-E	310	*** CS PIPE ELBOWS, ***** THICK (30", 0.079")	6 EA		
0053	0636000000-E	310	*** CS PIPE ELBOWS, ***** THICK (36", 0.079")	2 EA		
0054	0636000000-E	310	*** CS PIPE ELBOWS, ***** THICK (42", 0.109")	2 EA		
0055	0636000000-E	310	*** CS PIPE ELBOWS, ***** THICK (48", 0.109")	2 EA		
0056	0973100000-E	330	*** WELDED STEEL PIPE, ***** THICK, GRADE B IN SOIL (24", 0.500")	96 LF		
0057	0973100000-E	330	*** WELDED STEEL PIPE, ***** THICK, GRADE B IN SOIL (30", 0.500")	108 LF		
0058	0973100000-E	330	*** WELDED STEEL PIPE, ***** THICK, GRADE B IN SOIL (48", 0.625")	82 LF		
0059	0973100000-E	330	*** WELDED STEEL PIPE, ***** THICK, GRADE B IN SOIL (72", 1.000")	148 LF		
0060	0973300000-E	330	*** WELDED STEEL PIPE, ***** THICK, GRADE B NOT IN SOIL (24", 0.500")	96 LF		
0061	0973300000-E	330	*** WELDED STEEL PIPE, ***** THICK, GRADE B NOT IN SOIL (30", 0.500")	108 LF		
0062	0973300000-E	330	*** WELDED STEEL PIPE, ***** THICK, GRADE B NOT IN SOIL (48", 0.625")	82 LF		
0063	0973300000-E	330	*** WELDED STEEL PIPE, ***** THICK, GRADE B NOT IN SOIL (72", 1.000")	148 LF		
0064	0995000000-E	340	PIPE REMOVAL	7,698 LF		
0065	1011000000-N	500	FINE GRADING	Lump Sum	L.S.	
0066	1099500000-E	505	SHALLOW UNDERCUT	3,400 CY		
0067	1099700000-E	505	CLASS IV SUBGRADE STABILIZATION	6,600 TON		

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Line #	Item Number	Sec #	Description	Quantity	Unit Cost	Amount
0068	1112000000-E	505	GEOTEXTILE FOR SUBGRADE STABILIZATION	10,200 SY		
0069	1220000000-E	545	INCIDENTAL STONE BASE	4,610 TON		
0070	1297000000-E	607	MILLING ASPHALT PAVEMENT, **** DEPTH (1-1/2")	510 SY		
0071	1297000000-E	607	MILLING ASPHALT PAVEMENT, **** DEPTH (2-1/2")	1,660 SY		
0072	1297000000-E	607	MILLING ASPHALT PAVEMENT, **** DEPTH (4")	11,360 SY		
0073	1330000000-E	607	INCIDENTAL MILLING	3,670 SY		
0074	1491000000-E	610	ASPHALT CONC BASE COURSE, TYPE B25.0C	85,820 TON		
0075	1503000000-E	610	ASPHALT CONC INTERMEDIATE COURSE, TYPE I19.0C	50,990 TON		
0076	1519000000-E	610	ASPHALT CONC SURFACE COURSE, TYPE S9.5B	6,030 TON		
0077	1523000000-E	610	ASPHALT CONC SURFACE COURSE, TYPE S9.5C	39,180 TON		
0078	1575000000-E	620	ASPHALT BINDER FOR PLANT MIX	9,015 TON		
0079	1693000000-E	654	ASPHALT PLANT MIX, PAVEMENT REPAIR	1,290 TON		
0080	2000000000-N	806	RIGHT-OF-WAY MARKERS	231 EA		
0081	2022000000-E	815	SUBDRAIN EXCAVATION	1,311 CY		
0082	2026000000-E	815	GEOTEXTILE FOR SUBSURFACE DRAINS	3,900 SY		
0083	2036000000-E	815	SUBDRAIN COARSE AGGREGATE	655 CY		
0084	2044000000-E	815	6" PERFORATED SUBDRAIN PIPE	3,900 LF		

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Line #	Item Number	Sec #	Description	Quantity	Unit Cost	Amount
0085	2070000000-N	815	SUBDRAIN PIPE OUTLET	8 EA		
0086	2077000000-E	815	6" OUTLET PIPE	48 LF		
0087	2209000000-E	838	ENDWALLS	17.9 CY		
0088	2220000000-E	838	REINFORCED ENDWALLS	13.4 CY		
0089	2275000000-E	SP	FLOWABLE FILL	170 CY		
0090	2286000000-N	840	MASONRY DRAINAGE STRUCTURES	566 EA		
0091	2297000000-E	840	MASONRY DRAINAGE STRUCTURES	28.6 CY		
0092	2308000000-E	840	MASONRY DRAINAGE STRUCTURES	427.4 LF		
0093	2352000000-N	840	FRAME WITH GRATE, STD 840.**** (840.16)	75 EA		
0094	2366000000-N	840	FRAME WITH TWO GRATES, STD 840.24	48 EA		
0095	2374000000-N	840	FRAME WITH GRATE & HOOD, STD 840.03, TYPE ** (E)	32 EA		
0096	2374000000-N	840	FRAME WITH GRATE & HOOD, STD 840.03, TYPE ** (F)	189 EA		
0097	2374000000-N	840	FRAME WITH GRATE & HOOD, STD 840.03, TYPE ** (G)	201 EA		
0098	2396000000-N	840	FRAME WITH COVER, STD 840.54	23 EA		
0099	2440000000-N	852	CONCRETE TRANSITIONAL SECTION FOR CATCH BASIN	1 EA		
0100	2451000000-N	852	CONCRETE TRANSITIONAL SECTION FOR DROP INLET	55 EA		
0101	2535000000-E	846	*** X *** CONCRETE CURB (8" X 18")	860 LF		

