Illinois Department of Transportation
2300 South Dirksen Parkway / Springfield, Illinois / 62764

February 24, 2025

SUBJECT FAI Route 94 (I-94/Bishop Ford Expwy)
Section (42-B-11-1) BR,BJR 24
Project NHPP-2B1H(072)
Cook County
Contract No. 62W87

Item No. 152, March 7th, 2025 Letting
Addendum B

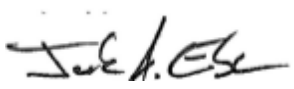
NOTICE TO PROSPECTIVE BIDDERS:

Attached is an addendum to the plans or proposal. This addendum involves revised and/or added material.

1. Revised Schedule of Prices
2. Revised pages i-v of the Table of Contents of the Special Provisions.
3. Added page iv of the Table of Contents of the Special Provision
4. Revised page 5-7, 67-71, 116-157, 167-168, 170-171, 197-201, and 243-246 of the Special Provisions.
5. Added pages 269-345 of the Special Provision
6. Revised sheets 1, 3-4, 6, 9-25, 39-42, 173, 176-177, and 187-191, 194,
   206-207, 212, 224-226, 228-232, 233-240, 242-248, 336-342, 344-389, 393, 398-402, 425-428, 684, 685, 700, 710-717, and 722-734 of the Plans.
7. Add sheet 099A, 389A-F, 424A, 428K, 693A-B, and 752A of the Plans.

Prime contractors must utilize the enclosed material when preparing their bid and must include any changes to the Schedule of Prices in their bid.

Very truly yours,



Jack A. Elston, P.E.
Bureau Chief, Design and Environment

MTS

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MAINTENANCE OF ROADWAYS (D1)
Effective: September 30, 1985 Revised: November 1, 1996

Beginning on the date that work begins on this project, the Contractor shall assume responsibility for normal maintenance of all existing roadways within the limits of the improvement. This normal maintenance shall include all repair work deemed necessary by the Engineer but shall not include snow removal operations. Traffic control and protection for maintenance of roadways will be provided by the Contractor as required by the Engineer.

If items of work have not been provided in the contract, or otherwise specified for payment, such items, including the accompanying traffic control and protection required by the Engineer, will be paid for in accordance with Article 109.04 of the Standard Specifications.

STATUS OF UTILITIES (D1)
Effective: June 1, 2016
Revised: October 16, 2024

Utility companies and/or municipal owners located within the construction limits of this project have provided the following information regarding their facilities and the proposed improvements. The tables below contain a description of specific conflicts to be resolved and/or facilities which will require some action on the part of the Department's contractor to proceed with work. Each table entry includes an identification of the action necessary and, if applicable, the estimated duration required for the resolution.

UTILITIES TO BE ADJUSTED

Conflicts noted below have been identified by following the suggested staging plan included in the contract. The company has been notified of all conflicts and will be required to obtain the necessary permits to complete their work; in some instances, resolution will be a function of the construction staging. The responsible agency must relocate, or complete new installations as noted below; this work has been deemed necessary to be complete for the Department's contractor to then work in the stage under which the item has been listed.

No conflicts to be resolved

UTILITIES TO BE WATCHED AND PROTECTED

The areas of concern noted below have been identified by following the suggested staging plan included for the contract. The information provided is not a comprehensive list of all remaining utilities, but those which during coordination were identified as ones which might require the Department's contractor to take into consideration when making the determination of the means and methods that would be required to construct the proposed improvement. In some instances, the contractor will be responsible to notify the owner in advance of the work to take place so necessary staffing on the owner's part can be secured.

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Pre-Stage

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STAGE / LOCATION	TYPE	DESCRIPTION	OWNER
I-94 @ E 103rd St	Sewer	Existing sewer crossing under expressway at E 103rd St.	MWRD
I-94 @ 130th St	Sewer	Existing sewer crossing under expressway at E 130th St.	MWRD
I-94 @ Cottage Grove Ave	Gas Main	12" STMP Under Expressway	Peoples Gas - Secondary
I-94 @ Woodlawn Ave	Gas Main	6" STMP Under Expressway	Peoples Gas - Secondary
Stony Island Ave Ramp Q @ Woodlawn Ave	Gas Main	6" STMP Under Expressway ramp	Peoples Gas - Secondary
Stony Island Ave Ramp Q @ Dorchester Ave	Gas Main	12" STMP Under Expressway ramp	Peoples Gas - Secondary
Stony Island Ave Ramp E @Sta 221+50	Gas Main	8" STMP Under Expressway ramp	Peoples Gas - Secondary
Stony Island Ave @ Sta 90+30	Gas Main	8" STMP Under Expressway ramp	Peoples Gas - Secondary
I-94 @ Sta 304+60	Gas Main	20" STMP in 24” Casing Under Expressway	Peoples Gas - Secondary
I-94 @ Sta 340+00	Gas Main	16" STMP in 30” Casing Under Expressway	Peoples Gas - Secondary
I-94 @ Sta 340+00	Gas Main	16" STMP in 30” Casing Under Expressway	Peoples Gas - Secondary
Length of Project	Electrical Transmission Lines		ComEd - Transmission
Length of Project	underground cable/conduits	Hand dig is required when crossing ComEd underground cable/conduits. Maintain 12 inches vertical clearance (18 inches if possible) from any ComEd facilities. When field conditions require ComEd assistance, please contact Ericka Irby via email at ERICKA.IRBY@EXELONCORP.COM at least 6 weeks prior to construction start.	ComEd – Distribution
Length of Project	Sewer		City of Chicago Department of Water Management. – Sewer Section

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The following contact information is what was used during the preparation of the plans as provided by the owner of the facility.

Agency/Company Responsible to Resolve Conflict	Name of contact	Phone	E-mail address
MWRD	Khaja Moinuddin	(312)751-3139	moinuddink@mwrd.org
Peoples Gas - Secondary	Lynn Lyon	(312)240-3602	lynn.lyon@peoplesgasdelivery.com
ComEd - Transmission	Christopher Elion	(773) 892-6391	Christopher.elion@comed.com
ComEd - Distribution	Arturo Salinas	(779) 231-2238	arturo.salinas@comed.com
City of Chicago Department of Water Management. – Sewer Section	Alex Huynh, Anupam Verma, Chuck Mann, Brendan Schreiber, Pablo Martinez, & Patrik Maloney	(312) 742-7135 (312) 744-5070 (312) 744-0344 & (312) 742-7226	Alexander.Huynh@cityofchicago.org, Anupam.Verma@cityofchicago.org, Chuck.Mann@cityofchicago.org, Brendan.Schreiber@cityofchicago.org Pablo.Martinez@cityofchicago.org, & Patrick.Maloney@cityofchicago.org

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The above represents the best information available to the Department and is included for the convenience of the bidder. The days required for conflict resolution should be considered in the bid as this information has also been factored into the timeline identified for the project when setting the completion date. The applicable portions of the Standard Specifications for Road and Bridge Construction shall apply. 1

Estimated duration of time provided above for the first conflicts identified will begin on the date of the executed contract regardless of the status of the utility relocations. The responsible agencies will be working toward resolving subsequent conflicts in conjunction with contractor activities in the number of days noted.

The estimated relocation duration must be part of the progress schedule submitted by the contractor. A utility kickoff meeting will be scheduled between the Department, the Department's contractor, and the utility companies when necessary.

The Department's contractor is responsible for contacting JULIE or DIGGER within city of Chicago prior to all excavation work. State Electrical Contractor shall be notified 72 hours in advance of construction to locate IDOT underground electrical facilities at 773-287-7600 or dispatch@meade100.com.

PUBLIC CONVENIENCE AND SAFETY (D1)
Effective: May 1, 2012 Revised: July 15, 2012

Add the following to the end of the fourth paragraph of Article 107.09:

"If the holiday is on a Saturday or Sunday and is legally observed on a Friday or Monday, the length of holiday period for Monday or Friday shall apply."

Add the following sentence after the holiday period table in the fourth paragraph of Article 107.09:

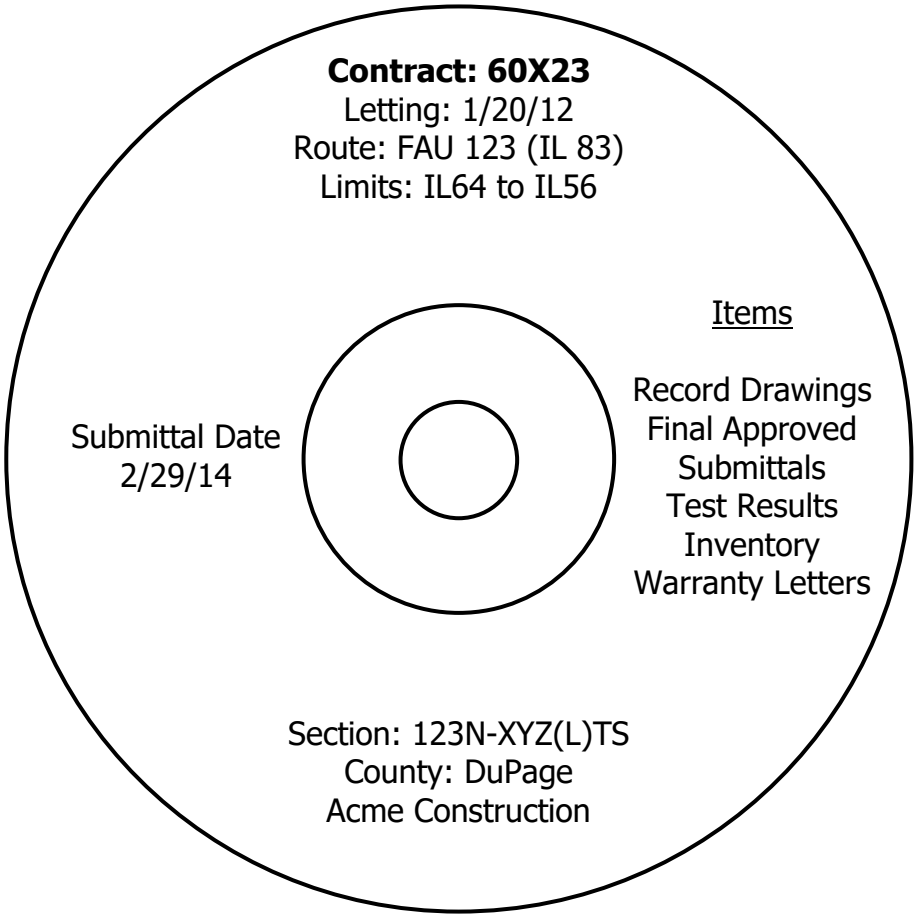
"The length of holiday period for Thanksgiving shall be from 5:00 AM the Wednesday prior to 11:59 PM the Sunday after"

Delete the fifth paragraph of Article 107.09 of the Standard Specifications:

"On weekends, excluding holidays, roadways with average daily traffic of 25,000 or greater, all lanes shall be open to traffic from 3:00 P.M. Friday to midnight Sunday except where structure construction or major rehabilitation makes it impractical."

CD LABEL FORMAT TEMPLATE.

Label must be printed; hand written labels are unacceptable and will be rejected.



~~**INDUCTION LOOP**~~
~~Effective: June 1, 1994 Revised: April 5, 2017~~

~~Description. This item shall consist of furnishing, installing, and testing an induction loop, of the dimensions shown on the plans or of the dimension from Table 1, at the locations shown. The induction loop shall be installed in accordance with all details shown on the plans and applicable portions of Section.886 Standard Specifications. All saw cutting, cable installation, joint sealing, lead-ins, and testing necessary to complete the installation shall conform with the following requirements.~~

~~Materials. The cable used for the induction loop shall be #14-19 strand XHHW-XLP-600V, encased in orange tubing as manufactured by Kris-Tech Wire Company, Inc., IMSA 51-7, or comparable. All loop wire shall be UL listed. The jacket, constructed of high-density polyethylene, shall be rated to 600 volts in accordance with UL-83 Section 36.~~

~~Joint sealer shall have sufficient strength and resiliency to withstand stresses set up by vibrations and differences in expansion and contraction due to temperature changes. The joint sealer shall have a minimum tensile strength of 100 P.I.E. when tested by ASTM Method D638-58T. Adhesion to clean dry, oil-free Portland cement concrete shall be at least equal to the tensile strength of the concrete. The joint sealer, with qualities described above, shall be capable of curing in a maximum of 30 minutes at all temperatures above 50 °F. Curing shall be defined as the capability of withstanding normal traffic loads without degradation. A hard asphalt-based filling and insulating compound having a high softening point and a high pouring temperature shall be used if the outside installation temperature is below 50 °F. The filling compound shall have a softening point of no less than 235 °F and a summer pouring temperature of 375 °F and winter pouring temperature of 425 °F.~~

~~Sealant for Detector Loops: The sealer shall meet or exceed the characteristics provided by OZ GEDNEY DOZSeal 230 filling compound.~~

~~Installation Details. Slots in the pavement shall be cut with a concrete sawing machine in accordance with the applicable portions of Art. 420.05 of the Standard Specifications. The slot must be clean, dry, and oil-free. Wire shall be inserted in the pavement slot with a blunt tool which will not damage the insulation. Loops shall not be dry cut. Loops should not be installed at an outside temperature below 50 °F unless directed by Engineer.~~

~~Plastic sleeving shall be used to insulate the wire where loop wire crosses cracks and joints in the pavement. The sleeving shall be properly sealed with electrical tape to prevent joint sealer from entering sleeves. Sleeving shall extend a minimum of 8 inch each side of joint.~~

~~Induction loops on exit and entrance ramps shall be square or rectangular with edges perpendicular or parallel to traffic flow. All mainline loops shall be round loops, 6 feet in diameter. Induction loops shall be centered on all ramps and in traffic lanes unless designated otherwise on the plans or by the Engineer. Traffic lanes shall be referred to by number and loop wire shall be color-coded and labeled accordingly. Lane one shall be the lane adjacent to the median, or that lane on the extreme left in the direction of the traffic flow; subsequent lanes are to be coded sequentially towards the outside shoulder. A chart which shows the coding for each installation shall be included in each cabinet. Core holes shall not be allowed at corner of loop. Saw cuts for all induction loops and lead-ins shall not be greater than 2.75 inches in depth.~~

~~All excess joint sealer shall be removed so that the level of the sealer in the saw cut is at the same level as the adjoining pavement.~~

~~All induction loops shall contain three turns of No. 14 wire min. Each induction loop shall have its own Canoga 30003 or equal home run or lead-in to the cabinet when said induction loops is over 150 feet from cabinet. Induction loops shall not be connected in series with other loops. This wire shall be free from kinks or any insulation abrasions. The loop lead-in shall be a Canoga 30003 cable. The loop lead-in shall be barrel sleeved, crimped, soldered, and protected by heat shrinkable tubing to the loop #14 wire. Lead-ins shall be twisted in a manner to prevent mechanical movement between the individual cables. Lead-ins shall be brought into a cabinet or handhole at the time the induction loop is placed in the pavement. Loops located over 1000 feet from cabinet require four turns of No. 14 wire.~~

~~Where lead in runs are less than 150 feet, the loop wire shall be utilized as lead-in from the core hole to the cabinet, without splices, being twisted 5 turns per foot. The additional loop wire will not be paid for separately but shall be included in the cost of this work.~~

~~Where duct is collapsed or damaged making it impossible to pull loop lead-in, the affected area will need to be replaced. This will be included in the cost of Conduit in Trench, High Density Polyethylene Coilable 1-1/4" and Trench and Backfill for Electrical Work.~~

~~Loop lead-ins placed in handholes shall be coiled, taped, and hung from the side of the handhole to protect against water damage. Any other method of installation will require prior written approval of the Engineer. Each loop lead-in shall be color coded and tagged in each handhole through which it passes. The loop lead-in shall be color coded and tagged at the core hole in each junction box it passes through and at the termination point in the cabinet.~~

~~Contractor shall core drill all mainline round loops 6 feet (183 meters) in diameter x .25 inch (6 mm) in width x 2.75 inches (7 cm) in depth.~~

~~Loop lead-ins shall not be allowed in saw cuts in shoulders. The Engineer shall be contacted regarding proposed changes in loop locations necessitated by badly deteriorated pavement. The Engineer may relocate such loops. Loop wire and lead-ins shall not be installed in the curb and gutter section or through the edge of pavement. A hole shall be drilled at least 12 inches in from the edge of pavement through which the P-duct, loop wire and lead-in shall be installed. Saw cuts through shoulders to core hole shall not be allowed.~~

~~W (M)~~	~~S (M)~~
~~13 ft (4.0 m)~~	~~9 ft (2.8 m)~~
~~14 ft (4.3 m)~~	~~10 ft (3.1 m)~~
~~15 ft (4.6 m)~~	~~11 ft (3.4 m)~~
~~16 ft (4.9 m)~~	~~12 ft (3.7 m)~~
~~17 ft (5.2 m)~~	~~13ft (4.0 m)~~
~~18 ft (5.5 m)~~	~~14ft (4.3 m)~~
~~19 ft (5.8 m)~~	~~15 ft (4.6 m)~~
~~20 ft (6.1 m)~~	~~16 ft (4.9 m)~~
~~21 ft (6.4 m)~~	~~17 ft(5.2 m)~~
~~22 ft (6.7 m)~~	~~18 ft (5.5 m)~~
~~23 ft (7.0 m)~~	~~19 ft (5.8 m)~~
~~24 ft (7.3 m)~~	~~20 ft (6.1 m)~~
~~25 ft (7.6 m)~~	~~21 ft (6.4 m)~~

~~Should the induction loop and/or core hole for the induction loop and loop lead-in cable be paved over by other construction operations, it shall be the Contractor's responsibility for locating and finding the induction loop and/or the core hole for the repair of a bad loop or lead-in or for the installation of a new loop or loop lead-in. The locating of the core hole and the induction loop shall be included in the cost of the induction loop lead-in installation. No extra compensation shall be allowed for finding and locating induction loops and/or core hole.~~

~~The loop shall be spliced to the lead-in wire with a barrel sleeve crimped and soldered. Epoxy filled heat shrink tubing shall be used to protect the splice. The soldered connection shall be made with a soldering iron or gun. No other method will be acceptable, i.e. the use of a torch to solder will not be acceptable. The heat shrink tube shall be shrunk with a heat gun. Any other method will not be acceptable, i.e. the use of a torch will not be acceptable. No burrs shall be left on the wire when done soldering. Cold solder joints will not be acceptable. Refer to T.S.C. typical(s) TY-1TSC-418 #2 & #3 for proper loop to loop lead-in splice detail.~~

Where there are continuous count stations or multiple lane exits or entrance ramps, the loop in the left most lane shall be wrapped clockwise, the adjacent lane loop wrapped counter-clockwise, etc, alternating wrapping the loops every other lane.

Traffic Systems Center Loop Splicing Requirement Color Code

Mainline Loops				Metering LOOPS	
Lane 1	Blue	Lane 4	Violet	Loop 1	Green
Lane 2	Brown	Exit	Black	Loop 2	Yellow
Lane 3	Orange	Entrance	White	Loop 3	Red

When two or three loops are installed on an exit or entrance ramp, the loop color code shall conform to the mainline loop color code and shall be marked as entrance or exit ramp loops.

In addition to color codes each loop shall be identified with a written label attached to the loop wire or lead-in wire. The tags shall be Panduit #MP250W175-C or equivalent. All wires and cables shall be identified in each handhole or cabinet that the cable passes through or terminates in. The labels shall be attached to the cable by use of two cable ties.

Prosecution Of Surveillance Work. The work shall consist of the replacement and/or repairs caused by the pavement repair, removal, and resurfacing to all induction loops, loop lead-in, poly-duct, steel conduits, all interconnecting cables, and all surveillance appurtenances. The Contractor shall make modifications to existing installations to render the location functional. The Contractor shall also furnish and install new induction loops, loop lead-ins, poly-duct, steel conduits, all interconnecting cables, and all surveillance appurtenances.

Should damage occur to any traffic systems center cabinets, housing telemetry equipment, and/or vehicle detection equipment, the Contractor shall install and replace all damaged equipment at their own expense. The traffic systems center staff shall determine what equipment shall be reusable and what shall be replaced. Replaced equipment shall be of equal or better quality and type.

Connections To Existing Installations. Where new work connects to existing installations, the Contractor shall do all necessary cutting, fitting, and foundation drilling to the existing installation. The Contractor shall remove all existing equipment, as required to make satisfactory connections, to leave the entire work in a finished and workmanlike manner as approved by the Engineer. No raceways shall be allowed to enter cabinet through the sides or backwalls.

Protection Of Work. Electrical work, equipment, and appurtenances shall be protected from damage during construction until final acceptance. Electrical raceway or duct openings shall be capped or sealed from the entrance of water and dirt. Wiring shall be protected from mechanical injury.

Standards Of Installation. Electrical work shall be installed in a neat and workmanlike manner in accordance with the best practices of the trade. Unless otherwise indicated, materials and equipment shall be new and installed in accordance with the manufacturer's recommendations. Except as specified elsewhere herein, materials and equipment shall be in conformance with the requirements of Section 106 of the Standard Specifications.

Testing. Before final acceptance, the induction loops shall be tested. Tests will not be made progressively, as parts of the work are completed. They shall all be made at one time. Items which fail to test satisfactorily shall be repaired or replaced.

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An electronic test instrument capable of measuring large values of electrical resistance, such as major megger, shall be used to measure the resistance of the induction loop and its lead-in. The resistance of the loop and its lead-in shall be a minimum of 100 meg ohms above ground under any conditions of weather or moisture. The resistance tests and all electronic tests shall be performed in the presence of the Engineer any number of times specified by the Engineer. The loop and loop lead-in shall have an inductance between 100 micro henries and 700 micro henries. The continuity test of the loop and loop lead-in shall not have a resistance greater than 2 ohms. The Contractor shall do all testing in the presence of the Engineer, and all readings will be recorded by the Engineer. Testing shall be done with an approved loop tester.

Final Acceptance Inspection. When the work is complete, tested and fully operational, the Contractor shall schedule a final acceptance inspection with the Engineer. Final acceptance will be made as a total system, not as parts. The Contractor shall furnish the necessary manpower and equipment to make the final acceptance inspection. The Engineer will designate the type of equipment required for the inspection tests.

Method Of Measurement. The induction loop measurement shall be the length of saw cut in the pavement which contains loop wire. The actual length of wire used in the saw cut shall not be considered in any measurement. The first 150 ft. of loop wire from core hole to cabinet will not be measured for payment.

Basis Of Payment. This work will be paid for at the contract unit price per FOOT as INDUCTION LOOP for furnishing and installing all materials listed complete and operating in place. If loop is less than 150 ft. from cabinet, loop wire shall be used as lead-in and will not be paid separately. If loop is greater than 150 ft. from cabinet, loop wire shall be spliced in handhole to an electric cable in conduit, lead-in no. 18 4/c twisted shielded.

at the ends of the conduit. Anchor rods and ground rod shall be set in place before the concrete is deposited by means of a template constructed to space the anchor rods according to the pattern of the bolt holes in the base of the appurtenance to be attached. The appurtenance shall not be erected on the foundation until the bases have cured for at least seven days. Concrete shall cure according to Article 1020.13 of the Standard Specifications. Contractor shall restore areas that have been disturbed or temporarily graded to their original condition. The cost to seed restored areas is included in this pay item.

Measurement. This work will be measured per each foundation installed.

Basis of Payment. This work will be paid for at the contract unit price per EACH for CONCRETE FOUNDATION, SURVEILLANCE CABINET MODEL 334.

DMS2 DMS WALK-IN ACCESS, FULL MATRIX, COLOR, NTCIP 1203

This special provision shall govern the furnishing and installation of a Walk-In Access, Full matrix, Color, NTCIP 1203 V3 Dynamic Message Sign and associated equipment cabinets as shown in the plans and as detailed in this special provision. The high resolution, full color display shall be a full matrix configuration of 96 pixels high by 400 pixels wide. The size of the sign shall be as shown in the plans. All display elements and modules shall be solid state. No mechanical or electromechanical elements or shutters shall be used.

Equipment to be furnished at each dynamic message sign (DMS) field site shown in the plans shall include, but not be limited to the following: LED DMS, sign controller, cabling, sign enclosure, documentation, warranties, mounting hardware, latest vendor maintenance diagnostic software with 20 licenses to load software on Department/Department's maintenance forces laptops. Five (5) units of FLIR 360 Cameleon Client ITS site license for each installed DMS.

The Central Controller resides at the Traffic Systems Center. The DMS Central Software was developed by 360 Surveillance, Inc. The successful sign vendor shall perform an on-site working sample demonstration test to prove their product is compatible with the 360 Cameleon Client/Server Software.

Each DMS assembly shall consist of a LED DMS sign case including contents, mounting brackets, its associated sign controller unit (SCU), and communication unit, cabling between the DMS case and the sign controller unit, optically coupled interface from controller to sign, and DMS walkway platforms with permanent safety and mounting brackets and hardware.

Each LED DMS shall be capable of displaying three lines of text. Each line shall consist of a string of 18 alphanumeric characters. Each character shall be composed from a luminous dot matrix system. The matrix system for a high resolution, full color display shall consist of 384 dots composed of 24 columns and 16 rows. A luminous pixel shall consist of a LED pixel array. All display elements and modules shall be solid state.

All characters, symbols, and digits shall be 18 inch nominal character size and shall be clearly visible and legible at a distance of 900 feet within a 30 degree cone of vision centered on the optical axis of the pixel.

The signs shall be capable of displaying the following:

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- A static message
- A flashing message
- Two alternating messages, either flashing or static

The changing from one message to another shall be instantaneous.

The total weight added to the sign structure shall be no greater than 4000 pounds. The dimensions of the sign housing will not exceed 8'-0" tall, 30'-0" wide, and 4' deep and access to the electronics shall be achieved through the front display panels of the DMS. Larger signs may be submitted, but they will require additional review time to evaluate the structural adequacy of the Department's standard sign trusses.

The Contractor shall provide structure mounted service equipment to provide power to each sign. The cost of this shall be considered incidental to the unit price for the DMS.

The Contractor shall be responsible to have a Licensed Structural Engineer in the State of Illinois design the sign attachment to the DMS sign truss and stamp the drawings. These drawings shall be submitted to the Engineer for approval before work can commence. These drawings will describe the mounting required to attach the DMS to the Structure. Shop drawings for the structures may be available upon request. The contractor shall supply all mounting hardware necessary to attach the DMS to the structure. The cost of this work shall be included in the contract bid price for the item. No additional compensation will be allowed for any modifications that maybe required to the structure.

All field equipment shall remain fully functional over an ambient temperature range of -40˚F to +149˚F with relative humidity of up to 95%. All field equipment enclosures shall be designed to and shall withstand the effects of sand, dust, and hose-directed water. All connections shall be watertight.

Working Sample Demonstration (Dynamic Message Sign) . To ensure timely delivery for installation, it is imperative that the DMS manufacturer be regularly engaged in the manufacture of the specified equipment and capable of immediately demonstrating a sample DMS that is in clear compliance with the key portions of the specifications. Delay from the specified timeline, and failure to present the sample in a timely manner may result in termination of the contract, at the discretion of the Engineer.

The DMS manufacturer shall provide a satisfactory, approvable demonstration of a working sample DMS within 14 calendar days after contract execution. The sample shall be a complete mock-up of a working DMS based on the proposed equipment to be furnished under this contract and identified in the submittal material. The sample demonstration may utilize a portable sample at the IDOT Traffic Systems Center, or it may be at the manufacturer's production facility if located within District 1. A demonstration of an identical installed unit for some other contract will be acceptable.

The sample demonstration will be for purposes of review and approval by the engineer. The Engineer will issue review comments based on examination of the unit and its operation at the time of the demonstration, and the Engineer may require a subsequent revised sample demonstration if, in the Engineer's judgment, the comments warrant re-work of the sample unit.

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Delay in presenting the specified demonstration or delay in attaining “Approved” or “Approved as Noted” status will result in the assessment of liquidated damages in the amount of $3,000 per calendar day until a satisfactory sample and demonstration are attained.

For a demonstration to be held at the IDOT Traffic Systems Center, the manufacturer shall coordinate the exact date, time, demonstration location, and power requirements with the Engineer.

The sample unit shall be in substantial compliance with the contract requirements. The Engineer may elect to waive minor deviations for purposes of the demonstration, or may waive minor deviations completely if alternative provisions are judged superior to specified requirements, but deviations from key specified requirements will not be accepted.

Materials All materials furnished, assembled, fabricated or installed under this item shall be new, corrosion resistant and in strict accordance with the details shown in the plans and as detailed in this specification. All details and functionality listed in this specification will be thoroughly inspected and tested by the department. Failure to meet all details and functionality detailed in this specification shall be grounds for rejection of the equipment.

Terminology Due to the varying definitions used in DMS technology, this section defines specific terms as they apply to this specification.

- Sign: The sign housing and its contents.
- Sign Controller: Located in a ground cabinet (as detailed in this specification), the sign controller specifies the message to be displayed. Messages can be selected either remotely from the central controller, locally from a laptop computer or from the front panel of the sign controller.
- Central Controller: The MS Windows Server computer system and related software, which operates the system from a remote control site.
- Workstation: This computer operates as a remote client to the central controller. A workstation operator may dial-in to the central controller and gain access to the functions of the central by using the appropriate access codes.
- LED: Light Emitting Diode
- Pixel: Any of the small discrete elements that, when arranged in a pixel matrix, create a character. A pixel contains a cluster of LEDs.
- Pitch: Distance measured from center to center of adjacent pixels within a matrix. This distance is measured both horizontally and vertically.
- Poll: The central controller and laptop computer are said to “poll” a sign when they request the sign’s status information. The term is derived from the periodic status polling, which a central can perform, but is loosely used to refer to any status request.
- Message: Text; the information shown on the sign.
- Display: The message seen by the motorist. A display may include more than one page of text (an alternating display). Any character or set of characters of a display may be flashed (a flashing display).
- Neutral State: Sign is blank, or displaying a predefined message that is displayed regularly.
- WYSIWYG: What You See IS What You Get. In this specification, this is the functionally of the LED DMS system where the central, workstation or laptop display mimics the actual message that is visibly displayed on the sign on an individual pixel basis.

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DMS Manufacture Requirements.

The company that designs and manufactures the LED DMS shall be currently ISO 9001 certified as of the bid date for this project and shall have received its ISO 9001 certification a minimum of three years prior to the bid date for this project. The scope of this company's ISO 9001 certification shall be for the Design, Manufacture, Installation, Maintenance and Sales of Dynamic Message Sign Systems. The facility where this company actually designs and manufactures the LED DMS shall be ISO 9001 certified. This company, this scope and the address of this facility shall all be listed on the ISO 9001 certificate. This ISO 9001 certificate shall be provided with the bid. The name, phone number and address of both the Authorized ISO 9001 Registrar that certified this company and the Authorized ISO 9001 Accreditation Body that accredited this Registrar shall be provided with the bid. Failure to fully comply with these requirements and to provide all this information will cause this company's equipment and software to be rejected. ISO 9002 and ISO 9003 certifications are not adequate and do not meet this requirement.

Experience Requirements: The LED DMS Manufacturer shall submit a State Department of Transportation reference for a minimum of three (3) different states that have been successfully operating a highway full color LED dynamic message sign system and that completely meets these specifications, manufactured and supplied by this manufacturer for a period of no less than five (5) years.

The LED DMS Signs and System shall be fabricated by an established DMS manufacturer having the minimum of:

- 10 years experience, under the current corporate name, in the design and manufacturing of State Highway or Interstate Highway, permanently-mounted, overhead dynamic message signs and central control systems installed in freeway service. These 10 years of experience shall include the complete design and manufacturing of all aspects of the dynamic message signs, including the electronic hardware, software and sign housings.
- 100 State Highway or Interstate Highway, permanently-mounted, overhead dynamic message signs installed in freeway service, under the current corporate name.
- 50 State Highway or Interstate Highway, permanently-mounted, overhead LED dynamic message signs that completely meet this specification with three lines of 18-inch characters and Walk-In Access housings installed in freeway service, under the current corporate name.
- The manufacturer of the LED DMS Signs and System shall submit documentary evidence and reference data for the above requirements. Reference data shall include the name and address of the organization, and the name and telephone number of an individual from the organization who can be contacted to verify the above requirements. The name of the DMS manufacturer that meets these experience requirements shall have the same corporate name as the DMS manufacturer that meets the ISO 9001 requirements stated elsewhere in this specification. This information shall be provided prior to documentation submittal. Failure to furnish the above references will be sufficient reason for rejection of the supplier's equipment.
- The Contractor shall submit the information described in this section to the Engineer within 15 days of award of the contract. The Engineer will review the submitted information and provide comments and approval of the information to the Contractor within 15 calendar days after receipt. Review of the submittal information by the Engineer shall not relieve the Contractor of the contractor's obligation to furnish and install the work in accordance

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with the contract documents. No time extensions will be granted to the Contractor as a result of the need to resubmit various items to review.