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Line #	Item Number	Sec #	Description	Quantity	Unit Cost	Amount
0102	2542000000-E	846	1'-6" CONCRETE CURB & GUTTER	36,700 LF		
0103	2549000000-E	846	2'-6" CONCRETE CURB & GUTTER	56,040 LF		
0104	2591000000-E	848	4" CONCRETE SIDEWALK	550 SY		
0105	2605000000-N	848	CONCRETE CURB RAMPS	4 EA		
0106	2612000000-E	848	6" CONCRETE DRIVEWAY	4,934 SY		
0107	2619000000-E	850	4" CONCRETE PAVED DITCH	140 SY		
0108	2655000000-E	852	5" MONOLITHIC CONCRETE ISLANDS (KEYED IN)	11,430 SY		
0109	2800000000-N	858	ADJUSTMENT OF CATCH BASINS	3 EA		
0110	2830000000-N	858	ADJUSTMENT OF MANHOLES	27 EA		
0111	2845000000-N	858	ADJUSTMENT OF METER BOXES OR VALVE BOXES	22 EA		
0112	3001000000-N	SP	IMPACT ATTENUATOR UNITS, TYPE TL-3	2 EA		
0113	3030000000-E	862	STEEL BEAM GUARDRAIL	10,375 LF		
0114	3045000000-E	862	STEEL BEAM GUARDRAIL, SHOP CURVED	1,287.5 LF		
0115	3105000000-N	862	STEEL BEAM GUARDRAIL TERMINAL SECTIONS	2 EA		
0116	3150000000-N	862	ADDITIONAL GUARDRAIL POSTS	10 EA		
0117	3195000000-N	862	GUARDRAIL END UNITS, TYPE AT-1	8 EA		
0118	3210000000-N	862	GUARDRAIL END UNITS, TYPE CAT-1	21 EA		

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Line #	Item Number	Sec #	Description	Quantity	Unit Cost	Amount
0119	3287000000-N	862	GUARDRAIL END UNITS, TYPE TL-3	22 EA		
0120	3288000000-N	862	GUARDRAIL END UNITS, TYPE TL-2	4 EA		
0121	3317000000-N	862	GUARDRAIL ANCHOR UNITS, TYPE B-77	9 EA		
0122	3345000000-E	864	REMOVE & RESET EXISTING GUARDRAIL	130 LF		
0123	3360000000-E	863	REMOVE EXISTING GUARDRAIL	1,240 LF		
0124	3380000000-E	862	TEMPORARY STEEL BEAM GUARDRAIL	850 LF		
0125	3389150000-N	862	TEMPORARY GUARDRAIL END UNITS, TYPE ***** (TL-3)	8 EA		
0126	3389160000-N	862	TEMPORARY ADDITIONAL GUARDRAIL POSTS	5 EA		
0127	3539000000-E	866	METAL LINE POSTS FOR *** CHAIN LINK FENCE (96")	58 EA		
0128	3545000000-E	866	METAL TERMINAL POSTS FOR *** CHAIN LINK FENCE (96")	10 EA		
0129	3575000000-E	SP	GENERIC FENCING ITEM VINYL COATED CHAIN LINK FENCE, 96" FABRIC WITH BROWN PRIVACY SLATS	677 LF		
0130	3628000000-E	876	RIP RAP, CLASS I	1,160 TON		
0131	3635000000-E	876	RIP RAP, CLASS II	380 TON		
0132	3649000000-E	876	RIP RAP, CLASS B	4,880 TON		
0133	3656000000-E	876	GEOTEXTILE FOR DRAINAGE	23,655 SY		
0134	3659000000-N	873	PREFORMED SCOUR HOLES WITH LEVEL SPREADER APRON	1 EA		

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Line #	Item Number	Sec #	Description	Quantity	Unit Cost	Amount
0135	4072000000-E	903	SUPPORTS, 3-LB STEEL U-CHANNEL	3,221 LF		
0136	4096000000-N	904	SIGN ERECTION, TYPE D	2 EA		
0137	4102000000-N	904	SIGN ERECTION, TYPE E	158 EA		
0138	4108000000-N	904	SIGN ERECTION, TYPE F	41 EA		
0139	4109000000-N	904	SIGN ERECTION, TYPE *** (OVERHEAD) (A)	1 EA		
0140	4116100000-N	904	SIGN ERECTION, RELOCATE TYPE **** (GROUND MOUNTED) (E)	5 EA		
0141	4155000000-N	907	DISPOSAL OF SIGN SYSTEM, U- CHANNEL	126 EA		
0142	4192000000-N	907	DISPOSAL OF SUPPORT, U-CHANNEL	5 EA		
0143	4234000000-N	907	DISPOSAL OF SIGN, A OR B (OVERHEAD)	2 EA		
0144	4400000000-E	1110	WORK ZONE SIGNS (STATIONARY)	3,168 SF		
0145	4405000000-E	1110	WORK ZONE SIGNS (PORTABLE)	625 SF		
0146	4410000000-E	1110	WORK ZONE SIGNS (BARRICADE MOUNTED)	423 SF		
0147	4415000000-N	1115	FLASHING ARROW BOARD	2 EA		
0148	4420000000-N	1120	PORTABLE CHANGEABLE MESSAGE SIGN	4 EA		
0149	4430000000-N	1130	DRUMS	1,076 EA		
0150	4435000000-N	1135	CONES	50 EA		
0151	4445000000-E	1145	BARRICADES (TYPE III)	1,144 LF		

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Line #	Item Number	Sec #	Description	Quantity	Unit Cost	Amount
0152	4455000000-N	1150	FLAGGER	720 DAY		
0153	4465000000-N	1160	TEMPORARY CRASH CUSHIONS	4 EA		
0154	4470000000-N	1160	REMOVE & RESET TEMPORARY CRASH CUSHION	1 EA		
0155	4485000000-E	1170	PORTABLE CONCRETE BARRIER	1,580 LF		
0156	4500000000-E	1170	REMOVE AND RESET PORTABLE CONCRETE BARRIER	430 LF		
0157	4510000000-N	1190	LAW ENFORCEMENT	96 HR		
0158	4650000000-N	1251	TEMPORARY RAISED PAVEMENT MARKERS	2,081 EA		
0159	4685000000-E	1205	THERMOPLASTIC PAVEMENT MARKING LINES (4", 90 MILS)	40,107 LF		
0160	4688000000-E	1205	THERMOPLASTIC PAVEMENT MARKING LINES (6", 90 MILS)	96,124 LF		
0161	4695000000-E	1205	THERMOPLASTIC PAVEMENT MARKING LINES (8", 90 MILS)	133 LF		
0162	4700000000-E	1205	THERMOPLASTIC PAVEMENT MARKING LINES (12", 90 MILS)	16,218 LF		
0163	4709000000-E	1205	THERMOPLASTIC PAVEMENT MARKING LINES (24", 90 MILS)	1,452 LF		
0164	4720000000-E	1205	THERMOPLASTIC PAVEMENT MARKING CHARACTER (90 MILS)	27 EA		
0165	4725000000-E	1205	THERMOPLASTIC PAVEMENT MARKING SYMBOL (90 MILS)	215 EA		
0166	4726110000-E	1205	HEATED-IN-PLACE THERMOPLASTIC PAVEMENT MARKING SYMBOL (90 MILS)	5 EA		
0167	4775000000-E	1205	COLD APPLIED PLASTIC PAVEMENT MARKING LINES, TYPE ** (6") (II)	1,375 LF		
0168	4775000000-E	1205	COLD APPLIED PLASTIC PAVEMENT MARKING LINES, TYPE ** (6") (IV)	1,308 LF		

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Line #	Item Number	Sec #	Description	Quantity	Unit Cost	Amount
0169	4785000000-E	1205	COLD APPLIED PLASTIC PAVEMENT MARKING LINES, TYPE ** (12") (IV)	320 LF		
0170	4810000000-E	1205	PAINT PAVEMENT MARKING LINES (4")	128,603 LF		
0171	4815000000-E	1205	PAINT PAVEMENT MARKING LINES (6")	475,311 LF		
0172	4820000000-E	1205	PAINT PAVEMENT MARKING LINES (8")	104 LF		
0173	4825000000-E	1205	PAINT PAVEMENT MARKING LINES (12")	63,237 LF		
0174	4835000000-E	1205	PAINT PAVEMENT MARKING LINES (24")	5,006 LF		
0175	4840000000-N	1205	PAINT PAVEMENT MARKING CHARACTER	60 EA		
0176	4845000000-N	1205	PAINT PAVEMENT MARKING SYMBOL	423 EA		
0177	4850000000-E	1205	REMOVAL OF PAVEMENT MARKING LINES (4")	9,274 LF		
0178	4855000000-E	1205	REMOVAL OF PAVEMENT MARKING LINES (6")	57,373 LF		
0179	4865000000-E	1205	REMOVAL OF PAVEMENT MARKING LINES (12")	2,103 LF		
0180	4870000000-E	1205	REMOVAL OF PAVEMENT MARKING LINES (24")	407 LF		
0181	4875000000-N	1205	REMOVAL OF PAVEMENT MARKING SYMBOLS & CHARACTERS	58 EA		
0182	4900000000-N	1251	PERMANENT RAISED PAVEMENT MARKERS	203 EA		
0183	4905100000-N	1253	NON-CAST IRON SNOWPLOWABLE PAVEMENT MARKER	1,616 EA		
0184	5015000000-E	1401	120' HIGH MOUNT STANDARD	2 EA		
0185	5020000000-N	1401	PORTABLE DRIVE UNIT	1 EA		