- Shop drawings shall be submitted in accordance with Article 105.04 of the Standard Specifications and as specified in these special provisions.
- Prior to purchase or fabrication of any equipment or materials for use in this project, the Contractor shall submit, for review by the Engineer, appropriate catalog cuts sheets, and specifications for all standard, off-the-shelf items and shall submit shop drawings and other necessary data for all non-catalog or custom-made items.
- The Contractor shall furnish five sets of submittal data directly to the Engineer. Two copies of this information, with appropriate notations, will be returned to the Contractor after the review.
- If reprinted literature, such as catalog cut sheets, is used to satisfy the submittal data requirements, there shall be no statements on the literature which conflict with the requirements of the contract documents. Any such statements shall be crossed off and initialed by the Contractor. Explanation of how specifications shall be met pertaining to items changed from the literature shall be documented in writing and included with the submittal information.
- All items shall be submitted together.
- Each submittal shall contain sufficient information and details to permit full evaluation of each item, and its interrelationships among the various items shall be carefully addressed.
- The Contractor shall prepare and submit detailed shop drawings for each sign type indicating types of materials proposed for each component of each sign, parts lists, assembly techniques, layout of all display elements and wiring schematics. The shop drawings shall also illustrate in detail how the Contractor proposes to mount and connect the DMS sign case to the sign support structure (truss). The DMS sign case shall include any support mechanism necessary for the installation of the DMS sign case that is not included in the truss. These drawings shall be submitted to the Engineer for review and approval prior to fabrication of any sign. Parts lists shall include circuit and board designation, part type and class, power rating, component manufacturer and mechanical part manufacturer.
- As part of the submittals for the DMS assembly, the Contractor shall submit an engineering drawing illustrating the DMS character set including 26 upper case letters, 10 numerals, a dash, a plus sign (+), and slash. The Contractor shall also submit complete technical information, shop drawings, photographs, graphs, circuit diagrams, instruction manuals, security provisions, and any other necessary documents to fully describe the DMS assembly and associated equipment.

Product Testing. The DMS manufacturer shall provide documentation indicating that the DMS product has been tested to the following standards. It shall be acceptable for the testing to be performed on scale-sized versions of the actual DMS provided that the test unit is functionally and structurally equivalent to the full size DMS.

Failure to conform to these testing requirements shall be grounds for rejection. Rejected equipment may be offered for test or retest provided all non-compliant items have been corrected and tested or retested by the DMS manufacturer. Any corrections deemed necessary by the Engineer shall be made by the DMS manufacturer, at no additional cost to the Department.

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Third Party Testing: Third party test reports shall be submitted for the following testing:

- NEMA Standards Publication TS 4, Hardware Standards for Dynamic Message Signs (DMS), with NTCIP Requirements – Section 2, Environmental Requirements. Test report shall detail results of mechanical vibration and shock, electrical noise and immunity, temperature, and humidity.
- Underwriters Laboratories (UL), UL 48 Standard for Electric Signs, UL 50 Enclosures for Electrical Equipment, and UL 1433 Standard for Control Centers for Changing Message Type Electric Signs. The UL report number(s) for all DMS and control equipment manufactured by the DMS manufacturer shall be submitted and the products shall bear the UL mark.

The supplier shall provide a record of each test performed including the results of each test. The report shall include a record of the 3rd party test laboratory and the test lab's representative that witnessed the tests, including the signature of the lab's representative. The test reports shall be provided to the Engineer for review as part of the technical submittal.

Self Certification: The DMS manufacturer shall provide self-certification, including a statement of conformance and copies of test reports, indicating that the following tests have been performed and passed.

Third party test reports shall be submitted for testing of the following National Transportation Communication for ITS Protocol (NTCIP) standards:

- NTCIP 1201:1996, NTCIP Global Object Definitions (including Amendment 1)
- NTCIP 1203:1997, Object Definitions for Dynamic Message Signs (including Amendment1)
- NTCIP 2101:2001, Point to Multi-Point Protocol Using RS-232 Subnetwork Profile.
- NTCIP 2103 (Draft v1.13), Point-to-Point Protocol over RS-232 Subnetwork Profile.
- NTCIP 2104 V01.11 Ethernet Subnetwork Profile

The NTCIP testing shall have been completed using industry accepted test tools such as the NTCIP Exerciser, Trevilon's NTester, Intelligent Devices' Device Tester, and/or Frontline's FTS for NTCIP. The NTCIP test report(s) shall include testing of sub-network communications functionality, all mandatory objects in all mandatory conformance groups, and a subset of the remaining objects.

<u>Physical Construction</u>

Wiring and Power Distribution

- Power and Signal Entrances
  - Two threaded conduit hubs shall be located on the rear or side wall of the DMS housing. One hub shall be for incoming AC power and the other shall be for incoming DMS signal cabling or a communications line.

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- Panel Board
  - The DMS shall contain a power panel board and circuit breakers that meet the following minimum requirements:

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- Service entrance-rated
- Minimum of 20 circuit breaker mounting positions
- Short circuit ratings of 22,000 amps and 10,000 amps for the main and branch circuits, respectively
- UL listed panel board and circuit breakers

▪ Internal Wiring
- Wiring for LED display module control, environmental control circuits and other internal DMS components shall be installed in the DMS housing in a neat and professional manner. Wiring shall not impede the removal of display modules, power supplies, environmental control equipment, and other sign components. Wires shall not make contact with or bend around sharp metal edges. All wiring shall conform to the National Electrical Code.

Earth Grounding: The DMS manufacturer shall provide one earth ground lug that is electrically bonded to the DMS housing. The lug shall be installed near the power entrance location on the DMS housing's rear wall. The DMS installation contractor shall provide the balance of materials and services needed to properly earth ground the DMS. All earth grounding shall conform to the National Electrical Code.

DMS Enclosure: The LED DMS shall enable the display of text, consisting of a string of alphanumeric and other characters. The size of the sign shall be as shown in the plans, and elsewhere in the specification. Each character shall be formed by a matrix of luminous pixels. The matrix of a standard character shall consist of 345 pixels over 15 columns and 23 rows.

The equipment design and construction shall utilize the latest available techniques with a minimum number of different parts, subassemblies, circuits, cards and modules to maximize standardization and commonality. The equipment shall be designed for ease of maintenance. All component parts shall be readily accessible for inspection and maintenance. Test points shall be provided for checking essential voltages.

The sign shall be designed for a minimum life of 20 years.

The sign shall be designed and constructed so as to present a clean and neat appearance. Poor workmanship shall be cause for rejection of the sign.

All cables shall be securely clamped or tied in the sign housing. No adhesive attachments will be allowed.

The dynamic message sign, including the sign housing and all modules and assemblies, shall be designed and manufactured in the USA.

The complete sign housing shall be designed and manufactured in-house by the LED DMS Sign Manufacturer. A registered structural engineer in the State of Illinois shall analyze the DMS structure and certify that the DMS will withstand the temporary effects of being lifted by the provided eye bolts, will comply with the applicable requirements of AASHTO Standard Specification for Structural Supports for Highway Signs, Luminaries and Traffic Signals, Fourth Draft, 2001, and will support a front face ice load of 4 lbs. per square foot.

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The equipment within the sign housing shall be protected from moisture, dust, dirt and corrosion. The sign shall be constructed of aluminum alloy 5052-H32 or 3003- H14 which shall not be less than 1/8" thick, unless otherwise specified in this document. Framing structural members shall be made of aluminum alloy 6061-T6 or 6063-T5.

All welding shall be by an inert gas process in accordance with the American Welding Society (AWS) Standards, ANSI/AWS D1.2-97. The LED DMS manufacturer's welders and welding procedures shall be certified by an ANSI/AWS Certified Welding Inspector to the 1997 ANSI/AWS D1.2-97 Structural Welding Code for Aluminum. Proof of certification of all the LED DMS manufacturer's welders and applicable welding procedures shall be supplied with the submittals. The name, phone number and address of the ANSI/AWS Certified Welding Inspector that certified the LED DMS manufacturer's welders and procedures shall also be provided with the submittals.

The DMS housing's right, left, and rear walls shall be vertical. The top and bottom sides shall be horizontal.

The sign housing shall be capable of withstanding a wind loading of 120 mph without permanent deformation or other damages.

All 120/240 VAC wiring located inside the sign housing shall be run in conduit pull- boxes, handy-boxes, power supply boxes, control cabinets, and circuit breaker boxes.

The performance of the sign shall not be impaired due to continuous vibration caused by wind, traffic or other factors. This includes the visibility and legibility of the display.

The presence of power transients or electromagnetic fields, including those created by any components of the system, shall have no deleterious effect on the performance of the system. The system shall not conduct or radiate signals which will adversely affect other electrical or electronic equipment including, but not limited to, other control systems, data processing equipment, audio, radio and industrial equipment.

All DMS structural hardware shall be stainless steel and appropriately sized for the application.

The DMS Manufacturer shall provide a signed and sealed copy of these certifications by the registered Structural Engineer as part of the catalog cut submittal.

- Electronic Components All electronic components, except printed circuit boards, shall be commercially available, easily accessible, replaceable and individually removable using conventional electronics repair methods.

  All workmanship shall comply with ANSI/IPC-1-610B Class 2 titled "Acceptability of Electronic Assemblies", ANSI/IPC-7711 titled "Rework of Electronic Assemblies", and ANSI/IPC-7721 titled "Rework and Modification of Printed Boards and Electronic Assemblies".

  All electronic components shall comply with Section Electronic Materials and Construction Methods, located in this document.

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All Printed Circuit Boards (PCBs) shall be completely conformal coated with a 0.010 inch (10 MIL) minimum thickness silicone resin conformal coat. The LED mother boards shall be completely conformal coated, except at the pixels on the front of the PCB, with a 0.010 inch (10 MIL) minimum thickness silicone resin conformal coat. The material used to coat the PCBs shall meet the military specification: MIL-I-46058C Type SR.

- Mechanical Components All external screws, nuts, and locking washers shall be stainless steel. No self-tapping screws shall be used. All parts shall be made of corrosion resistant materials, such as plastic, stainless steel or aluminum. All materials used in construction shall be resistant to fungus growth and moisture deterioration. An inert dielectric material shall separate dissimilar metals.

- Convenience Outlets. The DMS housing shall contain a utility outlet circuit consisting of a minimum of three (3) 15-A NEMA 15-R, 120 VAC duplex outlets, with ground-fault circuit interrupters. One outlet shall be located near each end of the DMS housing interior and the third outlet shall be located near the housing's center.

  If the sign controller and communication equipment is to be mounted in the sign, a second outlet circuit shall be included consisting of a minimum of two (2) 15-A NEMA 15-R, 120 VAC duplex outlets. These outlets shall be located near the controller and communication equipment mounting location.

Front Face Construction. 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.

Front face panels shall provide a high-contrast background for the DMS display matrix. The aluminum mask of each panel shall be painted black and shall contain an opening for each pixel. Openings shall be large enough to not block any portion of the viewing cones of the LEDs. Face panels shall be attached to each other using stainless steel hardware. Seams that separate adjacent panels shall be sealed. Panels shall not be welded or otherwise permanently mounted to the DMS housing.

Each panel shall have a single polycarbonate sheet attached securely to the inside of the aluminum panel. The polycarbonate sheet shall cover all of the pixel openings. The polycarbonate shall be sealed to prevent water and other elements from entering the DMS. The polycarbonate shall contain UV inhibitors that protect the LED display matrix from the effects of ultraviolet light exposure and prevent premature aging of the polycarbonate itself. The use of a plastic lens system will not meet the requirements and will be cause for rejection.

LED display modules shall mount to the inside of the DMS front face panels. No tools shall be needed for removal and replacement of LED display modules.

DMS front face borders (top, bottom, left side and right side) which surround the front face panels and LED display matrix, shall be painted black to maximize display contrast and legibility.

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In the presence of wind, the DMS front face shall not distort in a manner that adversely affects LED message legibility.

- Service Access. The DMS housing shall provide safe and convenient access to all modular assemblies, components, wiring and subsystems located within the DMS housing. All of those internal components shall be removable and replaceable by a single technician.

  At least one (1) 80” vertically hinged door shall be located on each end (left, right or left and right side) of the DMS housing. Each access door shall be mounted to an integral doorframe. A vertical stainless steel hinge shall support each door and all doors shall open outward. In the closed position, each door shall latch to its frame with a three-point draw-roller mechanism. The latching mechanism shall include an internal handle and release lever. Door release levers shall be located so that a person with no key and no tools cannot become trapped inside the housing.

  Access doors, when open at a 90-degree angle from the DMS housing end wall, shall not extend more than 38 inches (965 mm) from the housing. The bottom edge of each door shall be at least 3.5 inches (89 mm) from the bottom edge of the DMS housing. This will provide clearance for the doors to swing open over external access platform.

  Doorframes shall be double flanged on all sides to shed water. Each door shall close around its flanged frame and compress against a closed-cell foam gasket, which adheres to the door. All doors shall contain a stop that retains the door in a 90-degree open position. When a door is open, the door and its stop shall not be damaged by a 40 mph (64 km/h) wind.

  Each door shall be furnished with a lock that is keyed to a Corbin #2 lock.

  The DMS must be equipped with an OSHA compliant safety rail assembly, which prevents service personnel from falling out of the DMS when closed across an open access door. A rail assembly must be provided for each door in the display. The safety rail shall consist of a top rail that extends 42 inches (1,067 mm) above the interior walkway and a mid-rail that extends 21 inches (533 mm) above the interior walkway. The rail assembly shall require no tools to open and close.

  The DMS cabinet shall be equipped with an OSHA compliant anchor point at each entrance location for the connection of a personal fall arrest system. These anchorages integrated to the support structure must be strong enough to withstand a force of 5,000 pounds (22.2 kilo-newton(s)) as required by OSHA. The anchorages must be located such that they will not allow a person to free-fall more than 6 feet when a 6 foot lifeline is used. The anchorages must be located just inside each access door within easy reach from the outside.

  Interior work area, minimum headroom of 72 inches (1,829 mm) shall be provided. This free space shall be maintained across the entire width of the DMS housing, with the exception of structural frame members. Structural members shall be designed not to obstruct the free movement of maintenance personnel throughout the DMS.

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A level aluminum walkway shall be installed in the bottom of the DMS housing. The walkway shall be a minimum of 24 inches (610 mm) wide and it shall run the entire length of the housing, from one side to the other side. The walkway's top surface shall be non-slip and shall be free of obstructions that could trip service personnel. The walk-way shall support a load of 500 pounds (136 kg) per two (2) linear feet per AASHTO STA specifications for Highway Signs section 3.6 Live Loads and it shall be constructed of multiple aluminum removable panels.

- Face Panels. Front face panels shall provide a high-contrast background for the DMS display matrix. The aluminum mask of each door panel shall be painted black and shall contain an opening for each pixel. Openings shall be large enough to not block any portion of the viewing cones of the LEDs. Each panel shall have a single polycarbonate sheet attached securely to the inside of the aluminum panel. The polycarbonate sheet shall cover all of the pixel openings. The polycarbonate shall be sealed to prevent water and other elements from entering the DMS. The polycarbonate shall contain UV inhibitors that protect the LED display matrix from the effects of ultraviolet light exposure and prevent premature aging of the polycarbonate itself. Polycarbonate sheets shall have the following characteristics:

  - Tensile Strength, Ultimate: 10,000 psi
  - Tensile Strength, Yield: 9,300 psi
  - Tensile Strain at Break: 125%
  - Tensile Modulus: 330,000 psi
  - Flexural Modulus: 330,000 psi
  - Impact Strength, Izod (1/8", notched): 17 ft-lbs/inch of notch
  - Rockwell Hardness: M75, R118
  - Heat Deflection Temperature Under Load: 264 psi at 270°F and 66 psi at 288°F
  - Coefficient of Thermal Expansion: 3.9X10-5 in/in/F
  - Specific Heat: 0.30 BTU/lb/F
  - Initial Light Transmittance: 85% minimum
  - Change in Light Transmittance, 3 years exposure in a Southern latitude: 3%
  - Change in Yellowness Index, 3 years exposure in a Southern latitude: Less than 5%

  LED display modules shall mount to the inside of the DMS front face panels. Common hand tools shall be used for removal and replacement.

  DMS front face borders (top, bottom, left side, and right side), which surround the front face panels and LED display matrix, shall be painted black to maximize display contrast and legibility.

  In the presence of wind, the DMS front face shall not distort in a manner that adversely affects LED message legibility.

- Exterior Finish. DMS front face panels and front face border pieces shall be coated with semi-gloss black Kynar 500 resin or an equivalent brand of oven-fired fluoropolymer coating, which has an expected outdoor service life of 20 years.

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All other DMS housing surfaces, including the DMS mounting brackets, shall be natural mill-finish aluminum.

- Heating. The lens panel shall use heated, forced air to prevent fogging and condensation. An eight watt-per-foot, self-regulating, heat tape shall be provided along the bottom of the message area, between the glazing and the display modules. The sign controller shall control the heat tape. All heat tape terminal blocks shall be covered for safety.

Humidity Control. A humidity sensor shall be provided and sensed by the sign controller from zero percent to 100 percent relative humidity in one percent or fewer increments. The sensor shall operate and survive from 0 percent to 100 percent relative humidity.

The sensor shall have an accuracy that is better than +/- five percent relative humidity.

The sign controller shall read the internal temperature sensors, external ambient temperature sensor and the humidity sensor. The sign controller shall use these readings in an algorithm that turns on the heat tape and/or the fans at the appropriate times to reduce both frost on the face of the sign and condensation on the display modules and other electronic circuitry.

Drain Holes. The bottom panel of the housing shall contain small drain holes. The drain holes shall be screened to prevent the entrance of insects and small animals and shall be replaceable.

Ventilation System. The DMS shall contain systems for cabinet ventilation and safe over-temperature shutdown.

The DMS shall contain a electronically controlled ventilation system and a failsafe thermostat designed to keep the internal DMS air temperature lower than +140°F (+60°C), when the outdoor ambient temperature is +115°F (+46°C) or less.

The ventilation system shall consist of two or more air intake ports. Intake ports shall be located near the bottom of the DMS rear wall. Each intake port shall be covered with a filter that removes airborne particles measuring 500 microns in diameter and larger. One or more ball bearing-type fans shall be mounted at each intake port. These fans shall positively pressure the DMS cabinet.

Fans and air filters shall be removable and replaceable from inside the DMS housing.

Each ventilation fan shall contain a sensor to monitor its rotational speed, measured in revolutions per minute. The fan speed shall be reported to the sign controller upon request.

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

Each exhaust port shall be located near the top of the rear DMS wall. One exhaust port shall be provided for each air intake port. All exhaust port openings shall be screened to prevent the entrance of insects and small animals.

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An aluminum hood attached to the rear wall of the DMS shall cover each air intake and exhaust port. All intakes and exhaust hoods shall be thoroughly sealed to prevent water from entering the DMS.

The DMS shall automatically shut down the LED modules to prevent damaging the LEDs if the measured internal cabinet air temperature exceeds a maximum threshold temperature. The threshold temperature shall be configurable and shall have a default factory setting of 140°F (+60°C). The factory default setting shall be overridden if the selected message priority is set above 200 or is selected as an emergency message.

Alternate sign ventilation systems can be submitted to the Engineer for approval. Extra time and additional demonstration testing and documentation of the proposed alternate system may be needed to secure the necessary approval from the Engineer. No extra compensation shall be awarded to the Contractor for the alternate design but if the alternate design is rejected, liquidated damages may apply.

LED Display Modules The DMS shall contain LED display modules that include an LED pixel array, LED driver circuitry, and mounting hardware. These modules shall be mounted adjacently in a two-dimensional array to form a continuous LED pixel matrix. Each LED display module shall be constructed as follows:

- Each LED display module may consist of one or two circuit boards. If two boards are used, they shall be mounted physically to each other using durable corrosion resistant hardware. They shall be electrically connected via one or more header-type connectors. The header connectors shall be keyed such that the boards cannot be connected incorrectly.
- All LED modules shall be manufactured using laminated fiberglass printed circuit boards.
- Each LED display module shall be mounted to the rear of the display's front face panels using durable corrosion resistant hardware. No tools shall be required for module removal and replacement. The modules shall be mounted such that the LEDs emit light through the face panel's pixel holes and such that the face panel does not block any part of the viewing cone of any of the LEDs in any pixels.
- LED display module power and signal connections shall be a quick-disconnect locking connector type. Removal of a display module from the DMS, or a pixel board or driver circuit board from its display module, shall not require a soldering operation.
- All exposed metal on both sides of each printed circuit board, except connector contacts, shall be protected from water and humidity exposure by a thorough application of conformal coating. Bench level repair of individual components, including discrete LED replacement and conformal coating repair, shall be possible.
- Individual addressing of the each LED display module shall be configured via the communication wiring harness and connector. No on-board addressing jumpers or switches shall be allowed.
- Removal or failure of any LED module shall not affect the operation of any other LED module or sign component. Removal of one or more LED modules shall not affect the structural integrity of any part of the sign.
- It shall not be possible to mount an LED display module upside-down or in an otherwise incorrect position within the DMS display matrix.
- All LED display modules, as well as the LED pixel boards and driver circuit boards, shall be identical and interchangeable throughout the DMS.

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LED Pixels Each LED module shall contain a printed circuit board to which LED pixels are soldered. The LED pixel matrix shall conform to the following specifications:

- Each LED module shall contain a minimum of 256 LED pixels configured in a two dimensional array. The pixel array shall be a minimum of sixteen (16) pixels high by sixteen (16) pixels wide.
- The distance from the center of one pixel to the center of all adjacent pixels, both horizontally and vertically, shall be 0.81 inches (20.6 mm).
- Each pixel shall consist of a minimum of one (1) independent string of discrete LEDs for each color. All pixels shall contain an equal quantity of LED strings.
- The failure of an LED string or pixel shall not cause the failure of any other LED string or pixel in the DMS.
- Each pixel shall contain the quantity of discrete LEDs needed to output white colored light at a minimum luminous intensity of 12,400 candelas per square meter when operated within the forward current limits defined in these specifications.
- Each pixel shall also be capable of displaying amber colored light with a minimum luminous intensity of 7,440 candelas per square meter when operated within the forward current limits defined in these specifications.
- Each LED pixel shall not consume more than 1.5 watts.
- The circular base of the discrete LEDs shall be soldered so that they are flush and parallel to the surface of the printed circuit board. The longitudinal axis of the LEDs shall be perpendicular to the circuit board.

Discrete LEDs DMS pixels shall be constructed with discrete LEDs manufactured by Avago Technologies (formerly Agilent Technologies), Toshiba Corporation, Nichia Corporation, OSRAM, or equivalent. Discrete LEDs shall conform to the following specifications:

- All LEDs shall have a nominal viewing cone of 30 degrees with a half-power angle of 15 degrees measured from the longitudinal axis of the LED. Viewing cone tolerances shall be as specified in the LED manufacturer's product specifications and shall not exceed +/- 3 degrees.
- Red LEDs shall utilize AlInGaP semiconductor technology and shall emit red light that has a peak wavelength of 615 – 650 nm.
- Green LEDs shall utilize InGaN semiconductor technology and shall emit green light that has a peak wavelength of 525 – 535 nm.
- Blue LEDs shall utilize InGaN semiconductor technology and shall emit blue light that has a peak wavelength of 464 – 470 nm.
- The LED lenses shall be fabricated from UV light resistant epoxy.
- The LED manufacturer shall perform color sorting of the bins. Each color of LEDs shall be obtained from no more than two (2) consecutive color "bins" as defined by the LED manufacturer.
- The LED manufacturer shall perform intensity sorting of the bins. LEDs shall be obtained from no more than two (2) consecutive luminous intensity "bins" as defined by the LED manufacturer.

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- The various LED color and intensity bins shall be distributed evenly throughout the sign and shall be consistent from pixel to pixel. Random distribution of the LED bins shall not be accepted.
- LED package style shall be either through-hole flush-mount or surface-mount. Through-hole LEDs with standoffs will not be accepted.
- All LEDs used in all DMS provided for this contract shall be from the same manufacturer and of the same part number, except for the variations in the part number due to the intensity and color bins.
- The LEDs shall be rated by the LED manufacturer to have a minimum lifetime of 100,000 hours of continuous operation while maintaining a minimum of 70% of the original brightness.

Pixel Drive Circuitry One (1) electronic driver circuit board shall be provided for each LED pixel module and shall individually control all pixels on that module. The driver circuit boards shall conform to the following specifications:

- Each LED driver board shall be microprocessor-controlled and shall communicate with the sign controller on a wire or fiber optic communication network using an addressable network protocol. The microprocessor shall process commands from the sign controller to display data, perform diagnostic tests, and report pixel and diagnostic status.
- Constant current LED driver ICs shall be used to prevent LED forward current from exceeding the LED manufacturer's recommended forward current whenever a forward voltage is applied. To maximize LED service life, LED drive currents will not be allowed that exceed the manufacturer's recommendations for the 100,000-hour lifetime requirement.
- The LED pixels shall be directly driven using pulse width modulation (PWM) of the drive current to control the display intensity. This LED driver circuitry shall vary the current pulse width to achieve the proper display intensity levels for all ambient light conditions. The drive current pulse shall be modulated at a frequency high enough to provide flicker-free operation and a minimum of 200 brightness levels.
- The LED driver circuitry shall receive updated display data at a minimum rate of ten (10) frames per second from the sign controller.
- Each LED driver circuit shall be powered by 24 VDC from external regulated DC power supplies. Each driver circuit shall receive power from a minimum of two (2) independent power supplies. Indicator LEDs shall be provided to indicate the status of each power source.
- Each LED driver circuit shall contain a microprocessor-controlled power regulation circuit that controls the voltage applied to the LED strings. The power circuit shall automatically adjust the voltage supplied to the LEDs to optimize power consumption efficiency as the temperature changes.
- The voltage of each power input shall be measured to the nearest tenth of a volt and reported to the sign controller upon request. Each driver circuit shall also contain one status LED for each power source that indicates if the power source is present or not.
- The LED driver circuitry shall be able to detect that individual LED strings or pixels are stuck off and shall report the pixel status to the sign controller upon request.

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- The LED driver board shall contain a seven segment numeric LED display that indicates the functional status of the driver and pixel boards. At a minimum, it shall indicate error states of the LED pixels and communication network. The indicator shall be positioned such that a maintenance technician can easily view the status code for diagnostic purposes. The status codes shall also be reported to the sign controller upon request.

Characters Displayed. The signs shall be capable of displaying ASCII characters 32 through 126 (including all upper and lower case letters and digits from 0 to 9) at any location in a message line.

The display area shall be 96 pixels high by 400 pixels wide.

The sign shall normally display 18-inch characters using triple-stroke (23 x 15) characters with four-column spacing between characters. The operator shall be able to change the default spacing between characters. The spacing options shall be one, two or three pixel columns. Font access privileges shall be assigned by the system supervisor.

The full matrix display shall be capable of displaying other sized character, graphics/symbols, and other number of lines depending on the height of the character utilized.

The separation between the last column of one module and the first column of the next shall be equal to the horizontal distance between the columns of a single display module. The separation between the last row of one module and the first row of the next shall be equal to the horizontal distance between the rows of a single display module.

18-inch characters shall be legible under all light conditions at a distance of 900 feet within a 30 degree cone of vision centered on the optical axis of the pixel. The cone perimeter shall be defined by its 50% intensity points.

The sign shall be the proper brightness in all lighting conditions for optimum legibility. It shall be bright enough to have a good target value, but not be the point where the pixels bloom, especially in low ambient light level conditions.

The brightness and color of each pixel shall be uniform over the entire face of the sign within the 30 degree cone of vision from 900 feet to 200 feet in all lighting conditions. Non-uniformity of brightness or color over the face of the sign under these conditions shall be cause for rejection of the sign.

Display of Graphic Images. The DMS control software shall support the inclusion of graphics in messages. If the NTCIP 1203 standard has not reached a “recommended” or “approved” state by the time of contract award, the vendor shall support graphics using manufacturer-specific objects and MULTI tags.

If a manufacturer-specific means of supporting graphics is used, the vendor shall commit to provide NTCIP 1203 firmware updates at no cost to the customer. These updates will include all current requirements of these specifications and also standard graphics support. The vendor shall install the updates no later than six months after the NTCIP 1203 standard reaches the “approved” state.

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Regulated DC Power Supplies The LED pixel display modules shall be powered with auto-ranging regulated switching power supplies that convert the incoming AC to DC at a nominal voltage of 24 volts DC. Power supplies shall be wired in a redundant parallel configuration that uses multiple supplies for the DMS display matrix.

Power supplies shall be redundant and rated such that if one supply fails, the remaining supply(s) shall be able to operate 100% of the pixels in that display region at 100% brightness when the internal DMS air temperature is +140°F (60°C) or less.

Each power supply shall receive 120VAC power from separate circuits on separate circuit breakers, such that a single tripped breaker will not disconnect power from more than one supply.

The power supplies shall be sufficient to maintain the appropriate LED display intensity throughout the entire operating input voltage range.

The output of each power supply shall be connected to multiple circuits that provide power to the LED modules. Each output circuit shall not exceed 15 amperes and shall be fused.

Each power supply shall be monitored by a microprocessor-controlled circuit. This circuit shall monitor the voltage of each power supply. The power supply voltages shall be reported to the sign controller upon request. The power supplies used to power the LED pixel modules shall be identical and interchangeable throughout the DMS.

Regulated DC power supplies shall conform to the following specifications:

- Nominal output voltage of 24 VDC +/- 10%
- Nominal maximum output power rating of 1000 watts
- Operating input voltage range shall be a minimum of 90 to 260 VAC
- Operating temperature range shall be a minimum of -30ºF to +165ºF (-34ºC to +74ºC)
- Maximum output power rating shall be maintained over a minimum temperature range of -30ºF to +140ºF (-34ºC to +60ºC)
- Power supply efficiency shall be a minimum of 80%
- Power factor rating shall be a minimum of 0.95
- Power supply input circuit shall be fused
- Automatic output shut down and restart if the power supply overheats or one of the following output faults occurs: over-voltage, short circuit, or over-current
- Power supplies shall be UL listed
- Printed circuit boards shall be protected by an acrylic conformal coating

Photoelectric Sensor Devices. Three (3) photocells shall be installed on the sign. These devices shall permit automatic light intensity measurement of light conditions at each sign location. These photocells shall be mounted in a manner to measure front, rear and ambient light conditions.

Brightness Control. Automatic adjustment of the LED brightness shall occur in small enough increments so that the brightness of the sign changes smoothly, with no perceivable brightness change between adjacent levels. Provision shall be made to prevent perceivable brightening of the sign due to stray headlights shining upon the photo sensors at night.

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Pixel brightness shall be controlled by pulse width modulation of the DC current. The pixel current waveform shall have a frequency of 100 ± 5 Hertz at nighttime brightness levels and 2400 ± 120 Hertz at daytime brightness levels with an adjustable duty cycle of 0.03 to 99.9% in 0.5% or finer increments. Brightness shall be manually settable from the front panel of the controller and remotely from the central computer in 1% increments. Brightness control shall be able to be returned to automatic from the sign controller front panel and the central computer.

Pixel Status Feedback. Two separate types of pixel status feedback shall be provided to the central controller from the local sign controller. These include a pixel test and a pixel read:

Pixel Test: The pixel test shall be performed from the central controller on command and automatically once a day. During a pixel test, the full operational status of each string of LEDs in each pixel shall be tested and then transmitted to the central controller or laptop computer. This pixel status test shall distinguish the difference between half out, full out, half stuck-on and fully stuck-on pixels. A list of defective pixels shall be provided, listing pixel status, line number, module number, column number and row number for each defective pixel. The pixel test may briefly disturb the displayed message for less than 0.5 seconds.

Pixel Read: The pixel read shall be performed during both message downloads and during every sign poll from the central controller or laptop computer. The pixel read shall perform a real-time read of the displayed message and shall return the state of each pixel to the central controller as it is currently displayed to the motorist, including any errors. This shall allow the central controller operator to see what is visibly displayed to the motorist on an individual pixel basis. During a pixel read, the state of each pixel (full-on, half-on or off) in the sign shall be read by the sign controller to allow the central controller or laptop computer to show the actual message, including static flashing and alternating messages, that is visibly displayed on the sign in a WYSIWYG format. This pixel reading shall take place while a message is displayed on the sign without disturbing the message in any way. Any flashing, flickering, blinking, dimming, or other disturbance of the message during this pixel read shall be cause for rejection of the sign.

The pixel read shall be an actual real-time read of the current flowing through each string of LEDs at the time of the associated sign poll or message download and shall not be accomplished by simulating errors based on the last pixel test.

Environmental Operating Parameters. All DMS components shall be capable of operating without any decrease in performance over a temperature range of -40°C (-40°F) to +70°C (+158°F) with a relative humidity of up to 95% non-condensing, unless otherwise noted in this specification.

Sign Controller. Each DMS shall be controlled and monitored by its own sign controller. The sign controller shall be a stand-alone microprocessor-based system, which does not require continuous communication with DMS control software in order to perform most DMS control functions.

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- The sign controller shall meet the following operational requirements:
- Communicate using the NTCIP protocol
- Contain memory for storing changeable and permanent messages, schedules, and other necessary files for controller operation

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- Include a front panel user interface with LCD and keypad for direct operation and diagnostics as described herein
- Contain a minimum of three (3) NTCIP-compliant RS232 communication ports
- Contain a minimum of one (1) NTCIP-compliant Ethernet port with RJ45 connector
- Contain DMS-specific control firmware (embedded software) that shall monitor all external and internal sensors and communication inputs and control the display modules as directed by external control software and the front panel interface NTCIP shall be natively supported in the DMS controller. External protocol converter or translator devices shall not be allowed.

Controller Location. The sign controller and associated communication equipment shall be installed inside the ground mounted cabinet as shown on plans.

Environmental. The sign controller shall meet the following environmental requirements defined in NEMA Standards Publication TS 4, Hardware Standards for Dynamic Message Signs (DMS), with NTCIP Requirements.

Mechanical and Electrical. The sign controller shall meet the following electrical and mechanical requirements:

- Mount in a standard EIA 19-inch (480 mm) equipment rack with a maximum 4U space requirement
- Weigh no more than 10 pounds, including its enclosure
- Consume no more than 30 watts of power
- Powered by an internal regulated DC power supply capable of operating on 120VAC or 240VAC at both 50Hz and 60Hz
- All printed circuit boards shall be sealed with an acrylic conformal coating

Operational Requirements. The sign controller's front panel shall include a menu driven, 16 button keypad and a 280x472 graphical LCD. These devices shall be used to perform the following functions with the sign controller and DMS:

- Monitor the current status of the sign controller, including the status of all sensors and a RGB what-you-see-is-what-you-get (WYSIWYG) representation of the message visible on the display face
- Perform diagnostics testing of various system components, including pixels, power systems, sensors, and more
- Activate, create, preview and delete messages stored in memory
- Blank the sign.
- Start and stop the schedule.
- Configure display parameters, including display size and color technology
- Configure date and time.
- Configure communications port settings and NTCIP options
- Configure level of password protection per user.
- Select automatic or manual brightness mode of operation.

The front panel interface shall also include:

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- Power switch to turn the controller on and off
- LED power “on” indicator
- Local/remote selection from LCD interfaces.
- LED to indicate when any of the NTCIP communication channels are active

Memory. The sign controller shall have non-volatile electronically changeable memory. This memory shall be formed by flash or battery-backed static RAM integrated circuits that retain the data in memory for a minimum of 30 days following a power loss. This changeable memory shall be used to store messages and schedules. The controller memory shall be capable of storing a minimum of 500 changeable text based messages in non-volatile RAM. There shall be a minimum of 2 GB RAM and 8 GB of storage.

Internal Clock. The DMS sign controller shall contain a computer-readable clock that has a battery backup circuit. The battery shall keep the clock operating properly for at least 5 years without external power, and the clock shall automatically adjust for daylight savings time and leap year using hardware, software, or a combination of both. The clock shall be set electronically by the sign controller microprocessor and shall be accurate to within one (1) minute per month.

Communications. All remote communication ports shall be NTCIP-compatible as defined in the “Requirements for NTCIP Compatibility” section of these specifications.

Communication Modes. The DMS sign controller shall be able to receive instructions from and provide information to a computer containing DMS control software using the following communication modes:

- Remotely via direct or dial-up communications with a remotely located computer. The system communications backbone, as well as all field modems or signal converters, shall provide the DMS sign controller with an RS232 signal.
- Locally via direct connection with a laptop computer that is connected directly to the sign controller using an RS232 null modem connection.

Serial Communication Ports. The DMS sign controller shall contain a minimum of three (3) NTCIP-compatible RS232 communication ports. These ports shall support multiple communication interfaces, including, but not limited to, direct null-modem (for local laptop control), dial-up and leased-line modems, radio systems, cellular modems, and fiber optic modems. The RS232 ports shall all have standard DB9M connectors.

The baud rate, connection type, and NTCIP communication protocol shall be configurable. Each port must support all typical serial baud rates ranging from 1200 to 115,200 baud. All three ports shall be capable of supporting either of the following sub network profiles: NTCIP 2101 (PMPP) or NTCIP 2103 (PPP). They shall also be capable of supporting either NTCIP 2201 (Null) or NTCIP 2202 (Internet) transport profiles. Only one each of the transport and sub network profiles shall be active at any time on each port.

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Ethernet Port. The DMS sign controller shall contain a minimum of one (1) 10/100Base-T Ethernet communication port. This port shall be available for use for communicating from the central control

system to the DMS sign controller when an Ethernet network is available. The Ethernet port shall have a standard RJ45 connector.

Communications on the Ethernet port shall be NTCIP-compatible using the NTCIP 2202 Internet transport profile and the NTCIP 2104 Ethernet sub network profile. This shall permit the controller to be operated on any typical Ethernet network using the TCP/IP and UDP/IP protocols.

Controller Addressing. The DMS sign controller shall use whatever addressing scheme is appropriate for the NTCIP network types used for communications. The controller addressing shall be configurable through the front panel user interface.

NTCIP 2101 (PMPP) networks shall be configured with an address in the range of 1 to 255 with a default address of 1. NTCIP 2104 (Ethernet) networks shall use a static IP address. Both the IP address and subnet shall be configurable. NTCIP 2103 (PPP) networks shall not require network addressing.

Transient Protection. The DMS and sign controller signal and power inputs shall be protected from electrical spikes and transients as follows:

Sign AC Power. The AC power feed for all equipment in the sign cabinet shall be protected at the panel board by a parallel-connection surge suppresser rated for a minimum surge of 50 kA. This device shall conform to the following requirements:

- Withstand a peak 100,000-ampere surge current, 50kA L-N, 50kA L-G
- Designed, manufactured, & tested consistent with: ANSI/IEEE C62.41.1-2002, C62.42.2-2002, C62.45-2002, NEMA LS-1, NEC 285 and IEC 61643, CE
- Less than 1 nanosecond response time
- Temperature range of -15ºF to +140°F (-26ºC to +60ºC)
- Approximate dimensions of 3 inches wide by 8 inches long by 3 inches high
- High Energy Parallel Design for Category C3 & C-High Application
- UL listed to: UL 1449 Third Edition 200kA & 100kA SCCR

12.1 Control Equipment AC Power

- Withstand a peak 100,000-ampere surge current, 50kA L-N, 50kA L-G
- Designed, manufactured, & tested consistent with: ANSI/IEEE C62.41.1-2002, C62.42.2-2002, C62.45-2002, NEMA LS-1, NEC 285 and IEC 61643, CE
- Less than 1 nanosecond response time
- Temperature range of -15ºF to +140°F (-26ºC to +60ºC)
- Approximate dimensions of 3 inches wide by 8 inches long by 3 inches high
- High Energy Parallel Design for Category C3 & C-High Application
- UL listed to: UL 1449 Third Edition 200kA & 100kA SCCR

Communication Signals. Transient voltage surge suppressors shall protect all communication signals connecting to the control equipment from off-site sources using copper cables. Transient voltage surge suppressors shall protect all copper communication lines used to pass data between the sign controller and sign.

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Protection. A series/parallel two-stage suppression device shall protect the modem communication port from over-voltage and over-current conditions. This surge protection shall be integrated internally within the controller.

Local User Auxiliary Interface: When DMS sign Controller is located inside of DMS sign Enclosure.

Auxiliary Control Panel. The DMS shall include an auxiliary control panel that will provide a secondary user interface panel for DMS control, configuration, and maintenance. The auxiliary control panel shall meet the same electrical, mechanical, and environmental specifications as the DMS controller. It shall be powered independently from a 120 VAC outlet. There also shall be a 120 VAC convenience outlet for maintenance personnel lap top computers and a hinged shelf which folds from inside the cabinet and is suitable for the laptop computer to rest on.

Interface Panel. The auxiliary control panel shall have an LCD panel and keypad identical to those found on the DMS controller. It shall also contain a local/remote control switch; reset switch, status LEDs, and one NTCIP compatible RS232 communication port that meet the same specifications as the DMS controller.

DMS Control Interface. The auxiliary control panel shall include an identical menu system to the DMS controller with all of its features and functionality.

Location. The Auxiliary Control Panel shall be installed at grade level in a location that is safe and easy for maintenance personnel to access.

Controller Signal Interface . The auxiliary control panel shall interface to the DMS controller using fiber optic. It shall be capable of operating up to 4000 feet from the DMS controller.

Sign Controller Functions The sign controller shall be capable of being controlled from the central controller or the laptop computer.
The controller software shall be capable of performing the following functions:

Display a message, including:
1. Static messages
2. Flashing messages
3. Alternating messages

Messages shall be capable of displaying text, graphics or a combination of both. The graphics area shall be downloaded from the central controller with each message.

It shall be possible to separately vary the flashing and alternating frequencies.

Flashing messages shall have the following adjustable timing:
1. Message time on from 0.5 to 5.0 seconds in 0.1 second increments.
2. Message time off from 0.5 to 5.0 seconds in 0.1 second increments

It shall be possible to flash any character or set of characters in a static message.

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Alternating messages shall have the following adjustable timing:

1. Primary message time on from 0.5 to 5.0 seconds in 0.1 second increments.
2. Primary message time off from 0 to 5.0 seconds in 0.1 second increments.
3. Alternative message time on from 0.5 to 5.0 seconds in 0.1 second increments.
4. Alternate message time off from 0 to 5.0 seconds in 0.1 second increments.

It shall be possible to flash any character or set of characters in an alternating message at the adjustable frequencies listed above for flashing messages. The flashing period shall be a submultiple of the alternating on-time it is associated with.

Report errors and failures, including:

1. Power failure
2. Power recovery
3. Pixel string failure
4. Fan failure
5. Over a user selectable critical temperature
6. Power supply failure
7. Data transmission error
8. Receipt of invalid data
9. Communication failure recovery

Message and status monitoring: The sign controller shall respond to the central controller whenever it receives a request for status (a poll). The return message shall be capable of providing the following information:

1. Actual message that is visibly displayed on the sign on an individual pixel basis (full-on, half-on or off)
2. Current sign illumination level
3. Local Control Panel switch position (central, local or local override mode)
4. Error and failure reports
5. Temperature readings
6. LED power supply voltage levels
7. Origin of display message transmission (laptop, manual or central)
8. Heater status
9. Address of sign controller
10. Uninterruptible power supply status
11. AC Surge protection status
12. Communication line protection status
13. Operational status of the following sensors:
    - Each temperature sensor
    - Each photocell
    - Each airflow sensor
    - Humidity sensor
    - Each power supply sensor
    - Severe error condition response

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Each time the sign controller is polled by the DMS Master Controller or laptop computer, the sign controller shall test the operation status of the sensors listed below and return this information to the DMS Master Controller. This operational status test shall determine if each of the following sensors are functioning properly.

1. Each temperature sensor
2. Each photocell
3. Humidity sensor
4. Each LED power supply

The sign controller shall provide a library with a minimum of 50 permanent messages, consisting of 30 or less characters per line, stored in PROM. The sign controller shall also be able to accept a downloaded library from the central or laptop computer of a minimum of 25 changeable messages stored in non-volatile RAM. These messages may be called for display on the sign from the keypad on the front panel of the DMS Controller.

The sign controller shall also be capable of displaying messages on the sign that are downloaded from the central controller or laptop computer, but are not located in the library stored in nonvolatile memory of the sign controller.

The sign shall normally display triple stroke (23 x 15) characters with four-column spacing between characters. The sign shall also be able to display single stroke (5 X 7), expanded (6 X 7) or double-stroke (7 X 7) nominal character fonts or change the default spacing between characters. The spacing options shall be one, two or three pixel columns. Each font may be edited and downloaded to the sign controller from the central controller or laptop computer at any time without any software or hardware modifications.

The full matrix display shall also be capable of displaying other sized characters, graphics/ symbols, and other number of lines depending on the height of the character utilized. The interline spacing shall be variable.

The sign controller shall monitor the photo cell circuits in the sign and convert the measured light intensity into the desired pixel brightness. The photo circuit readings shall be correlated with a brightness table in the sign controller. The brightness table shall have a minimum of 255 brightness levels. Automatic adjustment of the LED driving waveform duty cycle shall occur in small enough increments so that brightness of the sign changes smoothly, with no perceivable brightness change between adjacent levels. The brightness table in each individual sign controller shall be adjustable from the central controller and can be customized according to the requirements of the installation site. Each sign shall have its own, independent brightness table.

Brightness shall be manually settable from the front panel of the controller and remotely from the central computer in one percent increments from one to 99%.

There shall be a means to adjust how rapidly the sign responds to changes in ambient light as measured by the photocells. This can be used, for example, to prevent the sign from changing its brightness due to a vehicle's headlight momentarily hitting the sign. The adjustment shall be made from the central controller or laptop computer and shall have two different settings, one for daytime control and one for nighttime control, with the day/night ambient light threshold also being an adjustable value. In addition, there shall be a means to specify different weighting factors for each

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photocell, to specify how prominently each photocell figures in the calculation of nighttime ambient light.

In the event of a power failure, the sign controller shall activate a programmable default message (which shall be a blank message) and shall report the AC power failure to the central controller.

The operational status of each pixel in the sign shall be automatically tested once a day and tested when a pixel test is requested from the central controller or laptop computer. A list of defective pixels shall then be transmitted to the central controller or laptop computer, listing pixel status test shall distinguish the difference between half-out, full-out, half-stuck on and fully stuck-on pixels. This test shall not affect the displayed message for more that 0.5 seconds.

When the sign controller is polled and when messages are downloaded from the central controller or laptop computer, each pixel in the sign shall be read and its current state (full-on, half-on or off), for the currently displayed message, shall be returned to the central controller. This will allow the central controller or laptop computer to show the actual message that is visibly displayed on the sign on an individual pixel basis in a WYSIWYG format. (This is different from the pixel test listed above.) This pixel status read shall not affect the displayed message in any way. The pixel read shall be an actual real-time read of the current flowing through each string of LEDs at the time of the associated sign poll or message download and shall not be accomplished by simulating errors based on the last pixel test.

The operational status of the fans shall be automatically tested once a day and tested on command from the central controller or laptop computer. Any failure will cause an error message to be sent to the central controller or laptop when the sign controller is polled by the central controller or laptop computer. The sign controller shall read the internal temperature sensors, external ambient temperature sensor and the humidity sensor. The sign controller shall use these readings in an algorithm that turns on the heat tape and/or the fans at the appropriate times to reduce both frost on the face of the sign and condensation on the display modules and other electronic circuitry.

Temperature sensors shall be continuously measured and monitored by the sign controller. A temperature greater than a user selectable critical temperature shall cause the sign message to go to blank and the sign controller shall report this error message to the central controller. This user selectable critical temperature shall be capable of being changed by the central controller or laptop computer. The central controller and laptop computers shall have the ability to read all measurements from the sign controller.

All LED module power supply voltages shall be continuously measured by the sign controller. The sign controller shall provide these voltage readings to the central controller or laptop computer when the sign controller is polled by the central controller or laptop computer.

There shall be no perceivable blinking, flickering or ghosting of the pixels at any time, except during a pixel test as described above. The displayed message will not be affected in any way at any time for the pixel status read as described above.

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In the event the central controller fails to communicate with the sign controller within a programmable time limit, the sign shall activate a programmable default message (which shall be a blank). This function shall apply only when the sign controller is in central control mode. Failure of any sign shall not affect the operation of any other sign in the system.

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The sign controller shall perform a consistency check of messages downloaded from the central controller or laptop computer to ensure that the message will fit in the display area of the sign. If any part of the message fails this check, the downloaded message shall not be displayed and an error message shall be displayed on the operator's GUI.

The sign controller internal time clock shall ensure that a message is taken down at the correct time, even in the event of a communications loss.

The sign controller shall allow a moving arrow to be displayed by the central controller or laptop computer. The moving arrow shall be on one line with a standard message on the other lines. The moving arrows shall be from the left or right and shall start from one end or in the middle of the sign and continue to the end of the sign.

The sign controller shall blank the sign in the event of a communication failure or power failure. The controller shall blank the sign if failure lasts greater than 5 minutes. Communication failures are either on the field transmit, field receive, or both.

The sign controller shall have a special function output to control an auxiliary blank-out sign. This shall be a contact closure to ground capable of sinking at least 10 mA. It shall be controlled from the central controller.

The sign controller shall be capable of being remotely reset from the central controller.

The system power shall be protected by two stages of transient voltage suppression devices as required in the AC Power Section of this specification. Tripping of each stage (or both if tripped simultaneously) of the surge protection shall cause the sign controller to call central and report the error condition (for dial-up operation) or report the error condition to central on the next poll (for multi-drop operation). There shall be an option that is either enabled or disabled and is selected and downloaded from the central controller to the sign controller. When this option is enabled, tripping of the second stage of surge protection shall prevent power from reaching any components of the sign until the surge protection has been replaced. When this option is disabled, the sign will continue to function normally after the second stage of surge protection is tripped.

Communication lines shall be protected by two stages of transient voltage suppression devices as required in the Sign Controller Communication Interface Section of this specification. Tripping of each stage (or both if tripped simultaneously) of the surge protection shall cause the sign controller to call central and report the error condition (for dial-up operation) or report the error condition to central on the next poll (for multi-drop operation). There shall be an option that is either enabled or disabled and is selected and downloaded from the central controller to the sign controller. When this option is enabled, tripping of the second stage of surge protection shall disconnect the communication lines until the surge protection has been replaced. When this option is enabled, tripping of the second stage of surge protection shall disconnect the communication lines until the surge protection has been replaced. When this option is disabled, the sign will continue to function normally after the second stage of surge protection is tripped.

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Modes of Operation The mode of operation determines which level of control governs the DMS message selection. The three modes of operation are:

Central Mode: The local control panel switch is off and the central controller controls and monitors the sign

Local Mode: The local control panel switch is on and the laptop computer is used to locally control the sign. The central controller only monitors the sign (i.e. status poll).

Local Override: The local mode has been overridden by the central to allow the central to control the sign in case the local control panel switch was unintentionally left in local mode.

AC Power. The sign and its sign controller shall be capable of operating with 120/240 VAC, 50 amp per leg, 60 hertz, single-phase power. The sign shall have a 50 amp per leg, 120/240 VAC, two-pole load center with 16 circuit capability. Each circuit in the sign shall be powered from a separate circuit breaker.

The system shall be protected by two stages of transient voltage suppression devices including MOVS and spark gap arrestor. If enabled by the central controller, tripping of the second stage shall prevent power from reaching any components of the sign until the surge protection has been replaced. Tripping of each stage of the surge protection shall cause the sign controller to call central and report the error condition (for dial-up operation) or report the error condition to central on the next poll (for multi-drop operation).

Transient Test Requirements. The sign housing electronics and the control cabinet shall be separately capable of withstanding a high-energy transient having the following characteristics repeatedly applied to the AC input terminals:

A ten microfarad oil filled capacitor charged to 1000 VDC ± 5% shall be discharged into the power input terminals a minimum of three times for each polarity. Immediately following this test the unit under test shall perform all of its defined functions upon the restoration of normal AC power.

Electronic Materials and Construction Methods

Printed Circuit Boards. Printed Circuit Boards (PCB) design shall be such that components may be removed and replaced without damage to boards, traces or tracks.

Only FR-4 0.062-inch material shall be used. Inter-component wiring shall be copper clad track having a minimum weight of 2 ounces per square foot with adequate cross section for current to be carried. Jumper wires will not be permitted, except from plated-through holes to component. The maximum number of jumper wires allowed per circuit board is two.

All PCBs shall be finished with a solder mask and a component identifier silk screen.

Components. All components shall be of such design, fabrication, nomenclature, or other identification so as to be purchased from a wholesale electronics distributor, or from the component manufacturer, except for printed circuit board assemblies.

Circuit design shall be such that all components of the same generic type, regardless of manufacturer, shall function equally in accordance with the specifications. 1

All discrete components, such as resistors, capacitors, diodes, transistors, and integrated circuits shall be individually replaceable. Components shall be arranged so they are easily accessible for testing and replacement.

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Technical Assistance The DMS manufacturer's technical representative shall provide on-site technical assistance in
following areas:

1. Sign to structure installation
2. Sign controller cabinet installation
3. Sign to controller cabling

The initial powering up of the sign(s) shall not be executed without the permission of the DMS manufacturer's technical representative.

Testing Requirements The equipment covered by this specification shall be subjected to design approval tests (DAT), factory demonstration tests (FDT), stand-alone tests, systems tests and 72 hour and 90 day test periods to determine conformance with all the specification requirements. The Engineer may accept certification by an independent testing lab in lieu of the design approval tests to verify that the design approval tests have previously been satisfactorily completed. The DMS vendor shall arrange for and conduct the tests in accordance with the testing requirements stated herein.

Unless otherwise specified, the DMS vendor is responsible for satisfying all inspection requirements prior to submission for the Engineer's inspection and acceptance. The contract periods will not be extended for time lost or delays caused by testing prior to final Department approval of any items. The Engineer reserves the right to have his representative witness any and all tests. The results of each test shall be compared with the requirements specified herein. Failure to conform to the requirements of any test shall be counted as a defect, and the equipment shall be subject to rejection by the Engineer. Rejected equipment may be offered again for a retest provided that all non-compliances have been corrected and retest by the DMS vendor and evidence thereof submitted to the Engineer.

Final inspection and acceptance of equipment shall be made after installation at the designated location as shown on the plans, unless otherwise specified herein.

Test Procedures. The DMS vendor shall provide five (5) copies of all design approval, factory demonstration, stand-alone and system test procedures and data forms for the Engineer's approval at least sixty (60) days prior to the day the tests are to begin. The test procedures shall include the sequence in which the tests will be conducted. The test procedures shall have the Engineer's approval prior to submission of equipment for tests.

The DMS vendor shall furnish data forms containing all of the data taken, as well as quantitative results for all tests. The data forms shall be signed by an authorized representative (company official) of the equipment manufacturer. At least one copy of the data forms shall be sent to the Engineer.

The DMS vendor shall be responsible for providing the test fixtures and test instruments for all of the tests.

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Design Approval Tests. Design approval tests shall be conducted by the DMS vendor on one or more samples of equipment of each type, as approved by the Engineer, to determine if the design

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of the equipment meets the requirements of this Specification. The test shall be conducted in accordance with the approved test procedures.

If the design approval tests have not previously been satisfactorily completed by an independent testing lab and accepted by the Engineer, the Engineer shall be notified a minimum of thirty (30) calendar days in advance of the time these tests are to be conducted.

The design approval tests shall cover the following:

- Temperature and Condensation The DMS sign system equipment shall successfully perform all the functionality requirements listed in this specification under the following conditions in the order specified below:
  1. The equipment shall be stabilized at -40°F (-40°C). After stabilization at this temperature, the equipment shall be operated without degradation for two (2) hours.
  2. Moisture shall be caused to condense on the equipment by allowing it to warm up to room temperature in an atmosphere having relative humidity of at least 40% and the equipment shall be satisfactorily operated for two (2) hours while wet.
  3. The equipment shall be stabilized at 149°F (65°C). After stabilization, the equipment shall be satisfactorily operated for two (2) hours without degradation or failure.
- Primary Power Variation. The equipment shall meet the specified performance requirements when the nominal input voltage is 115 V ± 15 V. The equipment shall be operated at the extreme limits for at least 15 minutes during which the operational test of the FDT shall be successfully performed.
- Power Service Transients. The equipment shall meet the performance requirements, specified in the parent specification, when subjected to the power service transient specified in 2.1.6 “Transient, Power Service”, of the NEMA standard TS1. The equipment shall meet the performance requirements specified in the parent specification.
- Relative Humidity. The equipment shall meet its performance requirements when subjected to a temperature of (149°F 65°C) and a relative humidity of 90%. The equipment shall be maintained at the above condition for 48 hours. At the conclusion of the 48 hour soak, the equipment shall meet the requirements of the operational test of the FDT within 30 minutes of beginning the test.
- Vibration. The equipment (excluding cabinets) shall show no degradation of mechanical structure, soldered components, or plug-in components and shall operate in accordance with the manufacturer’s equipment specifications after being subjected to the vibration tests as described in Section 2.2.5, “Vibration Test”, of the NEMA standard TS1.
- Consequences of Design Approval Test Failure. If the unit fails the design approval test, the design fault shall be corrected and the entire design approval test shall be repeated. All deliverable units shall be modified without additional costs to the Department, to include design changes required to pass the design approval tests.

DMS Controller Uninterruptible Power Supply. A UPS shall be provided to allow the sign controller to notify the central controller when an improper power condition at the DMS persists for longer than 30 seconds.

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The UPS shall meet the following minimum specifications:

1. Line Transient Protection: Passes ANSI/IEEE C62.41 Category A testing

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2. Safety Compliance: UL listed to UA1778
3. EMC Compliance: FCC Class B
4. Efficiency: > 95% on line
5. Capacity VA/Watts @ 0.67P.F. : 425VA/285W
6. Voltage Nominal: 120 VAC
7. Voltage Range: 100-142 VAC
8. Typical run time (minutes): Full load: 3 minutes. Typical load: 5 minutes
9. Transfer time: 4 ms typical
10. Battery: Sealed, maintenance-free, valve regulated, UL 924 recognized.
11. Battery recharge time (to 95% of capacity): 8 hours with output fully loaded
12. Over current protection (on line): circuit breaker
13. Input fault current (maximum): 15A
14. Operating temperature: Range minimum -10°F -140°F (-23°C to 60°C)
15. Humidity: 5% - 95% RH (non-condensing)

Factory Demonstration Tests. The DMS vendor shall be responsible for conducting Factory Demonstration Tests on an all units at the DMS Vendor's Manufacturing Facility. These tests shall be performed on each unit supplied. The Engineer shall be notified a minimum of sixty (60) calendar days before the start of tests. The DMS Vendor shall pay for all travel expenses, including airfare, rental car, hotel, meals, etc., for up to three department personnel or designated representatives for the Engineer to witness the Factory Demonstration Tests on the first unit at the vendor's manufacturing facility. All tests shall be conducted in accordance with the approved test procedures of Section 17.0. All equipment shall pass the following individual tests:

Examination Tests: All equipment shall be examined carefully to verify that the materials, design, construction, markings and workmanship comply with the requirements of the Specification.

Continuity Tests: The wiring shall be checked to determine that it meets the requirements of the appropriate paragraphs in the Specifications.

Operational Test. All equipment shall be operated long enough to permit equipment temperature stabilization, and to check and record an adequate number of performance characteristics to ensure compliance with the requirements of this Specification.

Consequences of Factory Test Failure. If any unit fails to pass its demonstration test, the unit shall be corrected and another unit substituted in its place and the test successfully repeated.

If a unit has been modified as a result of a demonstration test failure, a report shall be prepared and delivered to the Engineer prior to shipment of the unit. The report shall describe the nature of the failure and the corrective action taken.

If a failure pattern develops, the Engineer may direct that design and construction modifications be made to all units without additional cost to the Department or extension of the contract period.

Stand-Alone Tests. The DMS vendor shall conduct an approved stand-alone test of the equipment installation at the field site. The test shall, as a minimum, exercise all stand-alone (non-network) functional operations of the field equipment with all of the equipment installed as per the plans, or as directed by the Engineer.

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Approved data forms shall be completed and turned over to the Engineer as the basis for review and rejection or acceptance. At least thirty (30) working days' notice shall be given prior to all tests to permit the Engineer or his representative to observe each test.

Consequences of Stand-Alone Test Failure. If any unit fails to pass its stand-alone test, the unit shall be corrected or another unit substituted in its place and the test successfully repeated.

If a unit has been modified as a result of a stand-alone test failure, a report shall be prepared and delivered to the Engineer prior to the re-testing of the unit. The report shall describe the nature of the failure and the corrective action taken.

If a failure pattern develops, the Engineer may direct that design and construction modifications be made to all units without additional cost to the Department or extension of the contract period.

System Test. The DMS vendor shall conduct approved DMS system tests on the field equipment with the central equipment. The tests shall, as a minimum, exercise all remote control functions and display the return status codes from the controller.

Approved data forms shall be completed and turned over to the Engineer as the basis for review and for rejection or acceptance.

Consequence of System Test Failure. If system tests fail because of any components(s) in the subsystem, the particular components(s) shall be corrected or substituted with other components(s) and the tests shall be repeated. If a component has been modified as a result of the system test failure, a report shall be prepared and delivered to the Engineer prior to retest.

72 Hours and 90 Days Test Failure. After the installation of the DMS system is completed and the successful completion of the System Test, the DMS vendor shall conduct one continuous 72-hour full operating test prior to conducting a 90-day test period. The type of test to be conducted shall be approved by the Engineer, and shall consist primarily of exercising all control, monitor and communications functions of the field equipment by the central equipment.

The 90-day test period shall commence on the first day after the successful completion of the approved 72-hour continuous full operating test period.

During the 90-day test period, downtime, due to mechanical, electrical and/or other malfunctions, shall not exceed five (5) working days. The Engineer may extend the 90-day test period by a number of days equal to the downtime in excess of five (5) working days.

The Engineer will furnish the DMS vendor with a letter of approval stating the first day of the 90-day test period.

Final System Acceptance. Final system acceptance shall be defined as when all work and materials provided for in this item have been furnished and completely installed, and all parts of the work have been approved and accepted by the Engineer and the Dynamic Message Sign System has been operated continuously and successfully for ninety (90) calendar days with no more than five (5) working days downtime due to mechanical, electrical and/or other malfunctions.

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Warranty Equipment furnished under this Specification shall be guaranteed to perform according to these specifications and to the manufacturer's published specifications. Equipment shall be warranted for a minimum of **five years** return to factory against defects and/or failure in design, materials and workmanship. Unless otherwise specified in the invitation for bids, warranty coverage shall become effective on the date of final acceptance of the system by the Department. The Contractor shall assign to the Department all manufacturer's normal warranties or guarantees, on all such electronic, electrical and mechanical equipment, materials, technical data, and products furnished for and installed on the project. Defective equipment shall be repaired or replaced, at the manufacturer's option, during the warranty period at no cost to the Department. The Contractor shall provide a written document on DMS Vendor letterhead, signed by the DMS Principle, documenting said warranties or guarantees and shall be submitted to the Engineer before project acceptance.

Center to Field Communications NTCIP Requirements. This section describes the minimum specifications for the NTCIP communication capabilities of the DMS controller and DMS control software. The contractor shall provide all the software, firmware, and services necessary to operate a dynamic message sign (DMS) system that fully complies with the NTCIP functional requirements specified herein, including incidental items that may have been inadvertently omitted.

References. These specifications reference standards through their NTCIP designated names. The following list provides the current versions of each of these standards.

Each NTCIP device covered by these project specifications shall implement the version of the standard that is specified in the following table. Refer to the NTCIP library at www.ntcip.org for information on the current status of NTCIP standards.

Document Number and Version	Document Title	Document Status
NTCIP 1101: 1996 and Amendment 1	Simple Transportation Management Framework (STMF)	Approved Standard with Amendment
NTCIP 1102: 2004	Octet Encoding Rules (OER) Base Protocol	Approved Standard
NTCIP 1103 v1.26a	Transportation Management Protocols	Recommended Standard
NTCIP 1201: 1996 and Amendment 1	Global Object (GO) Definitions	Approved Standard
NTCIP 1203: 1997 and Amendment 1	Object Definitions for Dynamic Message Signs	Approved Standard with Amendment
NTCIP2001:1996 and Amendment 1	Class B Profile Approved	Standard
NTCIP 2101: 2001	Point to Multi Point Protocol (PMPP) Using RS-232 Subnetwork Profile	Approved Standard
NTCIP 2103: 2003	Point-to-Point Protocol Over RS-232 Subnetwork Profile	Approved Standard
NTCIP 2104: 2003	Ethernet Subnetwork Profile	Approved Standard
NTCIP 2201: 2003	Transportation Transport Profile	Approved Standard
NTCIP 2202: 2001	Internet (TCP/IP and UDP/IP) Transport Profile	Approved Standard
NTCIP 2301: 2001	Simple Transportation Management Framework (STMF) Application Profile	Approved Standard

Subnetwork Profiles. Each serial or modem port on each NTCIP device shall be configurable to support both NTCIP 2101 and NTCIP 2103. Only one of these profiles shall be active at any given time. Serial ports shall support external dial-up modems.

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Each Ethernet port on the NTCIP device shall comply with NTCIP 2104.

The NTCIP device(s) may support additional Subnet Profiles at the manufacturer's option. At any one time, only one subnet profile shall be active on a given port of the NTCIP device. All response datagram packets shall use the same transport profile used in the request. The NTCIP device shall be configurable to allow a field technician to activate the desired subnet profile and shall provide a visual indication of the currently selected subnet profile.

Transport Profiles. Each serial or modem port on each NTCIP device shall be configurable to support both NTCIP 2201 and NTCIP 2202.

Each Ethernet port on the NTCIP device shall comply with NTCIP 2202.

The NTCIP device(s) may support additional transport profiles at the manufacturer's option. Response datagrams shall use the same transport profile used in the request. Each NTCIP device shall support the receipt of datagrams conforming to any of the supported transport profiles at any time.

Application Profiles. Each NTCIP device shall comply with NTCIP 2301 and shall meet the requirements for Conformance Level 1.

An NTCIP device may support additional application profiles at the manufacturer's option. Responses shall use the same application profile used by the request. Each NTCIP device shall support the receipt of application data packets at any time allowed by the subject standards.

Object Support. Each NTCIP device shall support all mandatory objects of all mandatory conformance groups as defined in NTCIP 1201 and NTCIP 1203.

Each NTCIP device shall support all mandatory objects in all optional conformance groups required herein. All optional objects listed in these specifications shall be supported.

The NTCIP device(s) shall are required to support the following optional conformance groups.

Conformance	Group Reference
Time Management	NTCIP 1201
Timebase Event Schedule	NTCIP 1201
Report	NTCIP 1201
PMPP	NTCIP 1201
Font Configuration	NTCIP 1203
DMS Configuration	NTCIP 1203
MULTI Configuration	NTCIP 1203
MULTI Error Configuration	NTCIP 1203
Illumination/Brightness Control	NTCIP 1203
Scheduling	NTCIP 1203
Sign Status	NTCIP 1203
Status Error	NTCIP 1203
Pixel Error Status	NTCIP 1203

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The following table indicates objects that are considered optional in the NTCIP standards but are required by this specification. It also indicates modified object value ranges for certain objects.