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Line #	Item Number	Sec #	Description	Quantity	Unit Cost	Amount
0186	5025000000-E	SP	HIGH MOUNT FOUNDATIONS	19 CY		
0187	5030000000-N	SP	HIGH MOUNT LUMINAIRES ***** (560W LED)	16 EA		
0188	5050000000-N	1404	LIGHT STANDARDS, TYPE MTLT ***** (45' SA, 15' ARM)	21 EA		
0189	5070000000-N	SP	STANDARD FOUNDATION ***** (TYPE R1)	19 EA		
0190	5070000000-N	SP	STANDARD FOUNDATION ***** (TYPE R2)	2 EA		
0191	5080000000-N	SP	LIGHT STANDARD LUMINAIRES, TYPE ***** (RDW, 285W LED)	21 EA		
0192	5120000000-N	1407	ELECTRIC SERVICE POLE ***** (30' CLASS 4)	1 EA		
0193	5125000000-E	1407	ELECTRIC SERVICE LATERAL ***** (3 #1/0 USE)	25 LF		
0194	5145000000-N	1408	LIGHT CONTROL EQUIPMENT, TYPE RW ***** (240/480 V)	1 EA		
0195	5150000000-E	1409	ELECTRICAL DUCT, TYPE **, SIZE ***** (TL, 3")	490 LF		
0196	5150000000-E	1409	ELECTRICAL DUCT, TYPE **, SIZE ***** (TL, 4")	120 LF		
0197	5155000000-E	1409	ELECTRICAL DUCT, TYPE BD, SIZE ***** (2")	150 LF		
0198	5170000000-E	1410	** #8 W/G FEEDER CIRCUIT (2)	130 LF		
0199	5175000000-E	1410	** #6 W/G FEEDER CIRCUIT (2)	130 LF		
0200	5205000000-E	1410	** #8 W/G FEEDER CIRCUIT IN ***** CONDUIT (2, 1-1/2")	3,305 LF		
0201	5210000000-E	1410	** #6 W/G FEEDER CIRCUIT IN ***** CONDUIT (2, 1-1/2")	1,160 LF		

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Line #	Item Number	Sec #	Description	Quantity	Unit Cost	Amount
0202	5215000000-E	1410	** #4 W/G FEEDER CIRCUIT IN ***** CONDUIT (2, 1-1/2")	4,690 LF		
0203	5240000000-N	1411	ELECTRICAL JUNCTION BOXES ***** (CS36)	1 EA		
0204	5240000000-N	1411	ELECTRICAL JUNCTION BOXES ***** (HM18)	2 EA		
0205	5240000000-N	1411	ELECTRICAL JUNCTION BOXES ***** (IG18)	3 EA		
0206	5240000000-N	1411	ELECTRICAL JUNCTION BOXES ***** (LS18)	20 EA		
0207	5240000000-N	1411	ELECTRICAL JUNCTION BOXES ***** (LS36)	1 EA		
0208	5325600000-E	1510	6" WATER LINE	1,477 LF		
0209	5325800000-E	1510	8" WATER LINE	4,160 LF		
0210	5326200000-E	1510	12" WATER LINE	5,696 LF		
0211	5326600000-E	1510	16" WATER LINE	945 LF		
0212	5327400000-E	1510	24" WATER LINE	1,874 LF		
0213	5329000000-E	1510	DUCTILE IRON WATER PIPE FITTINGS	52,840 LB		
0214	5540000000-E	1515	6" VALVE	30 EA		
0215	5546000000-E	1515	8" VALVE	9 EA		
0216	5558000000-E	1515	12" VALVE	14 EA		
0217	5558600000-E	1515	16" VALVE	4 EA		

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Line #	Item Number	Sec #	Description	Quantity	Unit Cost	Amount
0218	5559400000-E	1515	24" VALVE	1 EA		
0219	5562000000-E	1515	*** INSERTION VALVE (12")	12 EA		
0220	5562000000-E	1515	*** INSERTION VALVE (24")	1 EA		
0221	5562000000-E	1515	*** INSERTION VALVE (6")	2 EA		
0222	5562000000-E	1515	*** INSERTION VALVE (8")	6 EA		
0223	5571600000-E	1515	6" TAPPING SLEEVE & VALVE	8 EA		
0224	5571800000-E	1515	8" TAPPING SLEEVE & VALVE	1 EA		
0225	5589200000-E	1515	2" AIR RELEASE VALVE	1 EA		
0226	5643000000-E	1515	*** WATER METER (1")	1 EA		
0227	5643000000-E	1515	*** WATER METER (5/8")	45 EA		
0228	5648000000-N	1515	RELOCATE WATER METER	73 EA		
0229	5649000000-N	1515	RECONNECT WATER METER	10 EA		
0230	5653610000-E	1515	RELOCATE 6" DCV BACKFLOW PREVENTION ASSEMBLY	1 EA		
0231	5666000000-N	1515	FIRE HYDRANT	31 EA		
0232	5673000000-E	1515	FIRE HYDRANT LEG	1,359 LF		
0233	5686500000-E	1515	WATER SERVICE LINE	8,750.5 LF		
0234	5691100000-E	1520	4" SANITARY GRAVITY SEWER	1,852 LF		