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Each NTCIP device shall provide the full, standardized object range support (FSORS) of all objects required by these specifications unless otherwise indicated below.

Object	Reference	Project Requirement
moduleTable	NTCIP 1201 Clause 2.2.3	Shall contain at least one row with module Type equal to 3 (software).
maxTimeBaseScheduleEntries	NTCIP 1201 Clause 2.4.3.1	Shall be at least 28
maxDayPlans	NTCIP 1201 Clause 2.4.4.1	Shall be at least 20
maxDayPlanEvents	NTCIP 1201 Clause 2.4.4.2	Shall be at least 12
maxEventLogConfig	NTCIP 1201 Clause 2.5.1	Shall be at least 50
eventConfigMode	NTCIP 1201 Clause 2.4.3.1	The NTCIP Component shall Support the following Event Configuration: on Change, Greater Than Value, Smaller Than Value
eventConfigLogOID	NTCIP 1201 Clause 2.5.2.7	FSORS
eventConfigAction	NTCIP 1201 Clause 2.5.2.8	FSORS
maxEventLogSize	NTCIP 1201 Clause 2.5.3	Shall be at least 200
maxEventClasses	NTCIP 1201 Clause 2.5.5	Shall be at least 16
eventClassDescription	NTCIP 1201 Clause 2.5.6.4	FSORS
maxGroupAddresses	NTCIP 1201 Clause 2.7.1	Shall be at least 1
communityNamesMax	NTCIP 1201 Clause 2.8.2	Shall be at least 3
numFonts	NTCIP 1203 Clause 2.4.1.1.1.1	Shall be at least 12
maxFontCharacters	NTCIP 1203 Clause 2.4.1.1.3	Shall be at least 255
defaultFlashOn	NTCIP 1203 Clause 2.5.1.1.1.3	The DMS shall support flash “on” times ranging from 0.1 to 9.9 seconds in 0.1 second increments
defaultFlashOff	NTCIP 1203 Clause 2.5.1.1.1.4	The DMS shall support flash “off” times ranging from 0.1 to 9.9 seconds in 0.1 second increments
defaultBackgroundColor	NTCIP 1203 Clause 2.5.1.1.1.1	The DMS shall support the black background color
defaultForegroundColor	NTCIP 1203 Clause 2.5.1.1.2	The DMS shall support the amber foreground color
defaultJustificationLine	NTCIP 1203 Clause 2.5.1.1.1.6	The DMS shall support the following forms of line

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		justification: left, center, and right
defaultJustificationPage	NTCIP 1203 Clause 2.5.1.1.1.7	The DMS shall support the following forms of page justification: top, middle, and bottom
defaultPageOnTime	NTCIP 1203 Clause 2.5.1.1.1.8	The DMS shall support page “on” times ranging from 0.1 to 25.5 seconds in 0.1 second increments
defaultPageOffTime	NTCIP 1203 Clause 2.5.1.1.1.9	The DMS shall support page “off” times ranging from 0.1 to 25.5 seconds in 0.1 second increments
defaultCharacterSet	NTCIP 1203 Clause 2.5.1.1.1.10	The DMS shall support the eight bit character set
dmsMaxChangeableMsg	NTCIP 1203 Clause 2.6.1.1.1.4	Shall be at least 100
dmsMessageMultiString	NTCIP 1203 Clause 2.6.1.1.1.8.3	The DMS shall support any valid MULTI string containing any subset of those MULTI tags listed in Table 3 (below)
dmsControlMode	NTCIP 1203 Clause 2.7.1.1.1.1	Shall support at least the following modes: local, central, and central Override
dmsSWReset	NTCIP 1203 Clause 2.7.1.1.1.2	FSORS
dmsMessageTimeRemaining	NTCIP 1203 Clause 2.7.1.1.1.4	FSORS
dmsShortPowerRecoveryMessage	NTCIP 1203 Clause 2.7.1.1.1.8	FSORS
dmsLongPowerRecoveryMessage	NTCIP 1203 Clause 2.7.1.1.1.19	FSORS
dmsShortPowerLossTime	NTCIP 1203 Clause 2.7.1.1.1.10	FSORS
dmsResetMessage	NTCIP 1203 Clause 2.7.1.1.1.12	FSORS
dmsCommunicationsLossMessage	NTCIP 1203 Clause 2.7.1.1.1.12	FSORS
dmsTimeCommLoss	NTCIP 1203 Clause 2.7.1.1.1.12	FSORS
dmsEndDurationMessage	NTCIP 1203 Clause 2.7.1.1.1.15	FSORS
dmsMemoryMgmt	NTCIP 1203 Clause 2.7.1.1.1.16	The DMS shall support the following Memory Management Modes: normal and clear Changeable Messages
dmsMultiOtherErrorDescription	NTCIP 1203 Clause 2.4.1.1.1.20	If the vendor implements any vendor-specific MULTI tags, the DMS shall provide meaningful error messages within this object whenever

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		one of these tags generates an error
dmsIllumControl	NTCIP 1203 Clause 2.8.1.1.1.1	The DMS shall support the following illumination control modes: Photocell, and Manual
dmsIllumNumBrightLevels	NTCIP 1203 Clause 2.8.1.1.1.4	Shall be at least 100
dmsIllumLightOutputStatus	NTCIP 1203 Clause 2.8.1.1.1.9	FSORS
numActionTableEntries	NTCIP 1203 Clause 2.9.1.1.1	Shall be at least 200
watcdogFailureCount	NTCIP 1203 Clause 2.11.1.1.1.5	FSORS
dmsStatDoorOpen	NTCIP 1203 Clause 2.11.1.1.1.6	FSORS
fanFailures	NTCIP 1203 Clause 2.11.2.1.1.8	FSORS
fanTestActivation	NTCIP 1203 Clause 2.11.2.1.1.9	FSORS
tempMinCtrlCabinet	NTCIP 1203 Clause 2.11.4.1.1.1	FSORS
tempMaxCtrlCabinet	NTCIP 1203 Clause 2.11.4.1.1.2	FSORS
tempMinSignHousing	NTCIP 1203 Clause 2.11.4.1.1.5	FSORS
tempMaxSignHousing	NTCIP 1203 Clause 2.11.4.1.1.6	FSORS

Multi Tags. Each NTCIP device shall support the following message formatting MULTI tags. The manufacturer may choose to support additional standard or manufacturerspecific MULTI tags.

MULTI Tag	(E) DESCRIPTION
f1	Field 1-time (12 hr)
f2	Field 1-time (24 hr)
f8	Field 8- day of month
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 0.1-second increments.
Fo	Font
jl2	Justification- line-left
jl3	Justification- line-center
jl4	Justification- line- right
jp2	Justification- page- top
jp3	Justification- page- middle
jp4	Justification- page- bottom
mv	Moving text
nl	New line
np	New page up to 5 instances in a message (i.e. up to 6 pages/frame in a message counting first page)
pt	Page times controllable in 0.1-second increments

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Documentation. NTCIP documentation shall be provided on a CD-ROM and will contain ASCII versions of the following Management Information Base (MIB) files in Abstract Syntax Notation 1 (ASN.1) format:

- The relevant version of each official standard MIB modules 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. The filename of this file shall be 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 OBJECTTYPE macros.
- A MIB containing any other objects supported by the device

Acceptance Testing. The vendor will provide certification of NTCIP-compliance as part of the vendor’s pre-build submittal documentation. This certification shall be in the form of a comprehensive test plan and completed test report as performed by either the vendor or a third-party testing agency. The testing shall have been completed using industry accepted test tools such as the NTCIP Exerciser, Trevilon’s NTester, Intelligent Devices’ Device Tester, and/or Frontline’s FTS for NTCIP. Data capture files from the FTS software during the performance of the above testing shall be furnished upon request of the Engineer.

The Engineer can elect to perform additional NTCIP testing if desired. This testing shall be conducted on a production DMS in the vendor’s facility during the factory acceptance test. The vendor shall provide a written NTCIP test procedure to the Engineer a minimum of 30 days prior to the NTCIP testing.

Interpretation Resolution. If the Engineer or DMS manufacturer discovers an ambiguous statement in the standards referenced by this procurement specification, the issue shall be submitted to the NTCIP DMS Working Group for resolution. If the Working Group fails to respond within 90 days, the engineer shall provide an interpretation of the specification for use on the project.

As-Built Documentation. The Contractor shall provide to the Engineer the following documentation of the complete installed equipment prior to testing. Sufficient documentation shall be provided to reflect “as-built” conditions and to facilitate operation, maintenance, modification and expansion of the system or any of its individual components. Manufacturer supplied documentation which covers the intent of this requirement may be used, subject to the approval of the Engineer.

Operator’s Manuals: A manual containing a general description and detailed operating and installation instructions shall be provided for each different type or model of equipment. Five copies of the manual shall include the following information:

1. A general description of the equipment including all information necessary to describe the basic use or function of the system components. This shall include a general block

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diagram presentation of the equipment. Where auxiliary equipment is required, tabular charts shall be included, list such equipment. These charts shall include the nomenclature physical and electrical characteristics and functions of the auxiliary equipment, unless such information is contained elsewhere in an associated manual. In the latter case, a reference shall be made to the location of the information pertaining to the auxiliary equipment.

2. The theory of operation of the system components in a clear, concise manner supported by simplified schematics, logic, data flow diagrams, onefunction diagrams, etc. Timing and waveform diagrams and voltage levels shall be shown as required. A logical development shall be used starting with a system block level and proceeding to a circuit analysis. Circuit analysis shall be detailed whenever circuits are not normally found in standard text books. This application of new theoretical concepts shall be fully described. Where the design allows operation in a number of different modes, an operational description of each mode shall be included.
3. In simple, clear language, the routine of operation, from necessary preparations for placing the equipment into operation, to securing the equipment after operation. This section shall contain appropriate illustrations, with the sequence of operations presented in tabular form wherever feasible.
4. The manufacturer's recommended procedures and checks necessary for preventive maintenance. This shall be specified for pre-operation, weekly, monthly, quarterly, semi-annual, annual and "as required" checks as necessary to assure reliable equipment operation. Specification, including tolerances, for all electrical, mechanical, and other applicable measurement, adjustments, or both, shall be listed.
5. Data necessary for isolation and repair of failure or malfunctions, assuming the maintenance technicians to be capable of analytical reasoning using the information provided in the submittal information. Accuracies, limits, and tolerances for all electrical, physical or other applicable measurements shall be described. General instructions shall be included for disassembly, overhaul and reassembly, including shop specifications or performance requirements.
6. Detailed instructions shall be given only where failure to follow special procedures would result in damage to the equipment, improper operation, danger to operating or maintenance personnel. Consumption of excessive person hours, etc. Such instructions and specifications shall be included only for such maintenance as maybe accomplished by specialized technicians and engineers in a modern electromechanical shop. The instructions shall describe special test set-up, components fabrication, the use of special tools, jigs and test equipment.
7. A detailed physical description of size, weight, special mounting requirements, electrical connections, and all other pertinent information necessary for proper installation and use of the equipment shall be provided.
8. The parts list shall contain all information required to describe the characteristics of the individual parts, as required for identification. It shall include a list of all equipment within a group and list all assemblies, subassemblies and replacement parts of units. The tabular arrangement shall be an alphanumerical order of the schematic reference symbols and shall give the associated description, manufacturer's name and part number. A table of contents or some other convenient means shall be provided for the purpose of identifying major components, assemblies, etc.

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9. Schematic diagrams shall be complete and accurate as required to supplement the text material and to allow the books to be a self-contained technical information source. Maximum size of these diagrams shall be limited to allow their use in close proximity to the equipment, in the class room, etc., part reference symbols, test voltages, waveforms and other aids to understanding of the circuits function shall be included on the diagrams. Test voltages, waveforms and other aids to understanding of the circuits function may be shown on either simplified schematics or other drawings (as required in the above sections) on theory of operation or maintenance or on the schematic diagrams required for this section. The overall scope of information shall not be less, however, than that stated for the schematic diagrams.

Software Manuals. The DMS vendor shall provide manuals and data for the computer software system and components thereof. These shall include the following:

1. Computer programmer's manuals and computer user's manuals (5 copies each). Include manuals for any CPU language used by the Contractor for this project. Include instructions for performing a back-up of all software and message libraries.
2. Two original copies of the computer's operating system manual and compiler and assembly language manuals and an instruction manual for translating source to object code.
3. Manufacturer's documentation (including schematics) for all plug in circuit cards used in the microcomputer chassis.
4. Computer program logic in flow chart form (5 copies).
5. Narrative descriptions of programs and input output formats (5 copies).
6. Two copies of source programs, for master and sign controller software, shall be provided on CD-ROM. An unrestricted license for software use by the Department shall be provided to the Engineer.
7. DMS vendor shall provide the communication protocol used between the DMS master controller and the DMS sign controller for use by the Department without any restrictions.

Final Documentation. Final documentation shall reflect all field changes and software modifications and shall be provided before installation. Final documentation shall be approved prior to final system acceptance has begun. This document shall include drawings of conduit layouts, cable diagrams, wiring lists, cabinet layouts, wiring diagrams and schematics for all elements of the communications system. This shall also include detailed drawings identifying by cable type, colorcoded function, the routing of all conductors (pairs) in the communications system. Upon completion of the installation, the Contractor shall submit these plans, maps, and/or drawings to reflect an as built condition, incorporating all changes made during installation, such as in pair identification and routing.

27.0 Spare Parts Requirements

The Contractor shall provide additional parts to create two (2) additional character matrixes, two (2) load modules to drive a character module, one (1) LED power supply, and one complete sign controller unit. The cost of additional parts/equipment shall be considered incidental to the price for each DMS. 1

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DMS Training. Operational and maintenance training for the entire system shall be provided to designated personnel during installation, testing and debugging. This training shall be provided through practical demonstrations and other related technical procedures. Training shall be limited to a maximum of 15 people and shall be provided at a time and location approved by the Engineer. The training shall include, but not be limited to, the following:

1. Hands-on operation of all sign control hardware
2. Explanation of all system commands, their function and usage.
3. Insertion of data
4. Required preventative maintenance
5. Servicing procedures
6. System trouble-shooting or problem identification procedures

A minimum of 24 hours of instruction shall be provided for the operational and maintenance procedures for the system. The DMS vendor shall submit an agenda for the training and one complete set of training materials along with the qualification of proposed instructors to the Engineer for approval at least 30 days before the training is to begin. The Engineer will review material and approve or request changes. After approval, the vendor shall provide a minimum of 5 copies of the training material that will become the property of the Department after training period is over.

The DMS vendor shall record the entire training on DVDs and shall provide the recordings to the Engineer for later use. The training shall be conducted at District One Traffic Systems Center building, after the completion of all system integration tests. The schedule of training sessions shall be established by the DMS vendor, with the approval of the Engineer.

Warranty The equipment and parts furnished for the DMS and DMS control system shall be new, of the latest model, fabricated under high quality standards.

Equipment and parts furnished for the DMS shall be warranted by the manufacturer to be free of defects in assembly or fabrication and materials for a minimum of five years from the date of acceptance and shall be warranted for quality of work for twelve months from the date of final acceptance. If component manufacturer's warranties are for a longer period, they shall apply. Any parts or equipment found to be defective during the warranty period shall, upon the concurrence of the defect by the manufacturer, be replaced free of charge.

The Engineer shall be furnished with a certification stating that the equipment, parts and material furnished for the DMS and DMS control system complies with all the provisions of this special provision. If there are any items which do not comply with this special provision, then a list of those exceptions shall be detailed on the certification.

All manufacturer's warranties and guarantees for the dynamic message sign system shall be transferred to the Department on the date of final acceptance.

Method of Measurement The DMS Walk-In Access, Full matrix, Color, NTCIP 1203 will be measured for payment in units of Each which cost shall include the cost of furnishing all labor, materials, documentation, warranties, tools and equipment to install, test, and make the location operational with the specified DMS in this pay item.

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Basis of Payment This work will be paid for at the contract unit price per each for DYNAMIC MESSAGE SIGN, WALK-IN ACCESS, FULLMATRIX, COLOR, NTCIP 1203.

DYNAMIC MESSAGE SIGN REMOVAL – IDOT

Description This work shall consist of removing an existing dynamic message sign (DMS).

The existing power and fiber optic communication cables shall be removed from the DMS to the controller cabinet. Existing conduits shall be abandoned in place or reused as shown on the Plans. The existing DMS controller cabinet, foundation, transformer, disconnect switches, above ground conduit, supports, and junction boxes shall be removed at locations shown in the Plans.

Before starting work, the Contractor shall submit a DMS Removal Plan to the Engineer for acceptance detailing the proposed methods of DMS removal and the amount, location(s), and type(s) of equipment to be used.

Removal of the structure will be paid for separately.

Construction It shall be the Contractor's responsibility to contact the TSC Engineer a minimum of 7 working days prior to the DMS removal. The Contractor shall coordinate his work fully with the TSC Engineer both as to the work required and the timing of the removal of the DMS. No additional compensation will be granted under this or any other item for extra work caused by failure to comply with this requirement.

The DMS on the existing structure shall remain operational until it is in conflict with construction operations, or as determined by the Engineer.

The Contractor shall provide the Engineer with a DMS Removal and Relocation Plan specific to each DMS location. The plan shall be approved by the Engineer at least two (2) weeks prior to the removal of the DMS.

DMS Removal Plan. The DMS Removal Plan shall be complete in detail for all phases, stages, and conditions anticipated during the removal.

(1) The DMS Removal Plan and procedures shall provide complete details of the work process including:
   (a) Falsework, struts, bracing, tie cables and other devices, material properties and specifications for temporary works, requirements prior to releasing the DMS and catwalks from the cranes (if required), connection details and attachments to other structure components or objects;
   (b) Procedure and sequence of operations, including a schedule with completion times for work items that comply with the working hour limitations;
   (c) Minimum load chart lift capacity, outrigger size and reactions for each crane;
   (d) Locations of cranes and outriggers relative to other structures, including retaining walls, wingwalls and utilities.
   (e) Calculated loads and lifting weights, lift points, lifting devices, spreaders, and angle of lifting cables.

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(f) Stresses at critical points along the DMS or catwalk length during progressive stages of removal shall be evaluated to assure that the structural integrity and stability is maintained at all times.

(g) Drawings, notes, catalog data showing the manufacturer's recommendations or performance tests, and calculations clearly showing the above listed details, assumptions, and dimensions.

(h) Contingency plans detailing what measures the Contractor will take in case of inclement weather (forecast or actual), equipment failure, delivery interruption, and slower than planned production.

(2) The DMS Removal Plan and procedures shall be submitted to the Engineer for review and acceptance prior to starting the work. Review and acceptance by the Engineer shall not be construed to guarantee the safety and acceptability of the work.

(3) Any changes to the removal plan must be reviewed and accepted by the Engineer before implementation.

(4) Pre-Removal Conference

(a) A Pre-Removal meeting shall be held at least one week prior to the commencement of the work. The Engineer, Contractor, and the Contractor's Engineer shall attend the meeting. The intent of the meeting is to develop a mutual understanding of the proposed implementation of the Contractor's DMS Removal Plan. Revisions or adjustments to the plan, and potential revisions or adjustment to the implementation of the DMS Removal Plan shall be discussed.

(b) Additional Pre-Removal meetings may be required for subsequent phases of construction, or for phases that differ from the original plan, as directed by the Engineer. Additional meetings may also be requested by the Contractor, and approved by the Engineer.

Dynamic Message Sign Removal Power to the sign shall be disconnected to the satisfaction of the Engineer and the TSC Engineer prior to any work on the DMS removal. The power and communications cables shall be pulled from the sign to the cabinet and disposed of, to the satisfaction of the Engineer.

Remove the DMS and DMS equipment (controller cabinet, cables, structure mounted conduit, mounting hardware, transformers, and disconnect switches) as shown on the Plans. Remove the existing controller cabinet foundation and restore the site to match existing conditions. All above ground conduit stub-outs shall be removed to a depth of six (6) inches below grade, capped, and abandoned in place.

The Contractor shall only be allowed to take one DMS out of service at a time. After a DMS has been removed, the Contractor shall have seven (7) calendar days to install the replacement DMS. The replacement will only be considered complete when the DMS is operational and can be controlled from the IDOT Traffic Operations Center.

Method of Measurement This work will be measured for payment per each DMS sign removed.

Basis of Payment This work will be paid for at the contract unit price each for DYNAMIC MESSAGE SIGN REMOVAL - IDOT, which will be payment in full for performing the work described herein.

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conduits and ITS devices in or adjacent to the work zone. This work may also include the abandonment of the existing device and communication pathway and the installation of a temporary device such as a RVSD with a wireless communication. This work shall also include the relocation and adjustment of RVSD and wireless detection devices as necessary in coordination with construction staging. It is the Contractor's responsibility to maintain closed circuit television cameras including associated fiber optic communications and power.

The Contractor is responsible for the disconnection, rerouting, and reconnection of all fiber and copper communication cables currently located in existing conduits as indicated in the plans. The disconnection and reconnection must be made at an existing splice point or communication cabinet where a connection is made, or as otherwise indicated in the plans. The existing communication and infrastructure must be properly maintained for the duration of construction activities and the Contractor must coordinate the disconnection and reconnection activities with the Engineer.

All work required to maintain, relocate, or provide temporary ITS infrastructure as depicted in the plans or otherwise necessary and as provided for in this special provision shall be paid for under the this pay item. No component items germane to this work shall be paid for separately. 1

Once construction activities are complete, all temporary equipment installed will become the property of the Department and shall remain in place, except where a proposed location has been identified in the plans. All final locations and installations of ITS devices, communication cabinets, junction boxes, conduit, fiber optic, copper cable, wireless equipment and associated infrastructure shall be protected, secured and have the Engineer's approval. Proper documentation, to include latitude and longitude for all equipment locations and communication pathway must be turned over to the Department. The proposed plan for this work must be presented to the Engineer for approval prior to the commencement of the work.

Method of Measurement. The Contractor shall demonstrate to the satisfaction of the Engineer that the ITS components, devices, and infrastructure have been properly installed, protected and maintained and that the appropriate data is being transmitted to the TMC prior to submitting a pay request. In order for final payment to be released the contractor must demonstrate that the equipment is working as intended following inspection by the Engineer. Failure to do so will be grounds for denying the pay request.

Basis of Payment. This work will be paid for at the contract unit price per CALENDAR MONTH for MAINTAINING ITS DURINGCONSTRUCTION.

~~**REMOVE ELECTRIC CABLE FROM CONDUIT**~~

~~Description. This work shall consist of the removal of electric and telecommunication cable from existing conduit at locations shown on drawings.~~

~~Method of Measurement. The work will be measured for payment in feet. If two or more cables in the conduit are to be removed, each cable will be measured for payment separately. Measurements will be made in a straight line between changes in direction and to the centers of light poles, junction boxes, and other access points.~~

~~Basis of Payment. This work will be paid for at the contract unit price per FOOT for REMOVE ELECTRIC CABLE FROM CONDUIT.~~

REMOVE EXISTING TRAFFIC SURVEILLANCE EQUIPMENT

Description. This work will consist of removing and salvaging or disposing of various traffic surveillance equipment, as specified herein and as shown in the drawings.

No removal work will be permitted without approval from the Engineer. Removal shall not be allowed to start until after the temporary or new traffic surveillance system is integrated and placed into approved operation by the Department.

(a) Induction Loop Detector Site.

(1) Traffic Surveillance Cabinet (No Salvage). Traffic surveillance cabinet shall be removed from the site.
(2) Traffic Surveillance Cabinet Foundation. Traffic surveillance cabinet foundation removal will be paid for separately.
(3) Conduits. Existing underground conduits associated with the induction loop detector site as shown on the drawings shall be abandoned in place.
(4) Induction Loop Detector Cables (No Salvage). Cables routing between the cabinet and induction loop detector handholes shall be disconnected and removed.
(5) Cables (No Salvage). Existing power and communication lateral cables between the cabinet and the nearest access point as shown on the drawings (e.g., handhole, junction box, etc.) shall be removed in accordance with Article 895.05(d).
(6) Inductive loops. Inductive loops and associated wire shall be abandoned in place.
(7) Telephone Service. Existing telephone service will be disconnected and removed.
(8) Electrical Service. Existing electrical service removal will be paid for separately.
(9) Handholes. Existing handhole removal will be paid for separately.

(b) Dynamic Message Sign (DMS) Site.

(1) Traffic Surveillance Cabinet (No Salvage). Traffic surveillance cabinet shall be removed from the site.
(2) Traffic Surveillance Cabinet Foundation. Traffic surveillance cabinet foundation removal will be paid for separately.
(3) DMS Controller Cabinet (No Salvage) Contractor shall remove the DMS controller cabinet and all equipment contained within, except for the DMS controller. DMS controller will be relocated in accordance with these special provisions.
(4) DMS Controller Cabinet Foundation. DMS controller cabinet foundation removal will be paid for separately.
(5) Conduits. Existing underground conduits associated with the induction loop detector site as shown on the drawings shall be abandoned in place.
(6) Induction Loop Detector Cables (No Salvage). Cables routing between the cabinet and induction loop detector handholes shall be disconnected and removed.
(7) Cables (No Salvage). Existing power and communication lateral cables between the cabinet and the nearest access point as shown on the drawings (e.g., handhole, junction box, etc.) shall be removed in accordance with Article 895.05(d).
(8) Inductive loops. Inductive loops and associated wire shall be abandoned in place.
(9) Telephone Service. Existing telephone service will be disconnected and removed.

~~(10) Electrical Service. Existing electrical service removal will be paid for separately.~~
~~(11) Handholes. Existing handhole removal will be paid for separately.~~

~~Removal of Traffic Surveillance Equipment, No Salvage. When indicated, traffic surveillance equipment and associated hardware and appurtenances shall become the property of Contractor and shall be disposed of according to Article 202.03.~~

~~Method of Measurement. This work will be measured on a lump sum basis.~~

~~Basis of Payment. This work will be paid for at the contract unit price per LUMP SUM for REMOVE EXISTING TRAFFIC SURVEILLANCE EQUIPMENT.~~

REPLACE EXISTING CCTV CAMERA LOWERING DEVICE

Description. This item shall consist of removing and replacing an existing CCTV camera lowering device with a lowering device designed to support and lower a HD closed-circuit television (CCTV) camera, lens, housing, PTZ mechanism, cabling, connectors and other supporting field components without damage or causing degradation of camera operations.

Removal. The Contractor shall follow the manufacturer's recommendation for removal. Following removal, the Contractor shall dispose of the existing lowering device.

Materials. The lowering device shall consist of a conduit mount adapter, pole adapter for attachment to a pole top tenon, pole top junction box, divided support arm, suspension contact unit, camera junction box, and portable lowering tool. The divided support arm and receiver brackets shall be designed to self-align the contact unit with the pole center line during installation and insure the contact unit cannot twist under high wind conditions. For maximum arm strength, round support arms are not acceptable.

The camera-lowering device shall withstand wind forces of 120mph with a 14% gust factor using a 1.65 safety factor. The lowering device manufacturer, upon request, shall furnish independent laboratory testing documents certifying adherence to the stated wind force criteria utilizing, as a minimum effective projected area, the actual EPA or an EPA greater than that of the camera system to be attached. The camera-lowering device to be furnished shall be the product of manufacturers with a minimum of three years of experience in the successful manufacturing of camera lowering systems. The lowering device provider shall be able to identify a minimum of three previous projects where the purposed system has been installed successfully for over a one-year period of time each.

All pulleys for the camera lowering device and portable lowering tool shall have sealed, self-lubricated bearings, oil tight bronze bearings, or sintered oil-impregnated, bronze bushings. The lowering cable shall be a minimum 1/8-inch diameter stainless steel aircraft cable with a minimum breaking strength of 1740 pounds with seven strands of 19 wires each.

The electrical connections between the fixed and movable lowering device components shall be designed to conduct high frequency data bits and 1 volt peak-to-peak video signals as well as the power requirements for operation of dome environmental controls.

~~CLEANING AND PAINTING BEARINGS~~

~~Description: This work shall consist of the satisfactory cleaning and painting of the steel materials on the existing bridge bearings as indicated on the plans and to the satisfaction of the Engineer. This work also includes cleaning and painting all appurtenances associated with the bearings including retainer angles or plates and anchors at the bridge seats, if present.~~

~~The work also includes the satisfactory collection and disposal of paint cleaning residues and all debris generated by the cleaning process in accordance with the specifications. Containment of paint cleaning residues per the special provisions "Containment and Disposal of Lead Paint Cleaning Residues" or "Containment and Disposal of Non-Lead Paint Cleaning Residues" will not be required, but manual tools with vacuum systems shall be utilized to complete the work.~~

~~Materials: Paint materials shall be according to the following special provision:~~

~~1) "Cleaning and Painting Existing Steel Structures"~~

~~Construction Requirements: The existing bridge bearings shall be cleaned and painted in accordance with the following special provision:~~

~~1) "Cleaning and Painting Existing Steel Structures"~~

~~Method of Measurement: This work will be measured for payment in units of each.~~

~~Basis of Payment: This work will be paid for at the contract unit price per each for CLEANING AND PAINTING BEARINGS.~~

DETOUR SIGNING

This work shall consist of furnishing, installing, relocating, maintaining, and removing the required detour traffic control signs and devices as shown in the plans.

Work shall be done according to Sections 701, 720. And 1106 of the Standard Specifications and the Illinois Manual of Uniform Traffic Control Devices where applicable and a directed by the Engineer or herein specified.

The Contract shall be responsible for the proper location, installation, condition, and maintenance of all traffic control devices. All signs and barricades utilized for the proposed detour(s) shall be new or like new condition. All detour signs shall be post mounted and Road Closed to All Traffic in compliance with Highway Standard 701901

This item includes all signs, barricades, traffic cones, warning lights, drums, flaggers, and other traffic control devices required for the type of operation being performed. This pay items may also include any additional detour signing as required by the Engineer.

The Contractor shall ensure that access to private entrances is never eliminated. The Contractor shall complete any and all coordination necessary to maintain local traffic in a manner that will not hinder the delivery of mail by the U.S. Postal Service within the work

zone. The cost of any necessary provisions will not be paid for separately but shall be considered as included in the contract unit price of DETOUR SIGNING.

The Contract shall at all times conduct the work in such a manner as to ensure the least obstruction to vehicular and pedestrian traffic. The convenience and safety of the general public and of the residents along the site shall be provided for in an adequate and satisfactory manner.

Conflicting Route Signs / Directional Arrows shall be covered or removed in a manner approved by the Engineer.

Basis of Payment: This item shall be paid for at the contract unit price per Lump Sum for DETOUR SIGNING.

INTERCEPT EXISTING CONDUIT

Description. This item consists of intercepting an existing conduit or raceway for the purpose of making a connection to a new conduit.

General Requirements. Work under this item shall be performed in accordance with Sections 812, and 1088 of Standard Specifications.

Construction Requirements. For embedded conduits, Contractor shall carefully remove the existing concrete encasement around the conduit to be intercepted and thoroughly clean the conduit for a proper connection to the new conduit. This item shall include all work necessary to connect new conduit runs to the existing conduit runs. All new conduit and conduit fittings required to intercept the existing conduit and make the necessary connections to create a continuous conduit run will not be paid for separately and shall be included in this item. Contractor shall furnish and install all materials for complete installation.

Method of Measurement. This Work will be measured on a per each basis each for conduit end cut.

Basis of Payment. This Work will be paid for at the Contract unit price per each for INTERCEPT EXISTING CONDUIT, which will be payment in full for the material and work described herein.

~~**LAYER II DATALINK SWITCH**~~
~~Effective: November 1, 2023 Revised: September 1, 2024~~

~~Description.~~
~~This work shall consist of furnishing and installing a Layer II Ethernet switch used to transmit data from one traffic signal cabinet to another traffic signal cabinet containing a Layer II switch or a Layer III (Network) switch.~~

~~Materials.~~
~~The Layer II switch shall be environmentally hardened with a minimum of (2) 1Gbps SFP ports and (8) 1Gbps copper RJ45 ports. Two SFP ports shall be populated with environmentally hardened optical modules capable of transmitting the designed distance on single-mode and / or~~

multi-mode fiber optic cable as defined in the plans. An environmentally hardened power supply with input of 120 VAC and sufficient wattage for the switch shall be provided.

The switch shall conform to the following minimum specifications:

- Forwarding Bandwidth 3.8Gbps
- Switching Bandwidth 7.6Gbps
- Forwarding rate: 5.66Mpps with 64-byte packets (Line-rate at all packet sizes)
- Egress buffer: 2 MB
- Unicast MAC addresses: 8000
- Internet Group Management Protocol (IGMP) multicast groups: 255
- Virtual LANs (VLANs): 256
- IPv4 MAC security ACEs: 384 (default Ternary Content-Addressable Memory [TCAM] template)
- Bidirectional, 128 NAT translation entries
- IPv4 routing: 2000 routes, IPv6 routing: 1750 routes
- Layer 2 switching: IEEE 802.1, 802.3, 802.3at, 802.3af standard (see Table 8), VTPv2, NTP, UDLD, CDP, LLDP, Unicast MAC filter, Resilient Ethernet Protocol (REP), Media Redundancy Protocol (MRP) Ring (IEC 62439-2)
- Security: SCP, SSH, SNMPv3, TACACS+, RADIUS Server/Client, MAC Address Notification, BPDU Guard, SPAN session
- Multicast: IGMPv1, v2, v3 Snooping, IGMP filtering, IGMP Querier
- Safety certifications:
    - UL/CSA 60950-1
    - EN 60950-1
    - CB to IEC 60950-1 (with country deviations)
    - NOM to NOM-019-SCF1 (through partners and distributors)
    - CE Marking
- Hazard location:
    - ANSI/ISA 12.12.01 (Class1, Div2 A-D)
    - EN 60079-0, -15 ATEX Certificate (Class 1, Zone2 A-D)
- EMC emissions and immunity compliance:
    - FCC 47 CFR Part 15 Class A
    - EN 55022A Class A
    - VCCI Class A
    - RoHS compliance
    - AS/NZS CISPR 22 Class A, AS/NZS CISPR 24
    - CISPR11 Class A, CISPR22 Class A
    - ICES 003 Class A
    - CE Marking
    - IEC/EN/EN61000-4-2 (Electro Static Discharge), 15kV air/8kV contact
    - IEC/EN 61000-4-3 (Radiated Immunity, 10 and 20 V/m)
    - IEC/EN 61000-4-4 (Fast Transients - 4kV power line, 4kV data line)
    - IEC/EN 61000-4-5 (Surge 2 kV/1 kV)
    - IEC/EN 61000-4-6 (Conducted Immunity, 10 V/emf)
    - IEC/EN 61000-4-8 (Power Frequency Magnetic Field Immunity)
    - IEC/EN 61000-4-9 (Pulse Magnetic Field Immunity)
    - IEC/EN 61000-4-10 (Oscillatory Magnetic Field Immunity)
    - IEC/EN 61000-4-11 (AC power Voltage Immunity)
    - IEC/EN 61000-4-29 (Voltage Dips Immunity)

- IEC/EN 61000-6-1 (Immunity for Light Industrial Environments)
- IEC/EN 61000-6-2 (Immunity for Industrial Environments)
- IEC/EN 61000-6-4 Class A
- EN 61326

- Shock and vibration:
  - IEC 60068-2-27 (Operational Shock: 30G 11ms, half sine)
  - IEC 60068-2-27 (Non-Operational Shock 55-70G, trapezoidal)
  - IEC 60068-2-6, IEC 60068-2-64, EN 61373 (Operational Vibration)
  - IEC 60068-2-6, IEC 60068-2-64, EN 61373 (Non-operational Vibration)
- Industry standards:
  - UL508
  - CSA C22.2 No. 142
  - EN 61131-2 (EMC/EMI, environmental, mechanical)
  - Substation KEMA (IEEE 1613, IEC 61850-3)
  - EN50121-3-2
  - EN50121-4
  - NEMA TS-2 (EMC, environmental, mechanical)
  - ABB Industrial IT certification
  - IP30
  - ODVA Industrial Ethernet/IP support
- Corrosive testing:
  - ISO-12944-6
  - IEC-60068-2-60
- Humidity:
  - IEC 60068-2-52 (salt fog mist, test Kb) marine environments
  - IEC 60068 -2-3
  - IEC 60068-2-30
  - Relative humidity: 5% to 95% non-condensing
- Operating temperature:
  - -40C to +70C (vented enclosure - 40 LFM Air Flow)
  - -40C to +60C (sealed enclosure – 0 LFM Air Flow)
  - -34C to +75C (fan or blower-equipped enclosure – 200 LFM Air Flow)
  - -40C to +85C (IEC 60068-2-2 Environmental Type Testing – 16 hours)
- Operational altitude: Up to 15,000 ft
- Storage temperature:
  - -40 C to +85 C (storage temperature)
  - IEC 60068-2-14
- Storage altitude: Up to 15,000 ft
- Mean time between failure: 374,052 hours (42.7 years)
- Warranty: Five-year

The Cisco IE-3100-8T2C-E Industrial Ethernet Switch and Cisco GLC-LX-SM-RGD SFP are compliant with this specification. Other manufacturers that comply with this specification are allowed.

Construction Requirements

The Layer II switch and its power supply shall be mounted to either a standard DIN rail or an equipment mounting channel in the cabinet. The power supply shall be hard-wired to the cabinet power, not plugged into one of the traffic signal cabinet power outlets.

~~Configuration Design Document.~~
~~A configuration design document shall be submitted within 60 days after contract award. It shall be prepared by a designer with a minimum of CCNP certification – and shall include proof of currently active CCNP credentials. The document shall contain actual configuration files for each switch to be delivered under this contract.~~

~~The Layer II switch shall be configured to be compatible with the IDOT D1 field network design. High level guidance (IP Scheme / VLANs / routing protocols, etc.) will be provided by IDOT but the integration, functionality and compatibility with the existing network are the responsibility of the contractor.~~

~~The configuration design document shall meet the acceptance of the IDOT engineer. Contractor to coordinate with IDOT Electric Maintenance Contractor and Network engineer for proper set up and IP configuration.~~

~~Basis of Payment.~~
~~This work will be paid for at the contract unit price per each for LAYER II DATALINK SWITCH, the price of which shall include all equipment, materials, and labor required to furnish, configure and install the switch, including all necessary connectors, cables, fiber optic jumpers, hardware, software, and other peripheral equipment required to place the switch in operation to the satisfaction of the Traffic Engineer.~~

REMOVAL OF LIGHTING LUMINAIRE, SALVAGE

Description. This work shall consist of the removal and salvaging of existing luminaires from existing conventional poles.

CONSTRUCTION REQUIREMENTS

General. No removal work will be permitted without approval from the Engineer. Removal shall start as soon as the temporary lighting or permanent lighting, as applicable, is placed in approved operation. An inspection and approval by the Engineer will take place before any associated proposed permanent or temporary lighting is approved for operation.

Removal of luminaires. The existing luminaire shall be disconnected and removed from the existing pole mast arms. Disconnect any luminaire safety cable assemblies. Any damage resulting from the removal and/or transportation of the lighting luminaire and associated hardware, shall be repaired or replaced in kind. The Engineer will be the sole judge to determine the extent of damage and the suitability of repair and/or replacement. The removal of pole mounted luminaries shall include the luminaries, lamps and associated hardware and appurtenances.

Salvage. When indicated, luminaries, and all associated hardware and appurtenances shall remain the property of the Department and shall be delivered to a Department facility within the District 1 and unloaded and stacked there, as directed by the Engineer. Wood blocking, banding, or other appurtenant items required for proper stacking and protection shall be included. Luminaires shall be removed, boxed in new containers, approved by the Engineer, and delivered to a Department facility, as designated by the Engineer. The contractor shall call IDOT EMC at (708) 524-2145 to schedule the delivery date and location.

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OVERHEAD SIGN STRUCTURE – BRIDGE MOUNTED
Effective: July 1, 2015 Revised: March 1, 2017

Revise Article 733.10(b) of the Standard Specification to read:

"Sign Structure – Bridge Mounted. Bridge mounted overhead sign structures will be measured for by payment in feet of the overall width of the sign panel or total width of adjacent sign panels, including spacing between adjacent sign panels, to be installed on the sign structure."

~~**HANDHOLES**~~
~~Effective: January 01, 2002 Revised: July 1, 2018~~

~~Description. Add the following to Section 814 of the Standard Specifications:~~

~~All conduits shall enter the handhole at a depth of 30 inches except for the conduits for detector loops when the handhole is less than 5 feet from the detector loop. All conduit ends should be sealed with a waterproof sealant to prevent the entrance of contaminants into the handhole.~~

~~Steel cable hooks shall be coated with hot-dipped galvanization in accordance with AASHTO Specification M111. Hooks shall be a minimum of 1/2 inch diameter with two 90° bends and extend into the handhole at least 6 inches. Hooks shall be placed a minimum of 12 inches below the lid or lower if additional space is required.~~

~~Precast round handholes shall not be used unless called out on the plans.~~

~~The cover of the handhole frame shall be labeled "Traffic Signals" with legible raised letters. Only handholes serving IDOT traffic signal equipment shall have this label. Handhole covers for red light running cameras shall be labeled "RLRC".~~

~~Revise the third paragraph of Article 814.03 of the Standard Specifications to read:~~

~~"Handholes shall be constructed as shown on the plans and shall be cast-in-place, or precast concrete units. Heavy duty handholes shall be either cast-in-place or precast concrete units."~~

~~Add the following to Article 814.03 of the Standard Specifications:~~

~~"(c) Precast Concrete. Precast concrete handholes shall be fabricated according to Article 1042.17. Where a handhole is contiguous to a sidewalk, preformed joint filler of 1/2 inch thickness shall be placed between the handhole and the sidewalk."~~

~~Cast-In-Place Handholes. All cast-in-place handholes shall be concrete, with inside dimensions of 21-1/2 inches minimum. Frames and lid openings shall match this dimension.~~

~~For grounding purposes the handhole frame shall have provisions for a 7/16 inch diameter stainless steel bolt cast into the frame. The covers shall have a stainless steel threaded stint extended from the eye hook assembly for the purpose of attaching the grounding conductor to the handhole cover.~~

~~The minimum wall thickness for heavy duty hand holes shall be 12 inches.~~

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~~Precast Round Handholes. All precast handholes shall be concrete, with inside dimensions of 30 inches diameter. Frames and covers shall have a minimum opening of 26 inches and no larger than the inside diameter of the handhole.~~

~~For grounding purposes, the handhole frame shall have provisions for a 7/16 inch diameter stainless steel bolt cast into the frame. For the purpose of attaching the grounding conductor to the handhole cover, the covers shall either have a 7/16 inch diameter stainless steel bolt cast into the cover or a stainless steel threaded stint extended from an eye hook assembly. A hole may be drilled for the bolt if one cannot be cast into the frame or cover. The head of the bolt shall be flush or lower than the top surface of the cover.~~

~~The minimum wall thickness for precast heavy duty hand holes shall be 6 inches.~~

~~Precast round handholes shall be only produced by an approved precast vendor.~~

~~Materials. Add the following to Section 1042 of the Standard Specifications:~~

~~"1042.17 Precast Concrete Handholes. Precast concrete handholes shall be according to Articles 1042.03(a)(c)(d)(e)."~~

MAGNETIC DETECTOR REMOVAL AND DETECTOR LOOP INSTALLATION.

This work shall consist of the removal of existing magnetic detectors, magnetic detector lead-in cable, and magnetic detection amplifiers and related control equipment wiring, installation of detector lead-in cable, detector loops, detector amplifiers and related equipment wiring. The detector loop, cable, and amplifier shall be installed according to the applicable portions of the Standard Specifications and as stated in these special provisions. All drilling of handholes, furnishing and installing CNC, cable splicing, trench and backfill, removal of equipment, and removing cable from conduit shall be included in this item.

Basis of Payment. This work will be paid for at the contract unit price per FOOT for DETECTOR LOOP, TYPE I, per EACH for INDUCTIVE LOOP DETECTOR, and FOOT for ELECTRIC CABLE IN CONDUIT, LEAD-IN, NO. 14 1 PAIR.

TEMPORARY TRAFFIC SIGNAL TIMING
Effective: May 22, 2002 Revised: March 1, 2024

Description.
This work shall consist of developing and maintaining appropriate traffic signal timings for the specified intersection for the duration of the temporary signalized condition, as well as impact to existing traffic signal timings caused by detours or other temporary conditions.

All timings and adjustments necessary for this work shall be performed by an approved Consultant who has previous experience in optimizing Traffic Signal Systems for District One of the Illinois Department of Transportation. The Contractor shall contact the Traffic Signal Engineer for a listing of approved Consultants.

The following tasks are associated with TEMPORARY TRAFFIC SIGNAL TIMING:

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(a) Consultant shall attend temporary traffic signal inspection (turn-on) and/or detour meeting and conduct on-site implementation of the traffic signal timings.

(b) Consultant shall be responsible for making fine-tuning adjustments to the timings in the field to alleviate observed adverse operating conditions and to enhance operations.

(c) Consultant shall provide monthly observation of traffic signal operations in the field.

(d) Consultant shall provide on-site consultation and adjust timings as necessary for construction stage changes, temporary traffic signal phase changes, and any other conditions affecting timing and phasing, including lane closures, detours, and other construction activities.

(e) Consultant shall make timing adjustments and prepare comment responses as directed by the Area Traffic Signal Maintenance and Operations Engineer.

(f) Return original timing plan once construction is complete.

Temporary traffic signal timing shall be required at the following intersections, <u>except if the detour it is to be used for will be less than three consecutive days in length</u>:

Detour 1:
Dolton and Torrence
IL-83 and Torrence

Detour 2:
IL-83 and Lincoln
Dolton and Lincoln

Detour 3:
IL-83 and Lincoln
Dolton and Lincoln

Detour 4:
Dolton and Torrence
IL-83 and Torrence
IL-83 and Lincoln
Dolton and Lincoln

Detour 16:
IL-83 and Torrence

Detour 18:
IL-83 and Lincoln

Detour 25:
US-6 and Torrence
IL-83 and Torrence

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Basis of Payment.
The work shall be paid for at the Contract unit price each for TEMPORARY TRAFFIC SIGNAL TIMING, which price shall be payment in full for performing all work described herein per intersection. When the temporary traffic signal installation is turned on and/or detour implemented, 50 percent of the bid price will be paid. The remaining 50 percent of the bid price will be paid following the removal of the temporary traffic signal installation and/or detour.

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TEMPORARY TRAFFIC SIGNAL TIMING (CITY OF CHICAGO)

Effective: May 20, 2024

Description: This item shall consist of coordination of and payment for work performed by the City of Chicago – Division of Electrical Operations and/ or Division of Traffic Safety related to engineering services in support of this contract. For the CDOT (Chicago Department of Transportation) maintained signals at intersections listed in this specification, CDOT will perform, where necessary, traffic signal timing adjustments during construction and after construction is completed. Maintenance of the traffic signals during construction will remain under CDOT's responsibility.

General: It shall be the Contractor's responsibility to arrange and coordinate all required signal services for intersections listed herein with CDOT in accordance with the timeframes and procedures described herein. All work to be performed by CDOT is subject to CDOT work schedules and availability.

The following tasks are associated with SIGNAL TIMING

(a) The Contractor shall contact CDOT and schedule signal timing adjustments to be performed by CDOT based on temporary signal timing plans and/or field observations in order to enhance operation of the intersection while utilized by the detour. The Contractor shall contact CDOT a minimum of 4 weeks prior to the detour implementation. No extra compensation will be allowed for delays associated with late requests by the contractor. The contractor must retain records of CDOT's coordination. If all required approvals are obtained by the contractor for the detour implementation, the detour implementation will not be delayed if CDOT does not respond within 4 weeks regarding payment. The CDOT contact is

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BUDGETARY ALLOWANCE FOR CCTV INTEGRATION

Description. This item is to establish a budget account to allocate funds for the payment of the video integration. A budgetary allowance has been established since the final cost Is unknown.

This allowance will not be used to repair damage caused by the Contractor's operations. Damage caused by the Contractor's operations shall be repaired at no additional cost to the Contract.

The allowance under this Special Provision includes the coordination with camera equipment provided under this contract, adjacent contract(s), and coordination with existing CCTV equipment as indicated, including adjustments of or supplements to the equipment as may be required for Video Control software. The existing control software is ICX's 360 Cameleon Enterprise camera control. Included in this item, the Contactor shall provide 10 Enterprise software license units. The Contractor shall configure the cameras within the video control software.

This work shall be coordinated with the Electrical Maintenance Contractor.
Provisioning of IP routing and switching equipment. The Contractor shall fully integrate all the equipment to be installed with the existing video distribution system as a part of this item and this coordination will require technical services of the existing system integrator, a Cisco Systems Integrator and coordination with the State District 1 Electrical Maintenance Contractor. This work shall be included in the item and will not be paid for separately.

For bidding purposes, this item shall be estimated as $25,000.00

Method of Measurement. The invoices submitted by the designated and approved subcontractor for completion of, or a portion of the subcontractor's work shall be measured at a budgeted lump sum cost as described herein.

Basis of Payment. This item shall be paid for at the contract lump sum price or fraction thereof for BUDGETARY ALLOWANCE FOR CCTV INTEGRATION, which shall include all work as described herein.

ROD AND CLEAN EXISTING CONDUIT
Effective: January 1, 2015
Revised: July 1, 2015

Description.
This work shall consist of inserting a duct rod or electrical fish rod or tape of sufficient length and rigidity into an electrical conduit opening in one electrical handhole, and pushing the said rod through the conduit to emerge at the next or subsequent handhole in the conduit system at the location(s) shown on the plans. The duct rod may be inserted and removed by any standard construction method which causes no damage to the conduit. The size of the conduit may vary, but there shall be no differentiation in cost for the size of the conduit.

The conduit which is to be rodded and cleaned may exist with various amounts of standing water in the handholes to drain the conduit and to afford compatible working conditions for the installation of the duct rods and/or cables. Pumping of handholes shall be included with the work of rodding and cleaning of the conduit.

Any handhole which, in the opinion of the Engineer contains excessive debris, dirt or other materials to the extent that conduit rodding and cleaning is not feasible, shall be cleaned at the Engineer's order and payment approval as a separate pay item.

Prior to removal of the duct rod, a duct cleaning attachment such as a properly sized wire brush or cleaning mandrel shall be attached to the duct rod, which by removal of the duct rod shall be pulled through the conduit to remove sand, grit, or other light obstructions from the duct to provide a clean, clear passage for the installation of cable. Whenever the installation of cables is not performed as an adjunct to or immediately following the cleaning of the duct, a light weight pulling line such as a 1/8" polyethylene line or conduit measuring tape shall be placed and shall remain in the conduit to facilitate future work. When great difficulty of either inserting the duct rod or removal of the cleaning mandrel is encountered, the duct may require further cleaning by use of a compressed air gun, or a low pressure water hose. In the case of a broken conduit, the conduit must be excavated and repaired. The existence and location of breaks in the conduit may be determined by rodding, but the excavation and repair work required will be paid for separately.

This work shall be measured per lineal foot for each conduit cleaned. Measurements shall be made from point to point horizontally. No vertical rises shall count in the measurement.

Basis of Payment.
This work shall be paid for at the contract unit price per lineal foot for ROD AND CLEAN EXISTING CONDUIT for the installation of new electric cables in existing conduits. Such price shall include the furnishing of all necessary tools, equipment, and materials required to prepare a conduit for the installation of cable.

TELEVISE EXISTING CONDUIT

Description. This work shall consist of investigating the existing surveillance conduit located in the concrete barrier wall in the median of I-94 (Bishop Ford Expressway) at locations located in the plans for future use in running fiber optic cable in Contract 62K53.

Construction.

1. The existing junction boxes shall be opened so any existing cables located in the surveillance conduit can be identified. If any cables are discovered in the existing conduit, the Contractor shall coordinate with TSC and the Engineer to confirm the cables are abandoned. All existing surveillance cable(s) that have been abandoned shall be removed from the existing conduit.

2. The existing conduit shall be rodded and cleaned in accordance with the following:

   Conduits with existing cables that are to remain shall not be rodded and cleaned. A record of the existing conduit size shall be maintained.

   A duct rod or electrical fish rod or tape of sufficient length and rigidity shall be inserted into an electrical conduit opening in one electrical handhole, and pushing the said rod through the conduit to emerge at the next or subsequent handhole in the conduit system at the location(s) shown on the plans. The duct rod may be inserted and removed by any

standard construction method which causes no damage to the conduit. The size of the conduit may vary, but there shall be no differentiation in cost for the size of the conduit.

The conduit which is to be rodded and cleaned may exist with various amounts of standing water in the handholes to drain the conduit and to afford compatible working conditions for the installation of the duct rods and/or cables. Pumping of handholes shall be included with the work of rodding and cleaning of the conduit.

Any handhole which, in the opinion of the Engineer contains excessive debris, dirt or other materials to the extent that conduit rodding and cleaning is not feasible, shall be cleaned at the Engineer's order and payment approval as a separate pay item.

Prior to removal of the duct rod, a duct cleaning attachment such as a properly sized wire brush or cleaning mandrel shall be attached to the duct rod, which by removal of the duct rod shall be pulled through the conduit to remove sand, grit, or other light obstructions from the duct to provide a clean, clear passage for the installation of cable. Whenever the installation of cables is not performed as an adjunct to or immediately following the cleaning of the duct, a light weight pulling line such as a 1/8" polyethylene line or conduit measuring tape shall be placed and shall remain in the conduit to facilitate future work. When great difficulty of either inserting the duct rod or removal of the cleaning mandrel is encountered, the duct may require further cleaning by use of a compressed air gun, or a low pressure water hose.

In the case of a broken conduit, the Contractor shall coordinate with the Engineer to determine if the conduit should be repaired. The existence and location of breaks in the conduit shall be determined by televising, but the excavation and repair work required will be paid for separately.

3. The existing conduit shall be televised with videotaped recordings.
   The video must include the following information:

   e. Report No.
   f. Date of TV Inspection
   g. Upstream and Downstream Junction Box location
   h. Current distance reach

   The Contractor shall provide two copies of the video (DVD, SSD or other compatible format) to the Engineer.

   In addition to the videotape, the contractor shall notify the Engineer in writing of the existing surveillance conduit size and of any gaps/obstructions in the existing conduit that would prevent fiber from being installed. The location of the gap/obstruction should provide a general location and reference the distance reference from the video recording to provide an exact location of the gap/obstruction. Each gap/obstruction should indicate if the existing conduit was able to be repaired or not. Conduit that was not able to be repaired should provide a reason why the conduit was unable to be repaired.

Method of Measurement

All work associated with televise existing conduit will be measured for payment on a lump sum basis which shall include all labor and equipment required for the work.

Revised 2-22-2025

Basis of Payment

This work will be paid for at the contract lump sum price for TELEVISE EXISTING CONDUIT.

TRACER WIRE
Effective: July 1, 2024

Description. This work shall consist of furnishing and installing tracer wire in raceways, complete with all splicing, identifications, and terminations. A tracer wire shall be installed with all fiberoptic raceways including microduct, innerduct, and metal raceways or nonmetallic raceways installed underground, under the pavement, in trench or in conduit embedded in structures or attached to structures. Only one tracer wire per raceway is required. If there are parallel raceways, a tracer wire is required for each raceway. Tracer wire shall be installed in raceway segments to provide a continuous tracer wire system.

Materials. The tracer wire shall be a direct burial rated, number 12 AWG (minimum) solid (.0808" diameter), fully annealed, high carbon steel, extra high strength solid copper-clad steel tracer wire. The wire shall have a minimum break load of 1150 lbs. The wire shall have a 45 mil high density orange polyethylene (HDPE) jacket complying with ASTM-D-1248, rated for direct burial use at 600 volts.

Wire must conform to ASTM B1010. Copper is UNS-C10200, OF Copper in accordance with ASTM B-170. The conductor must be meet or exceed 21% conductivity.

Connection devices used shall be as approved by the tracer wire manufacturer, except wire nuts of any type are not acceptable and shall not be used.

Installation. Tracer wire shall be installed without damaging the insulation. The tracer wire shall be installed in the same trench as the fiberoptic raceway. When the fiber optic raceway is installed in conduit under pavement or in conduit embedded in structures or attached to structures, the tracer wire shall be installed in the same conduit as the fiber optic raceway.

Tracer wire cable extended to camera poles, ITS poles, ITS cabinets and similar equipment shall be of length sufficient for cable splices to be withdrawn a minimum of 18 inches out of pole handholes or similar equipment. Tracer wire shall follow all bending radius and pulling tensions of manufacturer.

The tracer cable shall be installed directly from the reels on which the cable was shipped. The cable shall be installed in continuous spans between terminal points and splicing will only be permitted in pole handholes, junction boxes, handholes, vaults, and communication huts and similar locations.

Immediately after placement, the cables ends shall be sealed to prevent entrance of moisture and contaminants.

Method of Measurement. The tracer wire will be measured for payment in feet in place. Measurements will be made in straight lines between changes in direction and to the center of equipment, handholes, vaults, or junction boxes.

Bais of Payment. This work will be paid for at the contract unit price per foot installed for **TRACER WIRE**, of the size specified.

Revised 2-22-2025

UNDERGROUND CONDUIT, SINGLE MICRODUCT

Description.
This work shall consist of furnishing, installing, splicing, connecting, and demonstrating continuity of a fiber optic conduit (duct) system of the size specified herein and as shown on the Plans.

Materials.
The conduit and fittings shall meet the requirements of Article 1088.01(c) of the Standard Specifications, except as modified herein. The conduit system shall consist of one 18mm O.D. (14mm I.D.) microduct contained inside a HDPE protective outer sheath with a minimum thickness of 0.02" as specified. The conduit system shall be designed for direct burial.

The single microduct shall have a supported bend radius of 9 inches, an unsupported bend radius of 18 inches, and a safe working load of 440 lbs.

The anticipated product life shall be a minimum of fifteen years after installation, allowing for jetting (blowing) operations for cable installations and replacements.

Conduit shall be free from holes, blisters, inclusions, cracks, or other imperfections that would affect the performance or serviceability of the product.

Conduit shall be constructed of polymeric materials, which are lightweight, flexible, corrosion resistant and nonconductive. The base material shall be clean virgin grade high-density polyethylene (HDPE), which conforms to ASTM D3350-98a, Type III, Category 5, Class B or C and Grade P- 34 per ASTM D1248-84 or equivalent.

The base HDPE material shall conform to the following minimum mechanical properties:

Description Property ASTM Standard Density D1505 0.940-0.950 g/cm3 Melt Index (E) D1238 0.10 – 0.35 g/10 Minute Environmental Stress Crack Resistance (ESCR) D1693 192.0 hrs (per ASTM D3350) Tensile @ Yield (min) D638 2500 – 3200 psi (1,700 – 2,200 N/cm2) % Elongation D638 300% Flexural Modulus (min) D790 115,000 psi (790,000 kPa) Hardness D2240 60 Shore D VICAT Softening Point D1525 248°F (120°C) Brittleness Temperature D746 -94°F (-70°C)

Microduct shall be smooth on the outside and have a co-extruded permanent layer of Silicore (or approved equivalent) to provide a permanent low friction boundary layer between the microduct and the fiber optic cable for the anticipated service life of the microduct.

Standard available microduct colors shall be blue, yellow, green, brown, grey, black, and red, or other colors as approved. Colors shall be protected from ultra-violet (UV) degradation by the incorporation of Hindered Amine Light Stabilizers (HALS) to allow for two years of outside storage UV protection. The duct material shall be compounded with antioxidant additives to prevent thermal degradation.

Unless otherwise indicated or as directed by the Engineer, microduct for trunk fibers shall be orange and microduct for distribution fibers shall be blue.

All 18/14mm microduct shall have a minimum sustained air pressure of 300 PSI, and a minimum burst pressure of 475 PSI.

The microduct system shall come equipped as one complete assembly with an integrated 20 AWG insulated copper wire designed to be used for underground utility locating purposes. Continuity of the tracer wire must be maintained at all points. Connection devices used shall be as approved by the tracer wire manufacturer, except wire nuts of any type are not acceptable and shall not be used.

The Contractor shall perform a locate or conductivity test as a part of the final documentation.

Conduit shall be supplied on 3,500 ft. reels (or larger as equipment and installation techniques permit) in order to minimize the number of conduit splices. Fittings shall be mechanical or glued splices that preserve the smooth, seamless surface on the inside of the conduit. Fittings shall be capable of developing a minimum of 75% of the rated tensile (pull) strength of the conduit.

Installation.

The microduct shall be installed according to Section 810 of the Standard Specifications, in accordance with manufacturer's specifications, and as specified herein.

Fiber optic cable shall be air blown (jetted) into the microducts.

Conduit shall be installed in existing 4'x2' duct bank, within any of the available 8 – 1 ¼" CNC innerducts as shown in the plans. Prior to installation, the selected innerduct shall be rodded and cleaned in accordance with Special Provision ROD AND CLEAN EXISTING CONDUIT. Conduits with existing cables that are to remain shall not be rodded and cleaned.

The microduct system shall be sealed at all times during construction to eliminate the ingress of dirt and moisture. The Contractor shall utilize caps that are approved for use by the duct manufacturer.
The Contractor shall perform post installation testing on all micro duct prior to installing fiber optic cable. As a minimum, tests shall include: an air test, a foam sponge test, a plastic sphere test and a pressure test. The tracer wire shall be tested per specifications prior to any fiber optic cable being installed.

Each microduct shall be tested for continuity by blowing a sponge and then a plastic sphere (approximately 80% of the inside duct diameter) from one end to the other and each duct shall be pressure tested in accordance with the manufacturer's procedures to ensure that the duct will pressurize and hold air pressure for a specific amount of time.

The Contractor shall perform acceptance testing of the microducts in accordance with the manufacturer's recommended practices. Testing, at a minimum shall demonstrate that the microduct is installed and assembled correctly, is air-tight, and has had no reduction of the interior diameter. Each microduct shall be pressurized to check for leaks and other problems that would prevent the installation of fiber optic cable in the future. All testing shall be performed in the presence of the Resident Engineer.

The Contractor shall submit testing information to the Department for review and approval prior to ordering material.

In addition to the GPS DUCT documentation requirements in the General Electrical Provisions, the Contractor shall locate the microduct every 100' feet using a GIS locating device that is accurate to the nearest foot.

The Contractor shall submit catalog cut sheets for the communications duct, microducts, splice kits, and all installation and testing documents to the Department for review prior to ordering.

Method of Measurement.
This work will be measured for payment in feet in place. Measurements will be made in straight lines along the centerline of the conduit between ends and changes in direction.

Vertical measurement of the duct shall be as follows:

> For runs terminating at junction boxes, the vertical measurement will be made from the bottom of the trench, or horizontal raceway, to a point 18 inches beyond the center of the junction box or control cabinet.

Basis of Payment.
This work will be paid for at the contract unit price per foot for UNDERGROUND CONDUIT, SINGLE MICRODUCT.

STABILIZED CONSTRUCTION ENTRANCE

Description. This work shall include the furnishing, installing, maintaining and removal of the Stabilized Construction Entrance at locations as directed by the Engineer.

General. This work shall be done in accordance with the applicable portions of Sections 281 of the Standard Specifications.

Materials. Filter fabric for the Stabilized Construction Entrance, must meet the requirements of Section 282 of the Standard Specifications. Coarse Aggregate must meet the requirements of Section 351 of the Standard Specifications, unless otherwise directed by the Engineer.

Basis of Payment. This work will be measured in place in square yards.

Basis of Payment. This work will be paid for at the contract unit price per square yard for STABILIZED CONSTRUCTION ENTRANCE.

REMOVAL AND DISPOSAL OF REGULATED SUBSTANCES (PROJECT SPECIFIC)

Description. This work shall consist of the removal and disposal of regulated substances according to Section 669 of the Standard Specifications as revised below.

Contract Specific Sites. The excavated soil and groundwater within the areas listed below shall be managed as either “uncontaminated soil”, hazardous waste, special waste or non-special waste. For stationing, the lateral distance is measured from centerline and the farthest distance is the offset distance or construction limit, whichever is less.

Soil Disposal Analysis. When the waste material requires sampling for landfill disposal acceptance, the Contractor shall secure a written list of the specific analytical parameters and analytical methods required by the landfill. The Contractor shall collect and analyze the required number of samples for the parameters required by the landfill using the appropriate analytical procedures. A copy of the required parameters and analytical methods (from landfill email or on landfill letterhead) shall be provided as Attachment 4A of the BDE 2733 (Regulated Substances Final Construction Report). The price shall include all sampling materials and effort necessary for collection and management of the samples, including transportation of samples from the job site to the laboratory. The Contractor shall be responsible for determining the specific disposal facilities to be utilized; and collect and analyze any samples required for disposal facility acceptance using a NELAP certified analytical laboratory registered with the State of Illinois.

Site 4231-1: ROW, M.M. 63 to M.M. 73.5, Chicago, Dolton, Calumet City and South Holland, Cook County

- Station 473+00 to Station 474+90 (CL I-94), 0 to 170 feet LT. The Engineer has determined this material meets the criteria of and shall be managed in accordance with Article 669.05(a)(1). Contaminants of concern sampling parameters: Iron, and Manganese.
- Station 474+90 to Station 477+00 (CL I-94), 0 to 265 feet LT. The Engineer has determined this material meets the criteria of and shall be managed in accordance with Article 669.05(a)(2). Contaminant of concern sampling parameter: Manganese.
- Station 483+00 to Station 484+80 (CL I-94), 0 to 260 feet LT. The Engineer has determined this material meets the criteria of and shall be managed in accordance with Article 669.05(a)(2). Contaminant of concern sampling parameter: Manganese.
- Station 484+80 to Station 486+50 (CL I-94), 0 to 260 feet LT. The Engineer has determined this material meets the criteria of and shall be managed in accordance with Article 669.05(a)(2). Contaminants of concern sampling parameters: Iron, Lead, and Manganese.
- Station 488+25 to Station 492+50 (CL I-94), 0 to 140 feet LT. The Engineer has determined this material meets the criteria of and shall be managed in accordance with Article 669.05(a)(2). Contaminants of concern sampling parameters: Iron, and Lead.
- Station 503+50 to Station 504+50 (CL I-94), 0 to 140 feet LT. The Engineer has determined this material meets the criteria of and shall be managed in accordance with Article 669.05(a)(2). Contaminants of concern sampling parameters: Iron, Lead, and Manganese.
- Station 514+00 to Station 516+30 (CL I-94), 0 to 170 feet LT. The Engineer has determined this material meets the criteria of and shall be managed in accordance with Article 669.05(a)(2). Contaminants of concern sampling parameters: Arsenic, and Lead.
- Station 516+30 to Station 519+25 (CL I-94), 0 to 170 feet LT. The Engineer has determined this material meets the criteria of and shall be managed in accordance with Article 669.05(a)(2). Contaminant of concern sampling parameter: Manganese.
- Station 546+00 to Station 547+00 (CL I-94), 0 to 125 feet LT. The Engineer has determined this material meets the criteria of and shall be managed in accordance with Article 669.05(a)(2). Contaminant of concern sampling parameter: Manganese.
- Station 572+00 to Station 578+20 (CL I-94), 0 to 155 feet LT. The Engineer has determined this material meets the criteria of and shall be managed in accordance with Article 669.05(a)(1). Contaminants of concern sampling parameters: Benzo(a)pyrene, Lead, and Manganese.
- Station 578+20 to Station 580+00 (CL I-94), 0 to 150 feet LT. The Engineer has determined this material meets the criteria of and shall be managed in accordance with Article 669.05(a)(5). Contaminants of concern sampling parameters: Benzo(a)pyrene, and Lead.