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Line #	Item Number	Sec #	Description	Quantity	Unit Cost	Amount
0235	5691300000-E	1520	8" SANITARY GRAVITY SEWER	647 LF		
0236	5768000000-N	1520	SANITARY SEWER CLEAN-OUT	25 EA		
0237	5775000000-E	1525	4' DIA UTILITY MANHOLE	3 EA		
0238	5781000000-E	1525	UTILITY MANHOLE WALL 4' DIA	24 LF		
0239	5800000000-E	1530	ABANDON 6" UTILITY PIPE	1,345 LF		
0240	5801000000-E	1530	ABANDON 8" UTILITY PIPE	5,145 LF		
0241	5804000000-E	1530	ABANDON 12" UTILITY PIPE	5,138 LF		
0242	5810000000-E	1530	ABANDON 16" UTILITY PIPE	492 LF		
0243	5813000000-E	1530	ABANDON 24" UTILITY PIPE	1,861 LF		
0244	5815000000-N	1530	REMOVE WATER METER	37 EA		
0245	5815500000-N	1530	REMOVE FIRE HYDRANT	30 EA		
0246	5816000000-N	1530	ABANDON UTILITY MANHOLE	1 EA		
0247	5836000000-E	1540	24" ENCASEMENT PIPE	130 LF		
0248	5836400000-E	1540	36" ENCASEMENT PIPE	96 LF		
0249	5872500000-E	1550	BORE AND JACK OF *** (24")	130 LF		
0250	5872500000-E	1550	BORE AND JACK OF *** (36")	96 LF		
0251	5872600000-E	1550	DIRECTIONAL DRILLING OF *** (16")	346 LF		

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Line #	Item Number	Sec #	Description	Quantity	Unit Cost	Amount
0252	5882000000-N	SP	GENERIC UTILITY ITEM CONCRETE CRADLE	5 EA		
0253	5882000000-N	SP	GENERIC UTILITY ITEM RELOCATE DCV BACKFLOW PREVENTOR	4 EA		
0254	5882000000-N	SP	GENERIC UTILITY ITEM WATER METER	8 EA		
0255	5888000000-E	SP	GENERIC UTILITY ITEM 3" PVC SLEEVE	2,352 LF		
0256	5888000000-E	SP	GENERIC UTILITY ITEM REMOVE 6" UTILITY PIPE	24 LF		
0257	5888000000-E	SP	GENERIC UTILITY ITEM REMOVE 8" UTILITY PIPE	34 LF		
0258	6000000000-E	1605	TEMPORARY SILT FENCE	118,190 LF		
0259	6006000000-E	1610	STONE FOR EROSION CONTROL, CLASS A	5,640 TON		
0260	6009000000-E	1610	STONE FOR EROSION CONTROL, CLASS B	14,035 TON		
0261	6012000000-E	1610	SEDIMENT CONTROL STONE	12,110 TON		
0262	6015000000-E	1615	TEMPORARY MULCHING	150.5 ACR		
0263	6018000000-E	1620	SEED FOR TEMPORARY SEEDING	5,900 LB		
0264	6021000000-E	1620	FERTILIZER FOR TEMPORARY SEEDING	30.5 TON		
0265	6024000000-E	1622	TEMPORARY SLOPE DRAINS	5,115 LF		
0266	6029000000-E	SP	SAFETY FENCE	6,900 LF		
0267	6030000000-E	1630	SILT EXCAVATION	58,160 CY		
0268	6036000000-E	1631	MATTING FOR EROSION CONTROL	231,689 SY		

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Line #	Item Number	Sec #	Description	Quantity	Unit Cost	Amount
0269	6037000000-E	1629	COIR FIBER MAT	1,275 SY		
0270	6038000000-E	SP	PERMANENT SOIL REINFORCEMENT MAT	2,975 SY		
0271	6042000000-E	1632	1/4" HARDWARE CLOTH	29,065 LF		
0272	6043000000-E	1644	LOW PERMEABILITY GEOTEXTILE	1,600 SY		
0274	6069000000-E	1638	STILLING BASINS	148 CY		
0275	6070000000-N	1639	SPECIAL STILLING BASINS	12 EA		
0276	6071002000-E	1642	FLOCCULANT	16,705 LB		
0277	6071012000-E	1642	COIR FIBER WATTLE	17,250 LF		
0278	6071030000-E	1640	COIR FIBER BAFFLE	9,520 LF		
0279	6071050000-E	1644	*** SKIMMER (1-1/2")	37 EA		
0280	6071050000-E	1644	*** SKIMMER (2")	4 EA		
0281	6071050000-E	1644	*** SKIMMER (2-1/2")	1 EA		
0282	6084000000-E	1660	SEEDING & MULCHING	99 ACR		
0283	6087000000-E	1660	MOWING	111 ACR		
0284	6090000000-E	1661	SEED FOR REPAIR SEEDING	1,550 LB		
0285	6093000000-E	1661	FERTILIZER FOR REPAIR SEEDING	4.75 TON		
0286	6096000000-E	1662	SEED FOR SUPPLEMENTAL SEEDING	2,325 LB		

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Line #	Item Number	Sec #	Description	Quantity	Unit Cost	Amount
0287	6108000000-E	1665	FERTILIZER TOPDRESSING	69.5 TON		
0288	6111000000-E	SP	IMPERVIOUS DIKE	563 LF		
0289	6114500000-N	1667	SPECIALIZED HAND MOWING	60 MHR		
0290	6114800000-N	SP	MANUAL LITTER REMOVAL	62 MHR		
0291	6114900000-E	SP	LITTER DISPOSAL	54 TON		
0292	6115000000-E	SP	MECHANICAL LITTER REMOVAL	24 SMI		
0293	6117000000-N	1675	RESPONSE FOR EROSION CONTROL	150 EA		
0294	6117500000-N	SP	CONCRETE WASHOUT STRUCTURE	35 EA		
0295	6120000000-E	SP	CULVERT DIVERSION CHANNEL	164 CY		
0296	6132000000-N	SP	GENERIC EROSION CONTROL ITEM FABRIC INSERT INLET PROTECTION CLEANOUT	3,639 EA		
0297	6132000000-N	SP	GENERIC EROSION CONTROL ITEM FABRIC INSERT INLET PROTECTION, TYPE 1	1,213 EA		
0298	6230000000-N	1670	BETULA NIGRA, RIVER BIRCH, (3 GAL)	138 EA		
0299	6285000000-N	1670	CRYPTOMERIA JAPONICA, JAPANESE CRYPTOMERIA, (3 GAL)	10 EA		
0300	6410000000-N	1670	JUNIPERUS VIRGINIANA, EASTERN RED CEDAR, (3 GAL)	23 EA		
0301	6540000000-N	1670	PLATANUS OCCIDENTALIS, SYCAMORE, (3 GAL)	138 EA		
0302	6575000000-N	1670	QUERCUS PHELLOS, WILLOW OAK, (3 GAL)	138 EA		

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Line #	Item Number	Sec #	Description	Quantity	Unit Cost	Amount
0303	6640000000-N	1670	GENERIC PLANTING ITEM CEDRUS DEODARA, DEODAR CEDAR (3 GAL)	9 EA		
0304	6640000000-N	1670	GENERIC PLANTING ITEM CUPRESSUS ARIZONICA VAR GLABRA, CAROLINA SAPPHIRE (3 GAL)	12 EA		
0305	6640000000-N	1670	GENERIC PLANTING ITEM QUERCUS PAGODA, CHERRYBARK OAK (3 GAL)	138 EA		
0306	6640000000-N	1670	GENERIC PLANTING ITEM THUJA STANDISHII X PLICATA, GREEN GIANT (5 GAL)	15 EA		
0307	7060000000-E	1705	SIGNAL CABLE	23,975 LF		
0308	7120000000-E	1705	VEHICLE SIGNAL HEAD (12", 3 SECTION)	94 EA		
0309	7132000000-E	1705	VEHICLE SIGNAL HEAD (12", 4 SECTION)	31 EA		
0310	7144000000-E	1705	VEHICLE SIGNAL HEAD (12", 5 SECTION)	11 EA		
0311	7204000000-N	1705	LOUVER	14 EA		
0312	7252000000-E	1710	MESSENGER CABLE (1/4")	30,840 LF		
0313	7264000000-E	1710	MESSENGER CABLE (3/8")	4,225 LF		
0314	7279000000-E	1715	TRACER WIRE	3,174 LF		
0315	7288000000-E	1715	PAVED TRENCHING (***** (1, 2")	200 LF		
0316	7300000000-E	1715	UNPAVED TRENCHING (***** (1, 2")	9,746 LF		
0317	7301000000-E	1715	DIRECTIONAL DRILL (***** (1, 2")	1,271 LF		
0318	7301000000-E	1715	DIRECTIONAL DRILL (***** (2, 2")	1,550 LF		