- Station 582+50 to Station 585+70 (CL I-94), 0 to 145 feet LT. The Engineer has determined this material meets the criteria of and shall be managed in accordance with Article 669.05(a)(2). Contaminants of concern sampling parameters: Iron, Lead, and Manganese.
- Station 585+70 to Station 591+30 (CL I-94), 0 to 145 feet LT. The Engineer has determined this material meets the criteria of and shall be managed in accordance with Article 669.05(a)(1). Contaminants of concern sampling parameters: Iron, Lead, and Manganese.
- Station 591+30 to Station 594+00 (CL I-94), 0 to 140 feet LT and Station 107+70 to Station 103+85 (CL Ramp Y1), 70 feet LT to 63 feet RT. The Engineer has determined this material meets the criteria of and shall be managed in accordance with Article 669.05(a)(5). Contaminants of concern sampling parameters: Arsenic, and Manganese.
- Station 101+60 to Station 103+70 (CL Ramp Y1), 0 to 70 feet LT and 0 to 65 feet RT. The Engineer has determined this material meets the criteria of and shall be managed in accordance with Article 669.05(a)(2). Contaminant of concern sampling parameter: Manganese.
- Station 702+00 to Station 703+50 (CL Ramp Y2), 0 to 60 feet LT and 0 to 50 feet RT. The Engineer has determined this material meets the criteria of and shall be managed in accordance with Article 669.05(a)(2). Contaminant of concern sampling parameter: Manganese.
- Station 756+30 to Station 757+00 (CL Ramp Y3), 0 to 40 feet LT and 0 to 40 feet RT. The Engineer has determined this material meets the criteria of and shall be managed in accordance with Article 669.05(a)(2). Contaminant of concern sampling parameter: Manganese.
- Station 481+00 to Station 483+00 (CL I-94), 0 to 110 feet RT. The Engineer has determined this material meets the criteria of and shall be managed in accordance with Article 669.05(a)(1). Contaminant of concern sampling parameter: Manganese.
- Station 487+00 to Station 488+60 (CL I-94), 0 to 110 feet RT. The Engineer has determined this material meets the criteria of and shall be managed in accordance with Article 669.05(a)(2). Contaminants of concern sampling parameters: Iron, Lead, and Manganese.
- Station 488+60 to Station 490+50 (CL I-94), 0 to 110 feet RT. The Engineer has determined this material meets the criteria of and shall be managed in accordance with Article 669.05(a)(5). Contaminants of concern sampling parameters: Arsenic, Iron, and Lead.
- Station 507+50 to Station 510+00 (CL I-94), 0 to 150 feet RT. The Engineer has determined this material meets the criteria of and shall be managed in accordance with Article 669.05(a)(1). Contaminant of concern sampling parameter: Manganese.
- Station 514+00 to Station 515+50 (CL I-94), 0 to 90 feet RT. The Engineer has determined this material meets the criteria of and shall be managed in accordance with Article 669.05(a)(5). Contaminants of concern sampling parameters: Arsenic, Iron, and Lead.
- Station 523+50 to Station 525+00 (CL I-94), 0 to 185 feet RT. The Engineer has determined this material meets the criteria of and shall be managed in accordance with Article 669.05(a)(1). Contaminants of concern sampling parameters: Iron, and Manganese.
- Station 523+50 to Station 525+00 (CL I-94), 185 feet RT to 350 feet RT. The Engineer has determined this material meets the criteria of and shall be managed in accordance with Article 669.05(a)(1). Contaminant of concern sampling parameter: Iron.
- Station 531+00 to Station 532+00 (CL I-94), 0 to 140 feet RT. The Engineer has determined this material meets the criteria of and shall be managed in accordance with Article 669.05(a)(2). Contaminant of concern sampling parameter: Lead.
- Station 547+00 to Station 549+50 (CL I-94), 0 to 115 feet RT. The Engineer has determined this material meets the criteria of and shall be managed in accordance with Article 669.05(a)(2). Contaminants of concern sampling parameters: Iron, and Manganese.

- Station 572+00 to Station 574+00 (CL I-94), 0 to 145 feet RT. The Engineer has determined this material meets the criteria of and shall be managed in accordance with Article 669.05(a)(5). Contaminants of concern sampling parameters: Benzo(a)pyrene, Benzo(b)fluoranthene, Dibenzo(a,h)anthracene, and Lead.
- Station 907+50 to Station 909+00 (CL Ramp Y6), 0 to 60 feet LT and 0 to 60 feet RT. The Engineer has determined this material meets the criteria of and shall be managed in accordance with Article 669.05(a)(2). Contaminant of concern sampling parameter: Manganese.
- Station 606+50 to Station 608+65 (CL I-94), 0 to 300 feet RT. The Engineer has determined this material meets the criteria of and shall be managed in accordance with Article 669.05(a)(2). Contaminant of concern sampling parameter: Manganese.
- Station 608+65 to Station 611+00 (CL I-94), 0 to 300 feet RT. The Engineer has determined this material meets the criteria of and shall be managed in accordance with Article 669.05(a)(5). Contaminants of concern sampling parameters: Manganese, and Thallium.
- Station 344+20 to Station 347+00 (CL US 6 / 159th St.), 0 to 90 feet LT and 0 to 90 feet RT. The Engineer has determined this material meets the criteria of and shall be managed in accordance with Article 669.05(a)(2). Contaminant of concern sampling parameter: Manganese.
- Station 340+80 to Station 343+00 (CL US 6 / 159th St.), 0 to 110 feet LT. The Engineer has determined this material meets the criteria of and shall be managed in accordance with Article 669.05(a)(2). Contaminant of concern sampling parameter: Manganese.
- Station 340+80 to Station 343+00 (CL US 6 / 159th St.), 0 to 90 feet RT. The Engineer has determined this material meets the criteria of and shall be managed in accordance with Article 669.05(a)(1). Contaminants of concern sampling parameters: Benzo(a)pyrene, and Manganese.

Work Zones

Three distinct OSHA HAZWOPER work zones (exclusion, decontamination, and support) shall apply to projects adjacent to or within sites with documented leaking underground storage tank (LUST) incidents, or sites under management in accordance with the requirements of the Site Remediation Program (SRP), Resource Conservation and Recovery Act (RCRA), or Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), or as deemed necessary. For this project, the work zones apply for the following ISGS PESA Sites**:**
None

REMOVE EXISTING TRAFFIC SURVEILLANCE EQUIPMENT

Description. This Work will consist of removing and salvaging or disposing of various traffic surveillance equipment at induction loop detector sites, as specified herein and as shown in the plans.

General Requirements. No removal work will be permitted without approval from the Engineer. Removal shall not be allowed to start until after the temporary or new traffic surveillance system is integrated and placed into approved operation by the Department.

Traffic surveillance equipment shall be removed in accordance with the following requirements and/or articles of the Illinois Department of Transportation Standard Specifications for Road and Bridge Construction.

Where indicated in the plans for removal the following items shall be removed, abandoned and/or disconnected:

(1) Traffic Surveillance Cabinet. Traffic surveillance cabinet shall be removed from the site.

(2) Conduits. Existing underground conduits associated with the induction loop detector site as shown on the plans shall be abandoned in place.

(3) Inductive loops. Inductive loops and associated wire shall be abandoned in place.

(4) Telephone Service. Existing telephone service will be disconnected and removed.

(5) Induction Loop Detector Cables. Cables routing between the cabinet and induction loop detector handholes shall be disconnected and removed in accordance with Article 895.05(d).

(6) Cables. Existing power and communication lateral cables between the cabinet and the nearest access point as shown on the plans (e.g., handhole, junction box, etc.) shall be removed in accordance with Article 895.05(d).

(7) Traffic Surveillance Cabinet Foundation. Traffic surveillance cabinet foundation removal shall be in accordance with Article 895.05(c).

(8) Electrical Service. Existing electrical service shall be removed in accordance with Article 845.03.

(9) Handholes. Existing handhole removal shall be in accordance with Article 895.05(b).

Unless otherwise noted in the plans, the traffic surveillance equipment and associated hardware and appurtenances shall become the property of Contractor and shall be disposed of according to Article 202.03.

Method of Measurement. This work will be measured for payment in units of each. Each traffic surveillance cabinet location where existing traffic surveillance equipment is removed, abandoned or disconnected will be considered one each.

Removal of existing electric cable will be measured for payment according to Article 895.07.

Basis of Payment. This work will be paid for at the Contract unit price each per site for REMOVE EXISTING ITS EQUIPMENT.

Removal of an existing electric cable will be paid for at the contract unit price per foot for REMOVE ELECTRIC CABLE FROM CONDUIT.

Removal of existing concrete foundations will be paid for at the contract unit price per each for REMOVE EXISTING CONCRETE FOUNDATION.

Removal of existing handholes will be paid for at the contract unit price per each for REMOVE EXISTING HANDHOLE.

Removal of electric service installations will be paid for at the contract unit price per each for REMOVAL OF ELECTRIC SERVICE INSTALLATION.

CABINET HOUSING EQUIPMENT REMOVAL

Description. This item shall consist of the removal of an existing camera equipment cabinet attached to an existing CCTV camera pole in preparation for a larger cabinet to be installed.

Prior to removal the Contractor shall coordinate with the TSC Engineer to determine what equipment located in the existing cabinet needs to be relocated to the proposed cabinet and what equipment should be removed. Equipment inside the existing cabinet that the TSC Engineer determines should be removed and remain the property of IDOT shall be delivered to the State's Electrical Maintenance Contractor for inclusion into the State stock. The remaining equipment and cabinet shall become the property of the Contractor and should be disposed of in accordance with Article 202.03.

The cabinet shall be removed without damage to the existing cabinet, conduits, cables or CCTV camera pole.

Basis of Payment. This item will be paid for at the contract unit price each for CABINET HOUSING EQUIPMENT REMOVAL.

IDOT COMMUNICATIONS NODE

Description
This work shall consist of furnishing, installing, and testing a Communications Node site per the Plans.

Materials

Layer III (Node) Switch
The Contractor shall provide a Layer III Ethernet switches with all necessary hardware and software to make the switch operational and be compatible with IDOT's existing network. The switch shall be a Cisco C9500-4844C or approved equivalent. The Contractor shall be responsible for programming and integrating the new switch into the existing network.

(A) Management Capabilities
- (1) Switches shall support full-duplex Ethernet
- (2) Switches shall be capable Layer 2 LAN Base services
- (3) Switches shall have American Standard Code for Information Interchange (ASCII) based configuration files for offline editing and bulk configuration
- (4) Switches shall be managed using Simple Network Management Protocol (SNMP) Version 3.
- (5) Switches must be able to use Secure File Transfer Protocol (SFTP) to transfer configuration file to and from a central server.

(6) Switches shall be compliant with IEEE 802.1 and 802.3. Specifically, the switch must comply with the following IEEE 802.1 standards:
  (a) IEEE 802.1D - Media Access Control (MAC) Bridges, including Rapid Spanning Tree Protocol (RSTP).
  (b) IEEE 802.1Q - Virtual Local Area Network (VLAN) tagging and Multiple Spanning Tree Protocol (MSTP).
  (c) IEEE 802.1X (Port Based Network Access Protocol).
(7) Switches shall perform multicast filtering using Internet Group Management Protocol (IGMP) snooping.
(8) Switches shall support Address Resolution Protocol (ARP)
(9) Switches shall support the following Layer 3 capabilities:
  (a) Internet Protocol Version 4 (IPv4);
  (b) Internet Protocol Version 6 (IPv6);
  (c) Open Shortest Path First (OSPF);
  (d) Generic Routing Encapsulation (GRE);
  (e) Inter-VLAN Internet Protocol (IP) routing for full Layer 3 routing between two or more VLANs;
  (f) Virtual Router Redundancy Protocol (VRRP);
  (g) IP multicast routing utilizing Protocol Independent Multicast (PIM) and Internet Group Management Protocol, Version 2 (IGMPv2). Support for PIM sparse mode (PIM-SM) and PIM dense mode (PIM-DM);
  (h) Quality of Service (QoS);
  (i) Security utilizing Access Control Lists (ACLs).

(B) Power Requirements
(1) Input Voltage to Power Supply Modules: 100 to 240 VAC
(2) Redundant Power Supplies

(C) Environmental Requirements
(1) Operating Temperature: -40° to +75°C
(2) Humidity: 0 to 95% (non-condensing)
(3) Resistant to electromagnetic interference (EMI)

(D) Network Port Requirements
(1) Switches shall have the following minimum port configurations:
  (a) (12) 10/100/1000 Mbps copper Ethernet ports, RJ-45 connector
  (b) (12) FE/GE SFP ports
  (c) (4) 10G SFP ports with SM transceivers, LC connector
(2) Contractor shall ensure the launch power of the optical ports is great enough such that when coupled with the receiver sensitivity of the connecting device, the optical budget of the link is not exceeded. The Contractor shall furnish GE transceivers and 10G transceivers to accommodate the number of links shown in the Plans. At a minimum, the Contractor shall provide the following transceivers or approved equivalent.
  (a) (12) GLC-LX-SM-RGD [1 Gbps single mode duplex transceivers)
  (b) (2) SFP-10G-BX40U-I [10 Gbps single mode simplex transceivers)
(3) All ports shall have Diagnostic light-emitting diodes (LED). These indicators shall include link, activity, and power LEDs.

Fiber Optic Splice Enclosure

The Contractor shall provide four (4) rack mountable fiber optic splice enclosures capable of terminating a 144 strand fiber optic cable. The fiber optic splice enclosure shall:
  (a) Have the capacity to accommodate all fibers from the entering fiber optic cables.
  (b) be capable of being installed in TIA standard 19” racks.

(c) be aluminum material per ATSM B209, powder coated, and modular design.
(d) be supplied with optical splice trays and organizer holders. Trays shall be aluminum with clear plastic covers, designed for outdoor use, and accommodate 24 fusion splices. The trays shall have perforations for cable ties and buffer tube strain relief features. Individual trays shall be removable from the enclosure without disturbing the other trays or removing the enclosure itself from the cabinet.
(e) have the tray capacity to accommodate immediate fusion splices and future splices of the entering fiber optic cables.
(f) have provisions for cable strain-relief
(g) have pull out labels for administrative documentation

Construction Requirements

Layer III (Node) Switch

Installation. The Contractor shall install the Ethernet switches and power supplies in the Communication Node Site as shown in the Plans or as approved by the Engineer. The Contractor shall install all necessary patch cords, optical transceivers, connectors, power supplies, communication transformers, or auxiliary equipment necessary to complete the communication circuits. The Contractor shall connect the switch to the field devices as indicated in the Plans.

Configuration. When requested by the Contractor, the Engineer will provide the necessary IP address assignments and port assignments, including the necessary port provisioning. The Contractor shall be responsible for all network programming of the switches and communicating elements within the building or cabinet.
The Contractor shall configure gateway IP addresses for all subnets that connect to the switch. OSPF routing shall be configured and the routes to those subnets being advertised to adjacent switches confirmed. The Contractor shall configure ACLs and work with the Department to determine IP Ranges, ports, and other settings to be used in configuring the ACLs.

The Department may elect to have its Network Administrator configure the node switches. In the event that the Department makes this election, the Contractor shall deliver all switches to the Department for configuration prior to installation. The Contractor shall request a meeting with the Departments Network Administrator within 2 weeks from Notice to Proceed to determine the Department's preferred approach to switch configuration.

Fiber Optic Splice Enclosure

The Contractor shall install the rack mountable fiber optic splice enclosures in the Fiber Cabinet per the Plans or as directed by the Engineer. All fiber optic cable strands entering the cabinet shall be terminated on patch panels per the construction section of the "Fiber Optic Cable, Single Mode" specification. Strands shown to be connected to the Ethernet switch per the Plans shall be joined using factory pre-terminated jumpers that pass through the conduit connections between cabinets.

Basis of Payment

This work will be paid for at the contract lump sum price for ILLINOIS DEPARTMENT OF TRANSPORTATION COMMUNICATIONS NODE.

CLOSED CIRCUIT TELEVISION CABINET

Description

This work shall consist of furnishing, installing, and testing a pole mounted CCTV equipment cabinet.

Materials

The Cabinet, Model 336 shall meet the Caltrans Transportation Electrical Equipment Specifications (TEES) for the components applied in the project. The cabinet shall be a durable, weatherproof enclosure constructed of 3/16 in. (4.75mm) thick aluminum or 1/8 inch (3.175 mm) thick aluminum lined with bullet resistant fiberglass panels that shall be UL listed and tested for UL752 Level 3 with a nominal thickness of ½ inch (12.7mm) maximum, and a nominal weight of 5.0 lbs. per square foot (24.5 kg per square meter) maximum. The cabinet shall be sized to adequately house all required components with extra space for arrangement and termination of wiring. The minimum size of the cabinet shall have a nominal outside dimension of 46 inches height x 24 inches wide X 24 inches deep. Cabinet, Model 336 shall consist of the following components: double door each equipped with a Corbin # 2 Brass lock or equal for front and rear cabinet entry, housing, manufacturer recommended mounting hardware for pole-mount application, mounting cage, power distribution assembly/service panel (including RFI filter surge suppression, outlets, circuit breakers, terminal blocks, and neutral and ground bus bars), thermostatically controlled fan, door switch, LED light, fiber optic patch panel, power data unit, and all necessary mounting hardware and wiring, and other equipment, as shown on the Plans and specified in these special provisions.

All bolts, nuts, washers, screws, hinges, and hinge pins shall be stainless steel unless otherwise specified. All equipment under this item shall be in accordance with Section 1074.03 of the Standard Specifications except as modified herein.

Power Data Unit.

The power data unit shall be installed in the cabinet and allow the CCTV camera PoE and network switch power supply to be remotely rebooted. The power distribution assembly shall meet the minimum requirements:

1) Minimum of eight individually switched 120V, 15-amp outlet circuits
2) Ethernet Interface: 10/100 autosensing, static IP, TCP port selectable, RJ-45 w/internal FCC filtering
3) Operating Temperature: -30□F to 170□F
4) Power Dissipation: 3.9W Typ Max (all on) <3W idle
5) Power Fail Hold-Over: 350ms minimum (all relays on)

Fiber Patch Panel.

A fiber patch panel shall be provided and installed within the cabinet. The fiber patch panel shall be paid for separately as FIBER OPTIC INTERCONNECT TERMINATION PANEL, 12F OR 24F.

Ground and Neutral Bus Bars. Separate ground and neutral bus bars, mounted on the equipment panel shall be provided. The neutral bus bar shall be isolated from the cabinet and equipment ground. Compression lugs, plus 2 spare lugs, shall be sized to accommodate the cables with the

heads of the connector screws painted green for ground connections and white for neutral connections.

Construction Requirements

Installation. The cabinet shall be installed on a CCTV Camera pole at 180 degrees from the camera arm orientation as shown on the plans. The front door side of the cabinet shall be positioned at 90 degrees from the pole handhole; the back door side of the cabinet shall be positioned at 120 degrees from the pole letters and numerals labeling. The Contractor shall confirm the orientation of the Cabinet Model 336 installation and its front door side with the Engineer prior to installation. Stainless steel bolted connections shall be provided with lock-washers, locking nuts, or other approved means to prevent the connection nuts from backing off. Dissimilar materials shall be isolated from one another by stainless steel fittings.

All conduit entrances into the cabinet installation shall be sealed with a pliable waterproof material.

The Contractor shall make all power connections to the cabinet in accordance with the Plans and as required. The neutral bus shall be isolated from the cabinet and equipment ground. It shall terminate at the neutral lug ultimately attached to the meter pedestal. All conductors used in cabinet wiring shall terminate with properly sized non-insulated (if used, for DC logic only) or clear insulated spring-spade type terminals except when soldered to a through-panel solder lug on the rear side of the terminal block or as specified otherwise. All conductors, except those which can be readily traced, shall be labeled. Labels attached to each end of the conductor shall identify the destination of the other end of the conductor. Cabling shall be routed to prevent conductors from being in contact with metal edges. Cabling shall be arranged so that any removable assembly may be removed without disturbing conductors not associated with that assembly.

All equipment in the cabinet shall be clearly and permanently labeled using marker strips. The marker strips shall be made of material that can be easily and legibly written on using a pencil or ballpoint pen. Marker strips shall be located immediately below the item that they are to identify and must be clearly visible with the items installed.

Testing. Cabinet Acceptance Test – in addition to the environmental and design approval tests specified in the FHWA Type 170 Traffic Signal control System Hardware Specification, the following water spray test shall be performed for each type of cabinet:

> Spray water from a point directly overhead at an angle of 60º from the vertical axis of the cabinet. Repeat for each of eight equally spaced positions around the cabinet for a period of five minutes in each position. The water shall be sprayed using a domestic type sprinkling nozzle at a rate of not less than 10 gal./min (40 liters/min) per square foot (0.1 meters) of surface area. The cabinet shall then be inspected for leakage. Evidence of water leakage shall be cause for rejection.

Operational Standalone Test: The operational standalone test for each cabinet installed shall consist of the following:

- Visual inspection of the cabinet and its contents for workmanship
- Verification of the cabinet grounding in accordance with Article 801.04 and Article 806.
- Measurement of the voltage at the input panel

Documentation. Shop drawings and wiring lists/diagrams showing the proposed layout of the cabinet shall be submitted to the Engineer for approval prior to the start of fabrication. Wiring lists for the internal manufacturer cut sheets for all electrical equipment included in each type of cabinet shall be included in the submission.

Four copies of drawings showing the wiring for each cabinet shall be provided. One copy shall be placed in the clear plastic envelope furnished as part of the cabinet. The other three copies shall be delivered to the Engineer.

For each cabinet, four copies of a configuration of the equipment reporting to that cabinet shall be provided. The sheet shall also list field settable options for the equipment contained in the cabinet. This shall include device addresses and output voltage settings for power supplies. One of these copies shall be placed in the clear plastic envelope furnished as part of the cabinet. The other three copies shall be delivered to the Engineer.

Warranty. The Contractor shall warranty all materials and workmanship including labor for a period of two years after the completion and acceptance of the installation, unless other warranty requirements prevail. The warranty period shall begin when the contractor completes all construction obligations related to this item and when the components for this item have been accepted, which shall be documented as the final completion date in the construction status report. The warranty shall warrant and guarantee repair of the component parts of the cabinet furnished by the Contractor that prove to be defective in workmanship and materials during the first two years of operation as defined and noted above at no additional cost to the Department.

The Engineer will notify the Contractor that a warranted item needs repair. The Contractor shall acknowledge the notification within 24 hours and replace or correct any part or parts of materials and equipment that are found defective within the two-year in-service warranty period. All items needing repair shall be returned to the Department in two weeks from the date of receipt at the Contractor’s facility or replaced in-kind by the Contractor, and the Contractor shall be responsible for any return shipping costs. No compensation will be made to the Contractor for such replacements or corrections.

The Contractor shall provide a warranty certificate for this item and its related components to the Department. The Department reserves the right to transfer this service to other parties who may be contracted with in order to provide overall maintenance of this item.

Method of Measurement
This work will be measured for payment per each CLOSED CIRCUIT TELEVISION CABINET furnished, installed and tested.

Basis of Payment
This work will be paid for at the contract unit price each for CLOSED CIRCUIT TELEVISION cabinet, which price shall be payment in full for furnishing and installing the cabinet and all connections, testing, labor, tools, equipment, transportation, and incidentals necessary to complete this item of work.

FIBER OPTIC CABLE, SINGLE MODE
Effective: September 1, 2024

Description. The Contractor shall furnish and install loose-tube, single-mode, fiber optic cable of the number of fibers specified as shown in the plans and as directed by the Engineer.

Other ancillary components, required to complete the fiber optic cable plant, including but not limited to, moisture and water sealants, cable caps, fan-out kits, etc., shall be included in the cost of fiber optic cable and will not be paid for separately.

Materials The single-mode, fiber optic cable shall incorporate a loose, buffer-tube design. The cable shall be an accepted product of the United States Department of Agriculture Rural Utilities Service (RUS) 7 CFR 1755.900 and meet the requirements of ANSI/ICEA Standard for Fiber Optic Outside Plant Communications Cable.

Fibers.

The cables shall use dispersion unshifted fibers. The optical and physical characteristics of the un-cabled fibers shall include:

The single-mode fiber shall meet EIA/TIA-492CAAA, "Detail Specification for Class IVa Dispersion-Unshifted Single-Mode Optical Fibers," and ITU recommendation G.652.D, “Characteristics of a single-mode optical fiber cable.”

Physical Construction			
Requirement		**Units**	**Value**
Cladding Diameter		(µm)	125.0 ± 0.7
Core-to-Cladding Concentricity		(µm)	≤ 0.5
Cladding Non-Circularity			≤ 0.7 %
Mode Field Diameter	1310 nm	(µm)	9.2 ± 0.4
	1550 nm		10.4 ± 0.5
Coating Diameter		(µm)	245 ± 5
Colored Fiber Nominal Diameter		(µm)	253 - 259
Fiber Curl radius of curvature		(m)	> 4.0 m

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Optical Characteristics				
Requirement			**Units**	**Value**
Cabled Fiber Attenuation		1310 nm	(dB/km)	≤ 0.4
		1550 nm		≤ 0.3
Point discontinuity		1310 nm	(dB)	≤ 0.1
		1550 nm		≤ 0.1
Macrobend Attenuation	Turns	Mandrel OD	(dB)	
	1	32 ± 2 mm		< 0.05 at 1550 nm
	100	50 ± 2 mm		< 0.05 at 1310 nm
	100	50 ± 2 mm		< 0.10 at 1550 nm
	100	60 ± 2 mm		< 0.05 at 1550 nm
	100	60 ± 2 mm		< 0.05 at 1625 nm
Cable Cutoff Wavelength (λ_{ccf})			(nm)	< 1260
Zero Dispersion Wavelength (λ_o)			(nm)	$1302 \le \lambda_o \le 1322$
Zero Dispersion Slope (S_o)			(ps/(nm²•km))	≤ 0.089
Total Dispersion		1550 nm	(ps/(nm•km))	≤ 3.5
		1285-1330 nm		≤ 17.5
		1625 nm		≤ 21.5
Cabled Polarization Mode Dispersion			(ps/km^{-2})	≤ 0.2
IEEE 802.3 GbE - 1300 nm Laser Distance			(m)	up to 5000
Water Peak Attenuation: 1383 ± 3 nm			(dB/km)	≤ 0.4

Cable Construction.

The number of fibers in each cable shall be as specified on the plans.

Optical fibers shall be placed inside a loose buffer tube. The nominal outer diameter of the buffer tube shall be 3.0 mm. Each buffer tube shall contain up to 12 fibers. The fibers shall not adhere to the inside of the buffer tube.

Each fiber shall be distinguishable by means of color coding in accordance with TIA/EIA-598-B, "Optical Fiber Cable Color Coding." The fibers shall be colored with ultraviolet (UV) curable inks.

Buffer tubes containing fibers shall be color coded with distinct and recognizable colors in accordance with TIA/EIA-598-B, "Optical Fiber Cable Color Coding." Buffer tube colored stripes shall be inlaid in the tube by means of co-extrusion when required. The nominal stripe width shall be 1 mm.

For cables containing more than 12 buffer tubes, standard colors are used for tubes 1 through 12 and stripes are used to denote tubes 13 through 24. The color sequence applies to tubes containing fibers only, and shall begin with the first tube. If fillers are required, they shall be placed in the inner layer of the cable. The tube color sequence shall start from the inside layer and progress outward.

In buffer tubes containing multiple fibers, the colors shall be stable across the specified storage and operating temperature range and shall not be subject to fading or smearing onto each other. Colors shall not cause fibers to stick together.

The buffer tubes shall be resistant to external forces and shall meet the buffer tube cold bend and shrinkback requirements of 7 CFR 1755.900.

Fillers may be included in the cable core to lend symmetry to the cable cross-section where needed. Fillers shall be placed so that they do not interrupt the consecutive positioning of the buffer tubes. In dual layer cables, any fillers shall be placed in the inner layer. Fillers shall be nominally 2.5 mm or 3.0 mm in outer diameter.

The central member shall consist of a dielectric, glass reinforced plastic (GRP) rod (optional steel central member). The purpose of the central member is to provide tensile strength and prevent buckling. The central member shall be overcoated with a thermoplastic when required to achieve dimensional sizing to accommodate buffer tubes/fillers.

Each buffer tube shall contain a water-swellable yarn for water-blocking protection. The water-swellable yarn shall be non-nutritive to fungus, electrically non-conductive, and homogeneous. It shall also be free from dirt or foreign matter. This yarn will preclude the need for other water-blocking material; the buffer-tube shall be gel-free. The optical fibers shall not require cleaning before placement into a splice tray or fan-out kit.

Buffer tubes shall be stranded around the dielectric central member using the reverse oscillation, or "S-Z", stranding process.

Water swellable yarn(s) shall be applied longitudinally along the central member during stranding.

Two polyester yarn binders shall be applied contrahelically with sufficient tension to secure each buffer tube layer to the dielectric central member without crushing the buffer tubes. The binders shall be non-hygroscopic, non-wicking, and dielectric with low shrinkage.

For single layer cables, a water swellable tape shall be applied longitudinally around the outside of the stranded tubes/fillers. The water swellable tape shall be non-nutritive to fungus, electrically non-conductive, and homogenous. It shall also be free from dirt and foreign matter.

For dual layer cables, a second (outer) layer of buffer tubes shall be stranded over the original core to form a two layer core. A water swellable tape shall be applied longitudinally over both the inner and outer layer. The water swellable tape shall be non-nutritive to fungus, electrically non-conductive, and homogenous. It shall also be free from dirt and foreign matter.

The cables shall contain one ripcord under the sheath for easy sheath removal.

Tensile strength shall be provided by the central member, and additional dielectric yarns as required.

The dielectric yarns shall be helically stranded evenly around the cable core.

The cables shall be sheathed with medium density polyethylene (MDPE). The minimum nominal jacket thickness shall be 1.4 mm. Jacketing material shall be applied directly over the tensile strength members (as required) and water swellable tape. The polyethylene shall contain carbon black to provide ultraviolet light protection and shall not promote the growth of fungus.

The MDPE jacket material shall be as defined by ASTM D1248, Type II, Class C, Category 4 and Grades J4, E7 and E8.

Fiber optic cables for 12 fibers used a lateral cable shall have a corrugated armored sheath.

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The jacket or sheath shall be free of holes, splits, and blisters.

The cable jacket shall contain no metal elements and shall be of a consistent thickness.

Cable jackets shall be marked with the manufacturer's name, month and year of manufacture, sequential meter or foot markings, a telecommunication handset symbol as required by Section 350G of the National Electrical Safety Code (NESC), fiber count, and fiber type. The actual length of the cable shall be within -0/+1% of the length markings. The print color shall be white, with the exception that cable jackets containing one or more co-extruded white stripes, which shall be printed in light blue. The height of the marking shall be approximately 2.5 mm.

The maximum pulling tension shall be 2700 N (608 lbf) during installation (short term) and 890 N (200 lbf) long term installed.

The shipping, storage, and operating temperature range of the cable shall be -40°C to +70°C. The installation temperature range of the cable shall be –30°C to +70°C.

General Cable Performance Specifications

The fiber optic cable manufacturer shall provide documentation and certify that the fiber optic cable complies with the following EIA-455-*xxx* Fiber Optic Test Procedures (FOTP):

When tested in accordance with FOTP-3, "*Procedure to Measure Temperature Cycling Effects on Optical Fibers, Optical Cable, and Other Passive Fiber Optic Components*," the change in attenuation at extreme operational temperatures (-40°C and +70°C) shall not exceed 0.15 dB/km at 1550 nm for single-mode fiber and 0.3 dB/km at 1300 nm for multimode fiber.

When tested in accordance with FOTP-82, "*Fluid Penetration Test for Fluid-Blocked Fiber Optic Cable*," a one meter length of unaged cable shall withstand a one meter static head or equivalent continuous pressure of water for one hour without leakage through the open cable end.

When tested in accordance with FOTP-81, "*Compound Flow (Drip) Test for Filled Fiber Optic Cable*," the cable shall exhibit no flow (drip or leak) of filling and/or flooding material at 70°C.