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Line #	Item Number	Sec #	Description	Quantity	Unit Cost	Amount
0319	7324000000-N	1716	JUNCTION BOX (STANDARD SIZE)	105 EA		
0320	7348000000-N	1716	JUNCTION BOX (OVER-SIZED, HEAVY DUTY)	39 EA		
0321	7360000000-N	1720	WOOD POLE	16 EA		
0322	7372000000-N	1721	GUY ASSEMBLY	27 EA		
0323	7384000000-E	1722	**** RISER WITH ***** (1-1/2", WEATHERHEAD)	4 EA		
0324	7408000000-E	1722	1" RISER WITH WEATHERHEAD	3 EA		
0325	7420000000-E	1722	2" RISER WITH WEATHERHEAD	1 EA		
0326	7432000000-E	1722	2" RISER WITH HEAT SHRINK TUBING	16 EA		
0327	7444000000-E	1725	INDUCTIVE LOOP SAWCUT	7,075 LF		
0328	7456100000-E	1726	LEAD-IN CABLE (14-2)	21,625 LF		
0329	7481000000-N	SP	SITE SURVEY	10 EA		
0330	7481240000-N	SP	CAMERA WITHOUT INTERNAL LOOP EMULATOR PROCESSING UNIT	48 EA		
0331	7481260000-N	SP	EXTERNAL LOOP EMULATOR PROCESSING UNIT	13 EA		
0332	7516000000-E	1730	COMMUNICATIONS CABLE (** FIBER) (24)	1,128 LF		
0333	7516000000-E	1730	COMMUNICATIONS CABLE (** FIBER) (72)	36,295 LF		
0334	7528000000-E	1730	DROP CABLE	8,036 LF		
0335	7540000000-N	1731	SPLICE ENCLOSURE	12 EA		

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Line #	Item Number	Sec #	Description	Quantity	Unit Cost	Amount
0336	7541000000-N	1731	MODIFY SPLICE ENCLOSURE	4 EA		
0337	7552000000-N	1731	INTERCONNECT CENTER	17 EA		
0338	7566000000-N	1733	DELINEATOR MARKER	25 EA		
0339	7576000000-N	SP	METAL STRAIN SIGNAL POLE	4 EA		
0340	7588000000-N	SP	METAL POLE WITH SINGLE MAST ARM	10 EA		
0341	7613000000-N	SP	SOIL TEST	19 EA		
0342	7614100000-E	SP	DRILLED PIER FOUNDATION	166 CY		
0343	7631000000-N	SP	MAST ARM WITH METAL POLE DESIGN	10 EA		
0344	7636000000-N	1745	SIGN FOR SIGNALS	43 EA		
0345	7642200000-N	1743	TYPE II PEDESTAL WITH FOUNDATION	15 EA		
0346	7684000000-N	1750	SIGNAL CABINET FOUNDATION	11 EA		
0347	7696000000-N	1751	CONTROLLERS WITH CABINET (*****) (TYPE 2070LX, BASE MTD)	6 EA		
0348	7744000000-N	1751	DETECTOR CARD (TYPE 170)	55 EA		
0349	7901000000-N	1753	CABINET BASE EXTENDER	11 EA		
0350	7980000000-N	SP	GENERIC SIGNAL ITEM 2070LX CONTROLLER	2 EA		
0351	7980000000-N	SP	GENERIC SIGNAL ITEM 5/8" X 10' GROUNDING ELECTRODE	18 EA		
0352	7980000000-N	SP	GENERIC SIGNAL ITEM CABINET WITHOUT CONTROLLER (TYPE 170E)	5 EA		

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Line #	Item Number	Sec #	Description	Quantity	Unit Cost	Amount
0353	7980000000-N	SP	GENERIC SIGNAL ITEM CCTV FIELD EQUIPMENT CABINET	2 EA		
0354	7980000000-N	SP	GENERIC SIGNAL ITEM CCTV METAL POLE	3 EA		
0355	7980000000-N	SP	GENERIC SIGNAL ITEM DEPARTMENT SUPPLIED 2070 CONTROLLER	5 EA		
0356	7980000000-N	SP	GENERIC SIGNAL ITEM DIGITAL CCTV CAMERA ASSEMBLY	3 EA		
0357	7980000000-N	SP	GENERIC SIGNAL ITEM DMS ACCESS LADDER	2 EA		
0358	7980000000-N	SP	GENERIC SIGNAL ITEM DMS PEDESTAL STRUCTURE	2 EA		
0360	7980000000-N	SP	GENERIC SIGNAL ITEM ETHERNET EDGE SWITCH	18 EA		
0361	7980000000-N	SP	GENERIC SIGNAL ITEM LUMINAIRE ARM FOR TEMPORARY VIDEO SYSTEM	40 EA		
0362	7980000000-N	SP	GENERIC SIGNAL ITEM METER BASE/DISCONNECT COMBO PANEL	4 EA		
0363	7980000000-N	SP	GENERIC SIGNAL ITEM MODIFY EXISTING VEHICLE SIGNAL HEAD	4 EA		
0364	7990000000-E	SP	GENERIC SIGNAL ITEM #4 SOLID BARE GROUNDING CONDUCTOR	180 LF		
0365	7990000000-E	SP	GENERIC SIGNAL ITEM 3-WIRE COPPER FEEDER CONDUCTORS	104.5 LF		
0366	7990000000-E	SP	GENERIC SIGNAL ITEM 3-WIRE COPPER SERVICE ENTRANCE CONDUCTORS	120 LF		
0367	7990000000-E	SP	GENERIC SIGNAL ITEM 4-WIRE COPPER FEEDER CONDUCTORS	71.5 LF		
0404	6045000000-E	SP	*** TEMPORARY PIPE (48")	143 LF		