When tested in accordance with FOTP-41, "*Compressive Loading Resistance of Fiber Optic Cables*," the cable shall withstand a minimum compressive load of 220 N/cm (125 lbf/in) applied uniformly over the length of the sample. The 220 N/cm (125 lbf/in) load shall be applied at a rate of 2.5 mm (0.1 in) per minute. The load shall be maintained for a period of 1 minute. The load shall then be decreased to 110 N/cm (63 lbf/in). Alternatively, it is acceptable to remove the 220 N/cm (125 lbf/in) load entirely and apply the 110 N/cm (63 lbf/in) load within five minutes at a rate of 2.5 mm (0.1 in) per minute. The 110 N/cm (63 lbf/in) load shall be maintained for a period of 10 minutes. Attenuation measurements shall be performed before release of the 110 N/cm (63 lbf/in) load. The change in attenuation shall not exceed 0.15 dB at 1550 nm for single-mode fibers and 0.30 dB at 1300 nm for multimode fiber.

When tested in accordance with FOTP-104, "*Fiber Optic Cable Cyclic Flexing Test*," the cable shall withstand 25 mechanical flexing cycles around a sheave diameter not greater than 20 times the cable diameter. The change in attenuation shall not exceed 0.15 dB at 1550 nm for single-mode fiber and 0.30 dB at 1300 nm for multimode fiber.

When tested in accordance with FOTP-25, "*Repeated Impact Testing of Fiber Optic Cables and Cable Assemblies*," except that the number of cycles shall be two at three locations along a one meter cable length and the impact energy shall be atleast 4.4 Nm (in accordance with ICEA S-87-640)", the change in attenuation shall not exceed 0.15 dB at 1550 nm for single-mode fiber and 0.30 dB at 1300 nm for multimode fiber.

When tested in accordance with FOTP-33, "*Fiber Optic Cable Tensile Loading and Bending Test*," using a maximum mandrel and sheave diameter of 560 mm, the cable shall withstand a rated tensile load of 2670N (601 lbf) and residual load of 30% of the rated installation load. The axial fiber strain shall be ≤ 60% of the fiber proof level after completion of 60 minute conditioning and while the cable is under the rated installation load. The axial fiber strain shall be ≤ 20% of the fiber proof level after completion of 10 minute conditioning and while the cable is under the residual load. The change in attenuation at residual load and after load removal shall not exceed 0.15 dB at 1550 nm for single mode fiber and 0.30 dB at 1300 nm for multimode fiber.

When tested in accordance with FOTP-85, "*Fiber Optic Cable Twist Test*," a length of cable no greater than 2 meters shall withstand 10 cycles of mechanical twisting. The change in attenuation shall not exceed 0.15 dB at 1550 nm for single-mode fiber and 0.30 dB at 1300 nm for multimode fiber.

When tested in accordance with FOTP-37, "*Low or High Temperature Bend Test for Fiber Optic Cable*," the cable shall withstand four full turns around a mandrel of ≤ 20 times the cable diameter after conditioning for four hours at test temperatures of -30°C and +60°C. Neither the inner or outer surfaces of the jacket shall exhibit visible cracks, splits, tears, or other openings. The change in attenuation shall not exceed 0.30 dB at 1550 nm for single mode fiber and 0.50 dB at 1300 nm for multimode fiber.

Quality Assurance Provision

All cabled optical fibers > 1000 meters in length shall be 100% attenuation tested. The attenuation of each fiber shall be provided with each cable reel. The cable manufacturer shall be TL 9000 registered.

Packaging

Top and bottom ends of the cable shall be available for testing. Both ends of the cable shall be sealed to prevent the ingress of moisture. Each reel shall have a weather resistant reel tag attached identifying the reel and cable. The reel tag shall include the following information:

- Cable Number
- Gross Weight
- Shipped Cable Length in Meters
- Job Order Number

- Product Number
- Customer Order Number
- Date Cable was Tested
- Manufacturer Order Number
- Cable Length Markings
  a: Top (inside end of cable)
  b: Bottom (outside end of cable)

The reel (one flange) marking shall include:

- Manufacturer
- Country of origin
- An arrow indicating proper direction of roll when handling
- Fork lift-handling illustration
- Handling Warnings.

Each cable shall be accompanied by a cable data sheet. The cable data sheet shall include the following information:

- Manufacturer Cable Number
- Manufacturer Product Number
- Manufacturer Factory Order Number
- Customer Name
- Customer Cable Number
- Customer Purchase Order Number
- Mark for Information
- Ordered Length
- Maximum Billable Length
- Actual Shipped Length
- Measured Attenuation of Each Fiber

The cable shall be capable of withstanding a minimum-bending radius of 20 times its outer diameter during installation and 10 times its outer diameter during operation without changing the characteristics of the optical fibers.

The cable shall meet all of specified requirements under the following conditions:

- Shipping/storage temperature: -58° F to +158° F (-50° C to +70° C)
- Installation temperature: -22° F to +158° F (-30° C to +70° C)
- Operating temperature: -40° F to +158° F (-40° C to +70° C)
- Relative humidity from 0% to 95%, non-condensing

Optical Patch Cords and Pigtails.
The optical patch cords and pigtails shall comply with the following:

- The optical patch cords shall consist of a section of single fiber, jacketed cable equipped with optical connectors at both ends.

- The factory installed connector furnished as part of the optical patch cords and pigtails shall meet or exceed the requirements for approved connectors specified herein.
- The fiber portion of each patch cord and pigtail shall be a single, jacketed fiber with optical properties identical to the optical cable furnished under this contract.
- The twelve fiber single-mode fiber optic cable shall be installed as a pigtail with factory installed ST compatible connectors.
- The patch cords shall comply with Telcordia GR-326-CORE

Connectors.
The optical connectors shall comply with the following:

- All connectors shall be factory installed ST compatible connectors. Field installed connectors shall not be allowed.
- Maximum attenuation 0.4dB, typical 0.2dB.
- No more than 0.2dB increase in attenuation after 1000 insertions.
- Attenuation of all connectors will be checked and recorded at the time of installation with an insertion test minimum 5 times checked with an OTDR.
- All fibers shall be connectorized at each end.
- All fibers shall terminate at a fiber patch panel
- Unused fibers will be protected with a plastic cap to eliminate dust and moisture.
- Termination shall be facilitated by splicing factory OEM pigtails on the end of the bare fiber utilizing the fusion splicing method. Pigtails shall be one meter in length.

CONSTRUCTION REQUIREMENTS

Experience Requirements.

Personnel involved in the installation, splicing and testing of the fiber optic cables shall meet the following requirements:

- A minimum of three (3) years experience in the installation of fiber optic cables, including fusion splicing, terminating and testing single mode fibers.

- Install two systems where fiber optic cables are outdoors in conduit and where the systems have been in continuous satisfactory operation for at least two years. The Contractor shall submit as proof, photographs or other supporting documents, and the names, addresses and telephone numbers of the operating personnel who can be contacted regarding the installed fiber optic systems.

- One fiber optic cable system (which may be one of the two in the preceding paragraph), which the Contractor can arrange for demonstration to the Department representatives and the Engineer.

Installers shall be familiar with the cable manufacturer's recommended procedures for installing the cable. This shall include knowledge of splicing procedures for the fusion splicer being used on this project and knowledge of all hardware such as breakout (furcation) kits and splice closures. The Contractor shall submit documented procedures to the Engineer for approval and to be used by Construction inspectors.

Personnel involved in testing shall have been trained by the manufacturer of the fiber optic cable test equipment to be used, in fiber optic cable testing procedures. Proof of this training shall be submitted to the Engineer for approval. In addition, the Contractor shall submit documentation of the testing procedures and a copy of the test equipment operation manual for approval by the Engineer.

Installation in Raceways.

Prior to installation, the Contractor shall provide a cable-pulling plan. The plan shall include the following information:

- Identify where each cable will enter the underground system and the direction each pull.
- Identify locations where the cable is pulled out of a handhole, coiled in a figure eight, and pulled back into the hand hole.
- The plan shall address the physical protection of the cable during installation and during periods of downtime.
- Identify the location of slack storage locations
- Identify the locations of splices.
- Identify distances between fiber access points and crossings.

The cable-pulling plan shall be provided to the Engineer for approval a minimum of 15 working days prior to the start of installation. The Engineer's approval shall be for the operation on the freeway and does not include an endorsement of the proposed procedures. The Contractor is responsible for the technical adequacy of the proposed procedures.

During cable pulling operations, the Contractor shall ensure that the minimum bending of the cable is maintained during the unreeling and pulling operations. Unless specified otherwise by the fiber optic cable manufacturer, the outside bend radius of the cable during installation shall be no less than 20 times the outside diameter of the fiber optic cable. Entry guide chutes shall be used to guide the cable into the handhole conduit ports. Lubricating compound shall be used to minimize friction. Corner rollers (wheels), if used, shall not have radii less than the minimum installation-bending radius of the cable. A series array of smaller wheels can be used for accomplishing the bend if the cable manufacturers specifically approve the array.

If figure-eight techniques are used during cable installation, the cable shall be handled manually and stored on the ground. The cable shall be placed on tarps to prevent damage from gravel, rocks, or other abrasive surfaces. Tarps should also be used in muddy conditions to keep the cable clean. Enough area to accommodate the cable length to be stored and sufficient personnel to maintain the required minimum-bending diameter as well as avoid kinking or otherwise damaging the cable shall be provided. If the cable has been figure-eighted in preparation for a forward feed, the figure-eight must be flipped over to access the outside cable end. Provide sufficient personnel to avoid kinking the cable as the figure-eight is flipped over. When removing the cable from the figure-eight, use care to avoid kinking the cable and violating the minimum-bending diameter.

Power assisted or figure-eight eliminator equipment, which is used to eliminate manual figure-eight procedures, shall not be used unless specifically allowed by the cable manufacturer in writing.

The pulling tension shall be continuously measured and shall not be allowed to exceed the maximum tension specified by the manufacturer of the cable. A dynamometer or in-line tensiometer shall be used to monitor tension in the pull-line near the winch. This device must be visible to the winch operator or used to control the winch. The pulling system shall have an audible alarm that sounds whenever a pre-selected tension level is reached. Tension levels shall be recorded continuously and shall be given to the engineer as well as included in the record drawing package.

The use of a breakaway link (swivel) may be used to ensure that the maximum tension of the cable is not exceeded. Breakaway links react to tension at the pulling eye and shall not be used in lieu of tension measuring devices. All pulling equipment and hardware which will contact the cable during installation must maintain the cable's minimum bend radius. Equipment including sheaves, capstans, bending shoes, and quadrant blocks shall be designed for use with fiber optic cable.

The cable shall be pulled into the conduit as a single component, absorbing the pulling force in all tension elements. The central strength member and Aramid yarn shall be attached directly to the pulling eye during cable pulling. "Basket grip" type attachments, which only attach to the cable's outer jacket, shall not be permitted. A breakaway swivel, rated at 95% of the cable manufacturer's approved maximum tensile loading, shall be used on all pulls. When simultaneously pulling fiber optic cable with other cables, separate grooved rollers shall be used for each cable.

To minimize the exposure of the backbone cable and to facilitate the longer lengths of fiber optic cable, the Contractor shall use a "blown cable" (pneumatically assisted) technique to place the fiber optic cable. A Compressed air cooler shall be used when ambient air temperatures reaches 90°F or more.

Where cable is to be pulled through existing conduit which contains existing cables, optical or other, the existing cables shall be removed and reinstalled with the fiber optic cable as indicated on the plans. The removal of the cable(s) shall be paid for separately. Reinstallation of the existing cables, if indicated on the plans, along with the fiber optic cable shall be included in this item for payment.

Armored fiber optic cables shall be grounded as shown on the plans.

Tracer Wire

Tracer wire shall be paid for separately and installed with all fiber optic cable runs as specified for Tracer Wire**.**

Aerial Fiber Optic Cable

Aerial fiber optic cable assemblies shall be of a self-supporting figure-8 design. The fiber optic cable shall be as described herein and shall be waterblocked utilizing water-swellable materials. The cable assembly shall be designed and manufactured to facilitate midspan access.

The submittal information must include a copy of the standard installation instructions for the proposed cable. Installed cable sag shall not exceed 1% of the span distance. The submittal information must also include catalog cuts for all hardware to be utilized in the installation.

Construction Documentation Requirements

Installation Practices for Outdoor Fiber Optic Cable Systems

The Contractor shall examine the proposed cable plant design. At least one month prior to starting installation of the fiber optic cable plant, the Contractor shall prepare and submit to the Engineer for review and approval, ten (10) copies of the Contractor's "Installation Practices for Outdoor Fiber Optic Cable Systems" manual. This manual shall address the Contractor's proposed practices covering all aspects of the fiber optic cable plant. This submittal shall include all proposed procedures, list of installation equipment, and splicing and test equipment. Test and quality control procedures shall be detailed as well as procedures for corrective action.

Operation and Maintenance Documentation

After the fiber optic cable plant has been installed, ten (10) complete sets of Operation and Maintenance Documentation shall be provided. The documentation shall, as a minimum, include the following:

- Complete and accurate as-built diagrams showing the entire fiber optic cable plant including locations of all splices.
- Final copies of all approved test procedures
- Complete performance data of the cable plant showing the losses at each splice location and each terminal connector.
- Complete parts list including names of vendors.

Testing Requirements

The Contractor shall submit detailed test procedures for approval by the Engineer as specified in the General Electrical Provisions.

Splicing Requirements

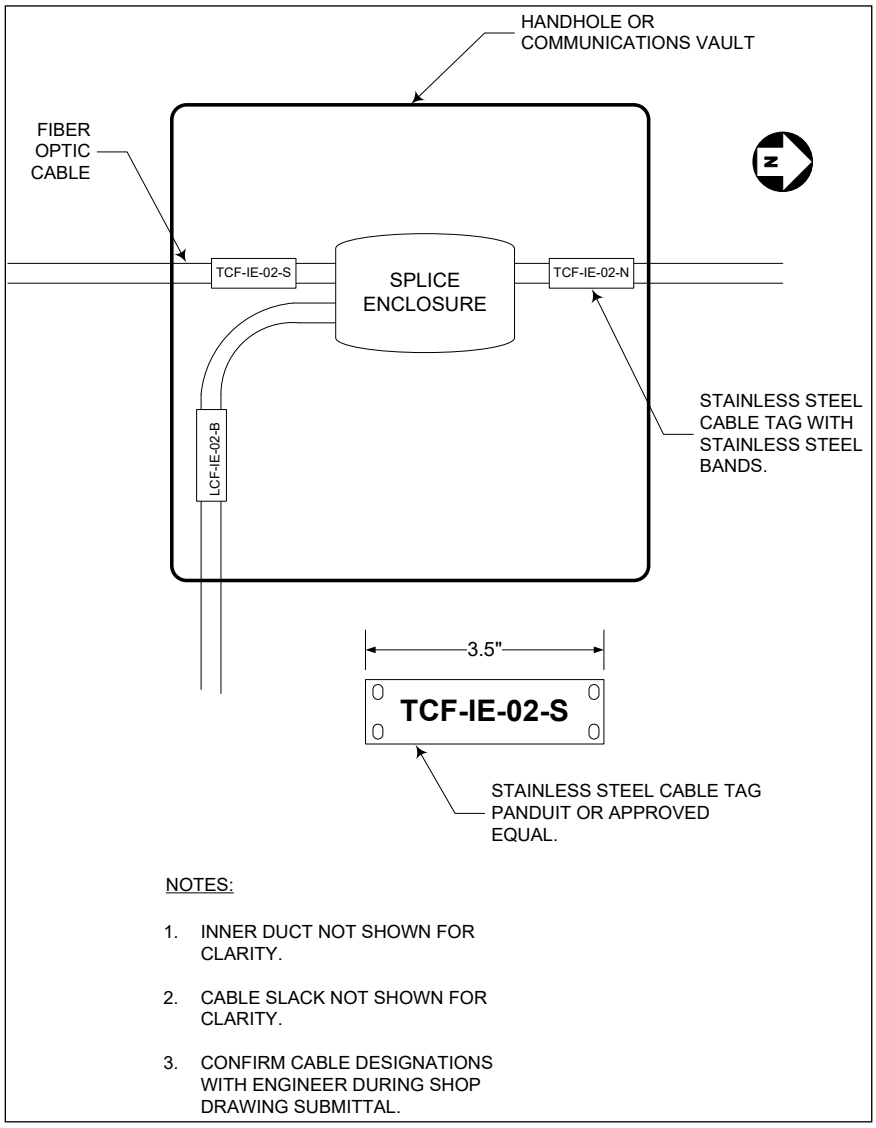
Splices shall be made at locations shown on the Plans. Any other splices shall be permitted only with the approval of the Engineer. Splices will be paid for separately. All splice locations must be identified in the Record Drawings. **Cable runs which dead-end at a handhole, communications vault, interconnect cabinet, or any other type of enclosure, shall be dead ended in a splice enclosure.**

Slack Storage of Fiber Optic Cables.

Included as a part of this item, slack fiber shall be supplied as necessary to allow splicing the fiber optic cables in a controlled environment, such as a splicing van or tent. After splicing has been completed, the slack fiber shall be stored underground in handholes or in the raised base adapters of ground mounted cabinets in accordance with the fiber optic cable manufacturer's guidelines.

Fiber optic cable slack shall be 100 feet for each cable at each splice location, above or below ground. Fiber optic cable slack shall be 50 feet for each cable at access points, above or below ground, where splicing is not involved. If the innerduct is cut, the ends of the innerduct should extend beyond the first vertical rack so they can be secured at that point. This slack shall be measured for payment.

Fiber optic cable shall be tagged inside handholes with yellow tape containing the text: "CAUTION - FIBER OPTIC CABLE." In addition, permanent tags, as approved by the engineer, shall be attached to all cable in a hand hole or other break-out environment. These tags shall be stainless steel, nominally 0.75” by 1.72”, and permanently embossed. These tags shall be attached with stainless steel straps, and shall identify the cable number, the number of fibers, and the specific fiber count. Tags and straps shall be Panduit or approved equal. See figure below:



Revised 2-22-2025

Label the destination of each trunk cable onto the cable in each handhole, vault or cable termination panel.

Method of Measurement Fiber optic cable will be measured for payment in feet in place installed and tested. Fiber optic cable will be measured horizontally and vertically between the changes in direction, including slack cable. The entire lengths of cables installed in buildings will be measured for payment

Basis of Payment This work will be paid for at the contract unit price per foot for **FIBER OPTIC CABLE** of the number of fibers, **SINGLE MODE;** or **FIBER OPTIC CABLE ARMORED** of the number of fibers, **SINGLE MODE** specified. Payment shall not be made until the cable is installed, spliced and tested in compliance with these special provisions.

ETHERNET SWITCH

Description
This Work shall consist of furnishing, installing, integrating, and testing an environmentally hardened Layer II Ethernet switch. Switch shall be a Cisco IE 3400-8TS2 (with IE 3300-8S expansion module) or approved equivalent. Contractor shall provide Ethernet switches with all necessary hardware and software to make the switches operational and be compatible with IDOT's existing network. Contractor shall be responsible for programming and integrating all new switches in coordination with the Department to have the new switches integrated into the existing network.

Materials

Layer II (Datalink) Switch

(E) Management Capabilities
- (1) Switches shall support full-duplex Ethernet
- (2) Switches shall be capable Layer 2 LAN Base services
- (3) Switches shall have American Standard Code for Information Interchange (ASCII) based configuration files for offline editing and bulk configuration
- (4) Switches shall be managed using Simple Network Management Protocol (SNMP) Version 3.
- (5) Switches must be able to use Secure File Transfer Protocol (SFTP) to transfer configuration file to and from a central server.
- (6) Switches shall be compliant with IEEE 802.1 and 802.3. Specifically, the switch must comply with the following IEEE 802.1 standards:
  - (a) IEEE 802.1D - Media Access Control (MAC) Bridges, including Rapid Spanning Tree Protocol (RSTP).
  - (b) IEEE 802.1Q - Virtual Local Area Network (VLAN) tagging and Multiple Spanning Tree Protocol (MSTP).
  - (c) IEEE 802.1X (Port Based Network Access Protocol).
- (7) Switches shall perform multicast filtering using Internet Group Management Protocol (IGMP) snooping.
- (8) Switches shall support Address Resolution Protocol (ARP)

(9) Switches shall support the following Layer 3 capabilities:
  (a) Internet Protocol Version 4 (IPv4);
  (b) Internet Protocol Version 6 (IPv6);
  (c) Open Shortest Path First (OSPF);
  (d) Generic Routing Encapsulation (GRE);
  (e) Inter-VLAN Internet Protocol (IP) routing for full Layer 3 routing between two or more VLANs;
  (f) Virtual Router Redundancy Protocol (VRRP);
  (g) IP multicast routing utilizing Protocol Independent Multicast (PIM) and Internet Group Management Protocol, Version 2 (IGMPv2). Support for PIM sparse mode (PIM-SM) and PIM dense mode (PIM-DM);
  (h) Quality of Service (QoS);
  (i) Security utilizing Access Control Lists (ACLs).

(F) Power Requirements
  (1) Input Voltage to Power Supply Modules: 100 to 240 VAC
  (2) Output Voltage from Power Supply Modules: 24 to 54 VDC

(G) Environmental Requirements
  (1) Operating Temperature: -40° to +75°C
  (2) Humidity: 10 to 95% (non-condensing)
  (3) Resistant to electromagnetic interference (EMI)

(H) Network Port Requirements
  (1) Switches shall have the following minimum port configurations:
    (a) Base Module
      i. (8) 10/100/1000 Mbps copper Ethernet ports, RJ-45 connector
      ii. (2) 100/1000 Mbps SFP ports with SM transceivers, LC connector
    (b) Expansion Module
      i. (8) 100/1000 Mbps SFP ports (with SM transceivers as required per Drawings, LC Connector)
  (2) Contractor shall ensure the launch power of the optical ports is great enough such that when coupled with the receiver sensitivity of the connecting device, the optical budget of the link is not exceeded. The transceivers shall be capable of 1 Gbps transmission rates. Each switch shall be furnished with (2) GLC-LX-SM-RGD (or approved equivalent) SFP transceivers.
  (3) All ports shall have Diagnostic light-emitting diodes (LED). These indicators shall include link, activity, and power LEDs.

Construction Requirements

Installation. Contractor shall locate shelf space or other suitable mounting location in the building or cabinet or as identified in the Drawings. Contractor shall secure the Ethernet switch as appropriate and approved by the Engineer.

Contractor shall install all necessary patch cords, optical transceivers, connectors, power supplies, communication transformers, or auxiliary equipment necessary to complete the communication circuits. Contractor shall connect the switch to the field devices as indicated in the Drawings.

Configuration. When requested by the Contractor, the Engineer will provide the necessary IP address assignments and port assignments, including the necessary port provisioning. The Contractor shall be responsible for all network programming of the switches and communicating elements within the building or cabinet.

Contractor shall configure switch ports for VLANS as shown in the Drawings or directed by the Engineer. Contractor shall configure trunking ports between switches and access ports between switches and equipment. VLAN Trunk Protocol (VTP) shall be set to transparent mode on all switches. Port Security shall be configured to only allow the MAC addresses of equipment connected to the switch to pass traffic. RSTP shall be configured to prevent bridging loops and provide redundant paths.

On Layer 3 switches, Contractor shall configure gateway IP addresses for all subnets that connect to the switch. OSPF routing shall be configured and the routes to those subnets being advertised to adjacent switches confirmed. Contractor shall configure ACLs and work with the Department to determine IP Ranges, ports, and other settings to be used in configuring the ACLs

The Department may elect to have its Network Administrator configure the node switches. In the event that the Department makes this election, the Contractor shall deliver all switches to the Department for configuration prior to installation. The Contractor shall request a meeting with the Departments Network Administrator within 2 weeks from Notice to Proceed to determine the Department's preferred approach to switch configuration.

Method of Measurement
This Work will be measured for payment by each LAYER II (DATALINK) SWITCH installed, configured and tested.

Basis of Payment
This Work will be paid for at the Contract unit price each for LAYER II (DATALINK) SWITCH.

CLOSED CIRCUIT TELEVISION CABINET

Description
This work shall consist of furnishing, installing, and testing a pole mounted CCTV equipment cabinet.

Materials

The Cabinet, Model 336 shall meet the Caltrans Transportation Electrical Equipment Specifications (TEES) for the components applied in the project. The cabinet shall be a durable, weatherproof enclosure constructed of 3/16 in. (4.75mm) thick aluminum or 1/8 inch (3.175 mm) thick aluminum lined with bullet resistant fiberglass panels that shall be UL listed and tested for UL752 Level 3 with a nominal thickness of ½ inch (12.7mm) maximum, and a nominal weight of 5.0 lbs. per square foot (24.5 kg per square meter) maximum. The cabinet shall be sized to adequately house all required components with extra space for arrangement and termination of wiring. The minimum size of the cabinet shall have a nominal outside dimension of 46 inches height x 24 inches wide X 24 inches deep. Cabinet, Model 336 shall consist of the following components: double door each equipped with a Corbin # 2 Brass lock or equal for front and rear

cabinet entry, housing, manufacturer recommended mounting hardware for pole-mount application, mounting cage, power distribution assembly/service panel (including RFI filter surge suppression, outlets, circuit breakers, terminal blocks, and neutral and ground bus bars), thermostatically controlled fan, door switch, LED light, fiber optic patch panel, power data unit, and all necessary mounting hardware and wiring, and other equipment, as shown on the Plans and specified in these special provisions.

All bolts, nuts, washers, screws, hinges, and hinge pins shall be stainless steel unless otherwise specified. All equipment under this item shall be in accordance with Section 1074.03 of the Standard Specifications except as modified herein.

Power Data Unit.
The power data unit shall be installed in the cabinet and allow the CCTV camera PoE and network switch power supply to be remotely rebooted. The power distribution assembly shall meet the minimum requirements:

6) Minimum of eight individually switched 120V, 15-amp outlet circuits
7) Ethernet Interface: 10/100 autosensing, static IP, TCP port selectable, RJ-45 w/internal FCC filtering
8) Operating Temperature: -30□F to 170□F
9) Power Dissipation: 3.9W Typ Max (all on) <3W idle
10) Power Fail Hold-Over: 350ms minimum (all relays on)

Fiber Patch Panel.
A fiber patch panel shall be provided and installed within the cabinet. The fiber patch panel shall be paid for separately as FIBER OPTIC INTERCONNECT TERMINATION PANEL, 12F OR 24F.

Ground and Neutral Bus Bars. Separate ground and neutral bus bars, mounted on the equipment panel shall be provided. The neutral bus bar shall be isolated from the cabinet and equipment ground. Compression lugs, plus 2 spare lugs, shall be sized to accommodate the cables with the heads of the connector screws painted green for ground connections and white for neutral connections.

Construction Requirements

Installation. The cabinet shall be installed on a CCTV Camera pole at 180 degrees from the camera arm orientation as shown on the plans. The front door side of the cabinet shall be positioned at 90 degrees from the pole handhole; the back door side of the cabinet shall be positioned at 120 degrees from the pole letters and numerals labeling. The Contractor shall confirm the orientation of the Cabinet Model 336 installation and its front door side with the Engineer prior to installation. Stainless steel bolted connections shall be provided with lock-washers, locking nuts, or other approved means to prevent the connection nuts from backing off. Dissimilar materials shall be isolated from one another by stainless steel fittings.

All conduit entrances into the cabinet installation shall be sealed with a pliable waterproof material.

The Contractor shall make all power connections to the cabinet in accordance with the Plans and as required. The neutral bus shall be isolated from the cabinet and equipment ground. It shall terminate at the neutral lug ultimately attached to the meter pedestal. All conductors used in cabinet wiring shall terminate with properly sized non-insulated (if used, for DC logic only) or clear

insulated spring-spade type terminals except when soldered to a through-panel solder lug on the rear side of the terminal block or as specified otherwise. All conductors, except those which can be readily traced, shall be labeled. Labels attached to each end of the conductor shall identify the destination of the other end of the conductor. Cabling shall be routed to prevent conductors from being in contact with metal edges. Cabling shall be arranged so that any removable assembly may be removed without disturbing conductors not associated with that assembly.

All equipment in the cabinet shall be clearly and permanently labeled using marker strips. The marker strips shall be made of material that can be easily and legibly written on using a pencil or ballpoint pen. Marker strips shall be located immediately below the item that they are to identify and must be clearly visible with the items installed.

Testing. Cabinet Acceptance Test – in addition to the environmental and design approval tests specified in the FHWA Type 170 Traffic Signal control System Hardware Specification, the following water spray test shall be performed for each type of cabinet:

> Spray water from a point directly overhead at an angle of 60º from the vertical axis of the cabinet. Repeat for each of eight equally spaced positions around the cabinet for a period of five minutes in each position. The water shall be sprayed using a domestic type sprinkling nozzle at a rate of not less than 10 gal./min (40 liters/min) per square foot (0.1 meters) of surface area. The cabinet shall then be inspected for leakage. Evidence of water leakage shall be cause for rejection.

Operational Standalone Test: The operational standalone test for each cabinet installed shall consist of the following:

- Visual inspection of the cabinet and its contents for workmanship
- Verification of the cabinet grounding in accordance with Article 801.04 and Article 806.
- Measurement of the voltage at the input panel

Documentation. Shop drawings and wiring lists/diagrams showing the proposed layout of the cabinet shall be submitted to the Engineer for approval prior to the start of fabrication. Wiring lists for the internal manufacturer cut sheets for all electrical equipment included in each type of cabinet shall be included in the submission.

Four copies of drawings showing the wiring for each cabinet shall be provided. One copy shall be placed in the clear plastic envelope furnished as part of the cabinet. The other three copies shall be delivered to the Engineer.

For each cabinet, four copies of a configuration of the equipment reporting to that cabinet shall be provided. The sheet shall also list field settable options for the equipment contained in the cabinet. This shall include device addresses and output voltage settings for power supplies. One of these copies shall be placed in the clear plastic envelope furnished as part of the cabinet. The other three copies shall be delivered to the Engineer.

Warranty. The Contractor shall warranty all materials and workmanship including labor for a period of two years after the completion and acceptance of the installation, unless other warranty requirements prevail. The warranty period shall begin when the contractor completes all

construction obligations related to this item and when the components for this item have been accepted, which shall be documented as the final completion date in the construction status report. The warranty shall warrant and guarantee repair of the component parts of the cabinet furnished by the Contractor that prove to be defective in workmanship and materials during the first two years of operation as defined and noted above at no additional cost to the Department.

The Engineer will notify the Contractor that a warranted item needs repair. The Contractor shall acknowledge the notification within 24 hours and replace or correct any part or parts of materials and equipment that are found defective within the two-year in-service warranty period. All items needing repair shall be returned to the Department in two weeks from the date of receipt at the Contractor's facility or replaced in-kind by the Contractor, and the Contractor shall be responsible for any return shipping costs. No compensation will be made to the Contractor for such replacements or corrections.

The Contractor shall provide a warranty certificate for this item and its related components to the Department. The Department reserves the right to transfer this service to other parties who may be contracted with in order to provide overall maintenance of this item.

Method of Measurement
This work will be measured for payment per each CLOSED CIRCUIT TELEVISION CABINET furnished, installed and tested.

Basis of Payment
This work will be paid for at the contract unit price each for CLOSED CIRCUIT TELEVISION cabinet, which price shall be payment in full for furnishing and installing the cabinet and all connections, testing, labor, tools, equipment, transportation, and incidentals necessary to complete this item of work.

DMS SIGN CONTROL EQUIPMENT

Description
This work shall consist of furnishing and installing equipment for the control and power distribution of DMS signs. This work includes circuit breakers, disconnect switches, transformers, junction boxes, sign controllers, ethernet switches, cellular modems, fiber patch panels, conduit and wiring attached to the DMS structure and other miscellaneous components necessary to control the sign.

Materials

General
The DMS control and power distribution equipment shall be mounted in a cabinet provided and paid for separately. The installation and mounting of the DMS sign and its associated equipment shall be fully coordinated with the cabinet. The equipment shall be securely mounted on a mounting back panel or on a corrosion resistant DIN rail if equipment is configured as such.

Power Distribution

(1) A NEMA 4X stainless steel non-fused disconnect shall be furnished and installed on the DMS Controller Cabinet as shown in the Plans. Disconnect shall be service entrance rated, minimum size 100 amps, 600 volt rated.
(2) For 480 volt electrical service, a single phase step down transformer shall be furnished and installed as shown on the Plans. Transformer shall conform to Article 1068.02.

Over-voltage Protection
Over-voltage protection shall be provided on the power conductors. The specific protection is based on the elements being protected

Incoming Power Protection
The incoming power shall be protected with a filtering surge protector that absorbs power line noise and switching transients. The specified performance shall be as follows:

Peak current	20 kA (8x20 µs waveshape)
Life Test	5% change
Clamp voltage	280 V typical @ 20 kA
Response time	≤5 ns
Continuous service current	10 amps max. 120 VAC/60 Hz
Operating Temperature	-40ºC to +75ºC (minimum)
Nominal dimensions	7.15 inches by 3.13 inches by 2.3 inches

Control Cabling
Manufacturer specified control cables shall be furnished by the Contractor. Fiber optic control cables shall be terminated on patch panels supplied by the Contractor. Patch cables shall be supplied with connector types as specified by the DMS Manufacturer.

Cabinet
The DMS controller cabinet shall meet the requirements specified for the CABINET, MODEL 334 and shall be paid for separately under that pay item.