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Line #	Item Number	Sec #	Description	Quantity	Unit Cost	Amount
0405	6045000000-E	SP	*** TEMPORARY PIPE (60")	147 LF		
0406	7980000000-N	SP	GENERIC SIGNAL ITEM DYNAMIC MESSAGE SIGN (TYPE 2C)	2 EA		
CULVERT ITEMS						
0368	8130000000-N	414	BOX CULVERT EXCAVATION, STA ***** (107+57.00 -L-)	Lump Sum	L.S.	
0369	8130000000-N	414	BOX CULVERT EXCAVATION, STA ***** (229+09.00 -L2-)	Lump Sum	L.S.	
0370	8133000000-E	414	FOUNDATION CONDITIONING MATERIAL, BOX CULVERT	354 TON		
0371	8196000000-E	420	CLASS A CONCRETE (CULVERT)	188 CY		
0372	8245000000-E	425	REINFORCING STEEL (CULVERT)	19,507 LB		
WALL ITEMS						
0373	8504000000-E	460	CONCRETE BARRIER RAIL WITH MOMENT SLAB	305 LF		
0374	8801000000-E	SP	MSE RETAINING WALL NO **** (1)	3,000 SF		
STRUCTURE ITEMS						
0375	8056000000-N	402	REMOVAL OF EXISTING STRUCTURE AT STATION ***** (140+39.50 -L- LT)	Lump Sum	L.S.	
0376	8056000000-N	402	REMOVAL OF EXISTING STRUCTURE AT STATION ***** (140+39.50 -L- RT)	Lump Sum	L.S.	
0377	8096000000-E	450	PILE EXCAVATION IN SOIL	44 LF		
0378	8097000000-E	450	PILE EXCAVATION NOT IN SOIL	46 LF		
0379	8105540000-E	411	3'-6" DIA DRILLED PIERS IN SOIL	27 LF		

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Line #	Item Number	Sec #	Description	Quantity	Unit Cost	Amount
0380	8105640000-E	411	3'-6" DIA DRILLED PIERS NOT IN SOIL	51 LF		
0381	8113000000-N	411	SID INSPECTIONS	2 EA		
0382	8114000000-N	411	SPT TESTING	2 EA		
0383	8115000000-N	411	CSL TESTING	2 EA		
0384	8121000000-N	412	UNCLASSIFIED STRUCTURE EXCAVATION AT STATION ***** (140+39.50 -L- LT)	Lump Sum	L.S.	
0385	8121000000-N	412	UNCLASSIFIED STRUCTURE EXCAVATION AT STATION ***** (140+39.50 -L- RT)	Lump Sum	L.S.	
0386	8147000000-E	420	REINFORCED CONCRETE DECK SLAB	13,146 SF		
0387	8161000000-E	420	GROOVING BRIDGE FLOORS	14,146 SF		
0388	8182000000-E	420	CLASS A CONCRETE (BRIDGE)	356.9 CY		
0389	8210000000-N	422	BRIDGE APPROACH SLABS, STATION ***** (140+39.50 -L- LT)	Lump Sum	L.S.	
0390	8210000000-N	422	BRIDGE APPROACH SLABS, STATION ***** (140+39.50 -L- RT)	Lump Sum	L.S.	
0391	8217000000-E	425	REINFORCING STEEL (BRIDGE)	58,954 LB		
0392	8238000000-E	425	SPIRAL COLUMN REINFORCING STEEL (BRIDGE)	4,404 LB		
0393	8265000000-E	430	54" PRESTRESSED CONCRETE GIRDERS	1,648.34 LF		
0394	8328200000-E	450	PILE DRIVING EQUIPMENT SETUP FOR *** STEEL PILES (HP 12 X 53)	29 EA		
0395	8364000000-E	450	HP 12 X 53 STEEL PILES	585 LF		

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Line #	Item Number	Sec #	Description	Quantity	Unit Cost	Amount
0396	8391000000-N	450	STEEL PILE POINTS	21 EA		
0397	8393000000-N	450	PILE REDRIVES	7 EA		
0398	8394000000-N	450	DYNAMIC PILE TESTING	2 EA		
0399	8503000000-E	460	CONCRETE BARRIER RAIL	753.56 LF		
0400	8608000000-E	876	RIP RAP CLASS II (2'-0" THICK)	3,555 TON		
0401	8622000000-E	876	GEOTEXTILE FOR DRAINAGE	3,960 SY		
0402	8657000000-N	430	ELASTOMERIC BEARINGS	Lump Sum	L.S.	
0403	8706000000-N	SP	EXPANSION JOINT SEALS	Lump Sum	L.S.	

1318/May17/Q2768434.55/D1901508304000/E404

Total Amount Of Bid For Entire Project :