Ethernet Switch
The ethernet switch shall meet the requirements specified for the LAYER II (DATALINK) SWITCH and shall be paid for separately under that pay item.

DMS Sign Controller
The DMS sign controller shall meet the requirements specified for the DYNAMIC MESSAGE SIGN, FULL MATRIX, COLOR, NTCIP 1203 and shall be paid for separately under that pay item.

CONTROLLER CABINET TYPE III

Description

This item shall consist of furnishing and installing Type-3 ground-mounted cabinets of the size specified in place including anchor bolts, bases, cable harnesses, ground rods, terminal boards, shelves, mounting hardware, and all miscellaneous items at locations as directed by the Engineer.

Materials

Cabinets shall be of fabricated aluminum supplied in the sizes with minimum inside dimensions as listed below.

Type	Height	Width	Depth	Thickness	Opening
E.S.P. 3	49.5 In	30 In	17 In	.185 In	38 In X 27.5 In

A heavy-duty gasket shall be installed around the cabinet door opening to provide a weather tight seal for the protection of the enclosed equipment.

The Type-3 ground mounted cabinet shall be caulked along the entire perimeter of the base with a waterproof, non hardening compound prior to setting the cabinet on the foundation to ensure a water, dust and insect-proof seal.

The cabinet shall be provided with a screened vent under the roof overhang, but a thermostatically controlled fan is not required. No louvers or filtered air intake in the door shall be required.

The cabinet exterior surface shall be smooth, free of marks and scratches and provide an unpainted brushed aluminum finish.

The cabinet door shall be capable of being opened to various angles by a stop and catch mechanism.

The cabinet door shall be equipped with Type-2 Corbin brass locks.

The cabinet shall not be equipped with a police door.

The cabinet shall have two (2) shelves for setting counter/classifiers and other equipment. The shelves' vertical position shall be adjustable.

Materials shall conform to applicable portions of controller cabinets as listed in the Standard Specifications Section 1074.03

Construction Requirements

Installation. Installation shall conform to applicable portions of Section 863 of the Standard Specifications.
The detector loop leads shall be equipped with lightning protection. Any lightning protection for the axle sensors shall be as recommended by the manufacturer. Lightning arrestors for the detector loop leads shall be EDCO SRA6LCBLL, manufactured by EDCO Inc. of Belleview, FL. or equivalent. The type of high quality lightning arrestors for the axle sensor lead-in shall be as recommended by the equipment manufacturers. The terminal board wiring and all other wiring

and connections shall be as indicated in the wiring diagram. Open-end spade connectors shall be used and shall be of sufficient length to allow moving the I.R.D. Automatic Traffic Recorder or equal counter/classifier at least 2 feet outside the cabinet door opening without disconnecting any cables.

No holes shall be drilled through the cabinet exterior for internal equipment mounting.

Each wire entering a cabinet shall be trained in a workmanlike manner and lugged at each terminal strip. If more than one wire has a common terminal on a terminal strip, the adjacent strip shall be used and an appropriate jumped connection shall be made.

All cables and wiring entering a cabinet shall be dressed, harnessed, tied, laced, and clamped to produce a workmanlike wiring installation.

All cables, loop wires, power, shall be labeled with a Panduit type cable tag. The tag will identify the type of cable and the cable destination.

A copper grounding bus shall be mounted on the rear wall of the cabinets connecting all components to earth ground. Each cabinet shall contain a wiring diagram of the installation in addition to the diagrams which are to be submitted to the Engineer.

The cabinet shall be wired in accordance with the plans provided. Any deviation from the plans shall be submitted and approved in advance.

The Contractor shall furnish three (3) diagrams of the internal and external connections of the equipment in each cabinet. He shall also furnish the operating and maintenance instructions for all equipment supplied. One copy of the wiring diagrams for each cabinet shall be retained in each field cabinet. Wiring diagram shall be contained in a plastic pouch that shall be permanently mounted to the door of each cabinet. Contractor shall permanently mark the cabinet for each terminal connection as to function and destination.

Incidental to the cost of each cabinet, the Contractor shall construct a 5 inch PCC sidewalk of a rectangular area 3 feet by 4 feet immediately adjacent to the cabinet foundation on the same side of the foundation as the cabinet door, with the 4 foot dimension of the rectangle parallel to the cabinet door when closed. If the width of the required cabinet foundation is greater than the 3 foot width of the standard Type D concrete foundation, the 4 foot dimension of the sidewalk area shall be increased to equal the width of the foundation plus 1 foot , the area to extend 6 inches beyond each side of the foundation. This paragraph shall be applicable at all cabinet locations included in this Section. The only situations where this paragraph shall not apply are as follows: When the foundation is immediately adjacent to or within a paved sidewalk or shoulder area and no further surfacing is required. The Engineer shall be the sole judge as to the applicability of this paragraph in all questions arising there from.
No conduit shall be allowed to enter cabinet through the sides, top or back walls.

Terminal blocks provided in field cabinets shall be the heavy duty barrier type. The terminal block shall be a minimum of 2 inch wide and 1.2 inch deep. Center to center of the terminal screws or studs shall be a minimum of 0.63 inch with barriers in-between. Terminal blocks shall be rated at 45 amps 600 volts breakdown RMS line to line 11,000 V. and breakdown RMS line to ground 13,800 V. A marking strip shall be provided with each terminal block.

Method of Measurement

Each cabinet installed complete and in place on a Type D concrete foundation will be counted as a single unit.

Basis of Payment

This work will be paid for at the contract unit price each for CONTROLLER CABINET TYPE-III which price shall be paid in full for furnishing, wiring and installing the new cabinet, anchor bolts and terminal facilities complete.

STORMWATER POLLUTION PREVENTION PLAN

Illinois Department of Transportation

Storm Water Pollution Prevention Plan

Route	Marked Route	Section Number
FAI 94	I-94 (Bishop Ford Expwy)	(42-B-11-1) BR, BJR 24
Project Number	**County**	**Contract Number**
NHPP-2B1H(072)	Cook	62W87

This plan has been prepared to comply with the provisions of the National Pollutant Discharge Elimination System (NPDES) Permit No. ILR10 (Permit ILR10), issued by the Illinois Environmental Protection Agency (IEPA) for storm water discharges from construction site activities.

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Permittee Signature & Date

SWPPP Notes

Preparing BDE 2342 (Storm Water Pollution Prevent Plan)

Guidance on preparing each section of BDE 2342 (Storm Water Pollution Prevention Plan) is found in Chapter 41 of the IDOT Bureau of Design and Environment (BDE) Manual, please consult this chapter during SWPPP preparation Please note that the Illinois Environmental Protection Agency (IEPA) has 30 days to review the Notice of Intent (NOI) prior to project approval and any deficiencies can result in construction delays.

The Notice of Intent contains the following documents:

- BDE 2342 (Storm Water Pollution Prevention Plan)
- BDE 2342 A (Contractor Certification Statement)
- Erosion and Sediment Control Plan (See Section 63-4.09 of the BDE Manual)

Non-applicable information
If any section of the SWPPP is not applicable put "N/A" in box rather than leaving blank.

National Pollutant Discharge Elimination System (NPDES) Compliance

Description of Work: This work shall consist of those efforts necessary for compliance with the requirements of the Clean Water Act, Section 402 (NPDES), and the Illinois Environment Protection Act. This provision also provides the background information needed to comply with ILR10 and ILR40 permits for this project.

NPDES COMPLIANCE REQUIREMENTS

Part I: Site Description

1. Describe the project location; include latitude and longitude, section, town, and range.

The project is located in the Cities of Chicago and Calumet City, and the Villages of Burnham, Dolton, Riverdale and South Holland, Cook County, along I-94 (Bishop Ford Expwy) from the West Martin Luther King Drive to South of US 6 (159th St).

Interstate 94 is under the jurisdiction of the Illinois Department of Transportation (IDOT). The project location is at Latitude 41.660 N, Longitude 87.588 W, in Section 16, T36N, R14E)

2. Describe the nature of the construction activity or demolition work.

This project consists of Standard Overlay, Resurfacing (Int-2nd), Sign Board System, pavement patching, bridge deck scarification and overlay, bridge deck repairs and joint reconstruction, parapet repairs, substructure repairs, bridge drainage system repairs, adjusting bridge scuppers, structural steel repairs, PPC I-Beam Repairs, FRP Strengthening of PPC I-Beams, slopewall repairs, approach slab repairs, bridge superstructure replacement (US 6 over I-94), storm sewers, US 6 WB to I-94 NB Ramp Reconstruction, Overhead Sign Structure relocation, ITS, lighting, and all incidental and collateral work necessary to complete the project as shown in the plans and as described herein. Traffic will be maintained using staging and detours.

Drainage work include installation of new storm structures and pipes and ditch grading as shown on plans.

Erosion and sediment control measures include seeding, mulch, erosion blanket, inlet and pipe protection, perimeter erosion barrier, ditch checks and wetland protection signage. See contract plans for location of erosion control devices.

3. Describe the intended sequence of major activities which disturb soils for major portions of the site (e.g. clearing, grubbing, excavation, grading, on-site or off-site stockpiling of soils, on-site or off-site storage of materials).

See attachment I.3

4. The total area of the construction site is estimated to be 71 acres.

5. The total area of the site estimated to be disturbed by excavation, grading or other activities is 3.0 acres.

6. Determine an estimate of the runoff coefficient of the site after construction activities are completed.

C before =0.9, C after=0.9

7. Provide the existing data describing the quality of the soil of any discharge from the site.

The design, installation, and maintenance of BMPs within the project limits are within an area where annual erosivity (R value) is less than or equal to 158. A rainfall erosivity factor of 5.0 or greater has been calculated for the project site period of construction and thus does NOT qualify for a waiver from NPDES permitting requirements and must seek Construction General Permit (CGP) coverage.

8. Erosion and Sediment Control Plan (Graphic Plan) is included in the contract. ☒ Yes ☐ No

9. List all soils found within project boundaries; include map until name, slope information, and erosivity.

See list of soils attached.

10. List of all MS4 permittees in the area of this project

Cook County

Note: For sites discharging to an MS4, a separate map identifying the location of the construction site and the location where the MS4 discharges to surface water must be included.

Part II: Waters of the US

1. List the nearest named receiving water(s) and ultimate receiving waters.

Little Calumet River North. Ultimate receiving water body: Lake Michigan.

2. Are wetlands present in the project area? ☒ Yes ☐ No

If yes, describe the areal extent of the wetland acreage at the site.

There is an excess of 30 acres of wetlands within the project limits. Wetlands will not be disturbed and no impacts will result from any of the project activities. Temporary Fence and Signage indicating wetland protection will be used.The perimeter of the construction limits are being protected with silt fence to prevent sediment from leaving the project site.

3. Natural buffers:

For any storm water discharges from construction activities within 50 feet of a Waters of the United States, except for activities for water-dependent structures authorized by a Section 404 permit, the following shall apply:

(i) A 50-foot undisturbed natural buffer between the construction activity and the Waters of the United States has been provided

☐ Yes ☒ No; and/or

(ii) Additional erosion and sediment controls within that area has been provided

☒ Yes ☐ No; and Describe: Temporary Fence and Signage are used for wetland protection.

Part III. Water Quality

1. Water Quality Standards

As determined by the Illinois Pollution Control Board, Illinois waters have defined numeric limits of pollutants under the umbrella term "Water Quality Standards." In the following table are commonly used chemicals/practices used on a construction site. These chemicals if spilled into a waterway, could potentially contribute to a violation of a Water Quality Standard. If other chemicals that could contribute a violation of a Water Quality Standard, add as needed.

- ☒ Fertilizer (check as appropriate)
  - ☒ Nitrogen
  - ☒ Phosphorus, and/or
  - ☒ Potassium
- ☐ Herbicide
- ☒ Petroleum (gas, diesel, oil, kerosene, hydraulic oil / fluids)
- ☒ Waste water for concrete washout station
- ☐ Coal tar Pitch Emulsion
- ☐ Other (Specify) _____
- ☐ Other (Specify) _____

Table 1: Common chemicals/potential pollutants used during construction

If no boxes are checked in Table 1 above, check the following box:

☐ There are no chemicals on site that will exceed a Water Quality Standards if spilled.

If any boxes are checked in Table 1 above, check the following box:

☒ There are chemicals on site that if spilled could potentially cause an exceedance of a Water Quality Standard. The Department shall implement Pollution Prevention/Good Housekeeping Practices as described in the Department's ILR40 Discharge for Small Municipal Separate Storm Sewer Systems (MS4) reiterated below and Part VIII. Unexpected Regulated Substances/Chemical Spill Procedures:

Pollution Prevention:

The Department will design, and the contractor shall, install, implement, and maintain effective pollution prevention measures to minimize the discharge of pollutants from construction activities. At a minimum, such measures must be designed, installed, implemented and maintained to:

(a) Minimize the discharge of pollutants from equipment and vehicle washing, wheel wash water, and other wash waters. Wash waters must be treated in a sediment basin or alternative control that provides equivalent or better treatment prior to discharge.

(b) Minimize the exposure of building materials, building products, construction wastes, trash, landscape materials, fertilizers, pesticides, herbicides, chemical storage tanks, deicing material storage facilities and temporary stockpiles, detergents, sanitary waste, and other materials present on the site exposed to precipitation and to storm water.

(c) Minimize the discharge of pollutants from spills, leaks and vehicle and equipment maintenance and repair activities and implement chemical spill and leak prevention and response procedures;

(d) Minimize the exposure of fuel, oil, hydraulic fluids, other petroleum products, and other chemicals by storing in covered areas or containment areas. Any chemical container with a storage of 55 gallons or more must be stored a minimum of 50 feet from receiving waters, constructed or natural site drainage features, and storm drain inlets. If infeasible due to site constraints, store containers as far away as the site permits and document in your SWPPP the specific reasons why the 50-foot setback is infeasible and how the containers will be stored.

(e) The contractor is to provide regular inspection of their construction activities and Best Management Practices (BMPs). Based on inspection findings, the contractor shall determine if repair, replacement, or maintenance measures are necessary in order to ensure the structural integrity, proper function, and treatment effectiveness of structural storm water BMPs. Necessary maintenance shall be completed as soon as conditions allow to prevent or reduce the discharge of pollutants to storm water or as ordered by the Engineer. The Engineer shall conduct inspections required in Section XI Inspections, and report to the contractor deficiencies noted. These Department conducted inspections do not relieve the contractor from their responsibility to inspect their operations and perform timely maintenance; and

(f) In addition, all IDOT projects are screened for Regulated Substances as described in Section 27-3 of the BDE Manual and implemented via Section 669: Removal and Disposal of Regulated substances in the Standard Specifications for Road and Bridge Construction.

Approved alterations to the Department's provided SWPPP, including those necessary to protect Contractor Borrow, Use and Waste areas, shall be designed, installed, implemented and maintained by the Contractor in accordance with IDOT Standard Specifications Section 280.

2. 303(d) Impaired Waterways

Does the project area have any 303(d) impaired waterways with the following impairments?

- suspended solids
- turbidity, and or
- siltation

☒ Yes ☐ No

If yes, list the name(s) of the listed water body and the impairment(s)

303(d) waterbody	Impairments(s)
Little Calumet River	Fish consumption at Little Calumet River is being impaired by phosphorus, mercury and polychlorinated biphenyls.

In addition, It is paramount that the project does not increase the level of the impairment(s) described above. Discuss which BMPs will be implemented to reduce the risk of impairment increase

3. Total Maximum Daily Load (TMDL)

Does the project include any receiving waters with a TMDL for sediment, total suspended solids, turbidity or siltation? ☐ Yes ☐ No

If yes, List TMDL waterbodies below and describe associated TMDL

TMDL waterbody	TMDL
TMDL waterbody	TMDL
TMDL waterbody	TMDL
TMDL waterbody	TMDL
TMDL waterbody	TMDL
TMDL waterbody	TMDL
TMDL waterbody	TMDL
TMDL waterbody	TMDL
TMDL waterbody	TMDL
TMDL waterbody	TMDL
TMDL waterbody	TMDL
TMDL waterbody	TMDL
NA	NA
NA	NA
NA	NA

Provide a description of the erosion and sediment control strategy that will be incorporated into the site design that is consistent with the assumptions and requirements of the TMDL

NA

If a specific numeric waste load allocation has been established that would apply to the project's discharges, provide a description of the necessary steps to meet that allocation

NA

Part IV. Temporary Erosion and Sediment Controls

Stabilization efforts must be initiated within 1 working day of cessation of construction activity and completed within 14 days. Areas must be stabilized if they will not be disturbed for at least 14 calendar days. Exceptions to this time frame include:

(i) Where the initiation of stabilization measures is precluded by snow cover, stabilization measures must be initiated as soon as practicable,

(ii) On areas where construction activities have temporarily ceased and will resume after 14 days, a temporary stabilization method can be used (temporary stabilization techniques must be described), and

(iii) Stabilization is not required for exit points at linear utility construction site that are used only episodically and for very short durations over the life of the project, provided other exit point controls are implemented to minimize sediment track-out.

Additionally, a record must be kept with the SWPPP throughout construction of the dates when major grading activities occur, when construction activities temporarily or permanently cease on a portion of the site, and when stabilization measures are initiated.

At a minimum, controls must be coordinated, installed and maintained to:

1. Minimize the amount of soil exposed during construction activity.
2. Minimize the disturbance of steep slopes.
3. Maintain natural buffers around surface waters, direct storm water to vegetated areas to increase sediment removal and maximize storm water infiltration, unless infeasible.
4. Minimize soil compaction and, unless infeasible, preserve topsoil.

Note: For practices below, consult relevant design criteria in Chapter 41 of the BDE Manual and maintenance criteria in Erosion and Sediment Control Field Guide for Construction.

1. Erosion Control:

The following are erosion control practices which may be used on a project (place a check by each practice that will be utilized on the project, add additional practices as needed):

- [x] Mulch
- [x] Erosion Control Blanket
- [ ] Turf Reinforcement Mat
- [ ] Sodding
- [ ] Geotextile fabric
- [ ] Preservation of existing vegetation
- [ ] Temporary Turf Cover Mixture (Class 7)
- [x] Permanent seeding (Class 1-6)
- [ ] Other (Specify) _____
- [ ] Other (Specify) _____
- [ ] Other (Specify) _____

2. Sediment Control:

The following sediment control devices will be implemented on this project:

- [x] Ditch Checks
- [x] Inlet and Pipe protection
- [ ] Hay or Straw bales
- [ ] Above grade inlet filters (fitted)
- [ ] Above grade inlet filters (non-fitted)
- [x] Inlet filters
- [x] Perimeter Erosion Barrier
- [ ] Rolled Excelsior
- [ ] Silt Filter Fence
- [ ] Urethane foam/geotextiles
- [ ] Other (Specify) _____
- [ ] Other (Specify) _____
- [ ] Other (Specify) _____

3. Structural Practices:

Provide below is a description of structural practices that will be implemented:

- [ ] Aggregate Ditch
- [ ] Articulated Block Revetment Mat
- [ ] Barrier (Permanent)
- [ ] Concrete Revetment Mats
- [ ] Dewatering Filtering
- [ ] Gabions
- [ ] In-Stream or Wetland Work
- [ ] Level Spreaders
- [ ] Paved Ditch
- [ ] Permanent Check Dams
- [ ] Precast Block Revetment Mat
- [ ] Rock Outlet Protection
- [x] Stabilized Construction Exits
- [x] Stabilized Trench Flow
- [ ] Sediment Basin
- [ ] Retaining Walls
- [ ] Riprap
- [x] Strom Drain Inlet Protection
- [ ] Slope Walls
- [ ] Sediment Trap
- [ ] Other (Specify) _____
- [ ] Other (Specify) _____
- [ ] Other (Specify) _____
- [ ] Other (Specify) _____

4. Polymer Flocculants

Design guidance for polymer flocculants is available in Chapter 41 of the BDE Manual. In addition, Polymer Flocculants may only be used by district Special Provision.

If polymer flocculants are used for this project, the following must be adhered to and described below:

- Identify the use of all polymer flocculants at the site.
- Dosage of treatment chemicals shall be identified along with any information from any Material Safety Data Sheet.
- Describe the location of all storage areas for chemicals.
- Include any information from the manufacturer's specifications.
- Treatment chemicals must be stored in areas where they will not be exposed to precipitation.
- The SWPPP must describe procedures for use of treatment chemicals and staff responsible for use/application of treatment chemicals must be trained on the established procedures.

Polymer flocculants will not be used for this project.

Part V. Other Conditions

1. Dewatering

Will dewatering be required for this project? ☐ Yes ☒ No

If yes, the following applies:

- Dewatering discharges shall be routed through a sediment control (e.g., sediment trap or basin, pumped water filter bag) designed to minimize discharges with visual turbidity;
- The discharge shall not include visible floating solids or foam;
- The discharge must not cause the formation of a visible sheen on the water surface, or visible oily deposits on the bottom or shoreline of the receiving water. An oil-water separator or suitable filtration device shall be used to treat oil, grease, or other similar products if dewatering water is found to or expected to contain these materials;
- To the extent feasible, use well-vegetated (e.g., grassy or wooded), upland areas of the site to Infiltrate dewatering water before discharge;
- You are prohibited from using receiving waters as part of the treatment area;
- To minimize dewatering-related erosion and related sediment discharges. use stable. erosion-resistant surfaces (e.g., well-vegetated grassy areas, clean filler stone, geotextile underlayment) to discharge from dewatering controls. Do not place dewatering controls, such as pumped water filter bags, on steep slopes (15% or greater in grade);
- Backwash water (water used to backwash/clean any filters used as part of storm water treatment) must be properly treated or hauled off- site for disposal;
- Dewatering treatment devices shall be properly maintained; and
- See Part XI (Inspections) for inspection requirement.

Part VI. Permanent (i.e., Post-Construction) Storm Water Management Controls

Provided below is a description of measures that may be installed during the construction process to control volume and therefore the amount pollutants in storm water runoff that can occur after construction operations have been completed.

Practices may include but are not limited to the following:

- Aggregate ditch checks;
- bioswales,
- detention pond(s),
- infiltration trench;
- retention pond(s),
- open vegetated swales and natural depressions,
- treatment train (sequential system which combine several practices).
- Velocity dissipation devices (See Structural Practices above)

Describe these practices below

Permanent Seeding: Once grading is completed permanent seeding will be applied to the areas shown on the Landscape Plan.
Where possible, permanent stabilization of the initial stage should be completed before work is moved to the subsequent stage.

Part VII. Additional Practices Incorporated From Local Ordinance(s)

In some instances, an additional practice from a local ordinance may be included in the project. If so, describe below (Note: the Department is not subject to local ordinances)

NA

Part VIII. Unexpected Regulated Substances/Chemical Spill Procedures

When Unexpected Regulated Substances or chemical spills occur, Article 107.19 of the Standard Specifications for Road and Bridge Construction shall apply. In addition, it is the contractor's responsibility to notify the Engineer in the event of a chemical spill into a ditch or waterway, the Engineer will then notify appropriate IEPA and IEMA personnel for the appropriate cleanup procedures.

Part IX. Contractor Required Submittals

Prior to conducting any professional services at the site covered by this plan, the Contractor and each subcontractor responsible for compliance with the permit shall submit to the Resident Engineer a Contractor Certification Statement, BDE 2342A.

1. The Contractor shall provide a construction schedule containing an adequate level of detail to show major activities with implementation of pollution prevention BMPs, including the following items:

- Approximate duration of the project, including each stage of the project
- Rainy season, dry season, and winter shutdown dates
- Temporary stabilization measures to be employed by contract phases
- Mobilization time-frame
- Mass clearing and grubbing/roadside clearing dates
- Deployment of Erosion Control Practices
- Deployment of Sediment Control Practices (including stabilized construction entrances and exits to be used and how they will be maintained)
- Deployment of Construction Site Management Practices (including concrete washout facilities, chemical storage, refueling locations, etc.)
- Paving, saw-cutting, and any other pavement related operations
- Major planned stockpiling operation
- Time frame for other significant long-term operations or activities that may plan non-storm water discharges as dewatering, grinding, etc.
- Permanent stabilization activities for each area of the project

2. During the pre-construction meeting, the Contractor and each subcontractor shall provide, as an attachment to their signed Contractor Certification Statement, a discussion of how they will comply with the requirements of the permit in regard to the following items and provide a graphical representation showing location and type of BMPs to be used when applicable:

- Temporary Ditch Checks - Identify what type and the source of Temporary Ditch Checks that will be installed as part of the project. The installation details will then be included with the SWPPP.
- Vehicle Entrances and Exits - Identify type and location of stabilized construction entrances and exits to be used and how they will be maintained.
- Material Delivery, Storage and Use- Discuss where and how materials including chemicals, concrete curing compounds,

petroleum products, etc. will be stored for this project. Specifically, any chemical stored in a 55 gallon drum provided by the contractor.

- Stockpile Management - Identify the location of both on-site and off-site stockpiles. Discuss what BMPs will be used to prevent pollution of storm water from stockpiles.
- Waste Disposal - Discuss methods of waste disposal that will be used for this project.
- Spill Prevention and Control - Discuss steps that will be taken in the event of a material spill.
- Concrete Residuals and Washout Wastes - Discuss the location and type of concrete washout facilities to be used on this project and how they will be signed and maintained.
- Litter Management - Discuss how litter will be maintained for this project (education of employees, number of dumpsters, frequency of dumpster pick-up, etc.).
- Vehicle and Equipment Fueling - Identify equipment fueling locations for this project and what BMPs will be used to ensure containment and spill prevention.
- Vehicle and Equipment Cleaning and Maintenance - Identify where equipment cleaning and maintenance locations for this project and what BMPs will be used to ensure containment and spill prevention.
- Dewatering Activities - Identify the controls which will be used during dewatering operations to ensure sediments will not leave the construction site.

Additional measures indicated in the plan

Part X. Maintenance

It will be the Contractor's responsibility to attain maintenance guidelines for any manufactured BMPs which are to be installed and maintained per manufacture's specifications. However, when requested by the Contractor, the Resident Engineer will provide general maintenance guides (e.g., IDOT Erosion and Sediment Control Field Guide) to the Contractor for the practices associated with this project. Any damage or undermining shall be repaired immediately.

Below, describe procedures to maintain in good and effective operating conditions

Mulch: Repair straw if blown or washed away, or if hydraulic mulch washes away. Place tackifier or an ECB if mulch does not control erosion. Erosion Control Blanket : Repair damage due to water running beneath the blanket and restore blanket when displacement occurs. Reseeding may be necessary. Replace all displaced blanket and re-staple. Temporary Erosion Control Seeding: Reapply seed if stabilization hasn't been achieved. Apply temporary mulch to hold seed in place if seed has been washed away or found to be concentrated in ditch bottoms. Restore rills, greater than 4 inches deep, as quickly as possible on slopes steeper than 1V:4H to prevent sheet-flow from becoming concentrated flow patterns. Mow, if necessary, to promote seed soil contact when excessive weed development occurs, a common indication of ineffective temporary seeding. Supplement BMP if weather conditions (extreme heat or cold) are not conducive for germination. Inlet Filters: Remove sediment from inlet filter baskets when basket is 25% full or 50% of the fabric pores are covered with silt. Remove ponded water on road surfaces immediately. Clean filter if standing water is present longer than one hour after a rain event. Remove trash accumulated around or on top of inlet filter. When filter is removed for cleaning, replace fabric if any tear is present. Perimeter Erosion Control Barrier: Repair tears, gaps or undermining in silt fence or super silt fence. Restore leaning silt fence and ensure taut. Repair or replace any missing or broken stakes immediately. Clean fence line if sediment reaches one-third height of barrier. Remove fence once final stabilization is established. Repair fence if undermining occurs anywhere along its entire length. Stabilized Construction Exits: Replenish stone or replace exit if vehicles continue to track sediment onto the

roadway from the construction site. Sweep sediment on roadway from construction activities.

Temporary Ditch Checks: Remove sediment from upstream side when it has reached 50% of height of structure. Repair or replace ditch checks whenever tears, splits unraveling or compressed excelsior is apparent. Remove debris when observed on checks. Replace the fabric mat that may allow water to undermine the ditch check.

Dust Suppression: When temporary dust control measures are used, repetitive treatment should be applied as needed to accomplish control.

Temporary Fencing and Signage: Restore fences which are not upright. Clean posted 'No Entry' signs as needed. Most intrusions will necessitate ION submittal. The protective signs and fences shall be removed only after all construction work has been finished.

Protection of Trees: The protective signs, fences and tree trunk protection will be removed only after all construction work has been finished and the site has been inspected by a Professional Forester for damages to the trees. On active construction sites, it is recommended that trees be inspected daily to every 7 days for compliance.

The Contractor should provide to the RE a plan to ensure that a stabilized flow line will be provided during storm sewer construction. The use of a stabilized flow line between installed storm sewer and open disturbance will reduce the potential for offsite discharge of sediment bearing waters, particularly when rain is forecasted so flow will not erode. Lack of an approved plan or failure to comply will result in an ESC Deficiency Deduction.

https://idot.illinois.gov/content/dam/soi/en/web/idot/documents/transportation-system/manuals-guides-and-handbooks/highways/environment/erosion-and-sediment-control-field-guide-for-construction-inspection.pdf

Part XI. Inspections

Qualified personnel shall inspect disturbed areas of the construction site that have not been finally stabilized, structural control measures, and locations where vehicles enter or exit the site at least once every seven calendar days and within 24 hours of the end of a storm or by the end of the following business or workday that is 0.50 inches or greater or equivalent snowmelt (except as allowed for Frozen Conditions).

In addition, all areas where storm water typically flows within the site should be inspected periodically to check for evidence of pollutants entering the drainage system, as well as all locations where stabilization measures have been implemented to ensure they are operating correctly.

Inspections shall be documented on the form BC 2259 (Storm Water Pollution Prevention Plan Erosion Control Inspection Report).

The Erosion and Sediment Control Field Guide for Construction Inspection shall be consulted as needed.

Dewatering

For site(s) discharging dewatering water, an inspection during the discharge shall be done once per day on which the discharge occurs and record the following in a report within 24 hours of completing the Inspection:

- The inspection date;
- Names and titles of personnel performing the inspection;
- Approximate times that the dewatering discharge began and ended on the day of inspection;
- Estimates of the rate (in gallons per day) of discharge on the day of inspection;
- Whether or not any of the following indications of pollutant discharge were observed at the point of discharge: a sediment plume, suspended solids. unusual color, presence of odor, decreased clarity, or presence of foam; and/or a visible sheen on the water surface or visible oily deposits on the bottom or shoreline of the receiving water.

Frozen Conditions

Inspections may be reduced to once per month when all construction activities have ceased due to frozen conditions. Weekly inspections will recommence when construction activities resume, either temporarily or continuously, or if there is 0.5" or greater rain event, or a discharge due to snowmelt occurs.

Flooding or unsafe conditions

Areas that are inaccessible during required inspections due to flooding or other unsafe conditions must be inspected within 72 hours of becoming accessible.

Part XII. Incidence of Noncompliance (ION)

The Department shall notify the appropriate Agency Field Operations Section office by email as described on the IEPA ION form, within 24 hours of any incidence of noncompliance for any violation of the storm water pollution prevention plan observed during any inspection conducted, or for violations of any condition of this permit.

The Department shall complete and submit within 5 days an "Incidence of Noncompliance" (ION) report for any violation of the storm water pollution prevention plan observed during any Inspection conducted, or for violations of any condition of this permit. Submission shall be on forms provided by the IEPA and include specific information on the cause of noncompliance, actions which were taken to prevent any further causes of noncompliance, and a statement detailing any environmental impact which may have resulted from the noncompliance. Corrective actions must be undertaken immediately to address the identified non-compliance issue(s}.

Illinois Environmental Protection Agency

Division of Water Pollution Control Compliance Assurance Section

1021 North Grand Avenue East

Post Office Box 19276 Springfield, Illinois 62794-9276

Part XIII. Corrective Actions

Corrective actions must be taken when:

- A storm water control needs repair or replacement;
- A storm water control necessary to comply with the requirements of this permit was never installed, or was installed incorrectly;
- Discharges are causing an exceedance of applicable water quality standards; or
- A prohibited discharge has occurred.

Corrective Actions must be completed as soon as possible and documented within 7 days in an Inspection Report or report of noncompliance. If it is infeasible to complete the installation or repair within 7 calendar days, it must be documented in the records why it is infeasible to complete the installation or repair within the 7 day time-frame and document the schedule for installing the storm water control(s) and making it operational as soon as feasible after the 7-day time-frame.. In the event that maintenance is required for the same storm water control at the same location three or more times, the control must be repaired in a manner that prevents continued failure to the extent feasible, and it must be documented the condition and how it was repaired in the records. Alternatively, it must be documented why the specific re-occurrence of this same issue must continue to be addressed as a routine maintenance fix.

Part XIV. Retention of Records

The Department must retain copies of the SWPPP and all reports and notices required by this permit, records of all data used to complete the NOI to be covered by this permit, and the Agency Notice of Permit Coverage letter for at least three years from the date that the permit coverage expires or is terminated. the permittee must retain a copy of the SWPPP and any revisions to the SWPPP required by this permit at the construction site from the date of project initiation to the date of final stabilization. Any manuals or other documents referenced in the SWPPP must also be retained at the construction site.

Part XV. Failure to Comply

Failure to comply with any provisions of this Storm Water Pollution Prevention Plan will result in the implementation of a National Pollutant Discharge Elimination System/Erosion and Sediment Control Deficiency Deduction against the Contractor and/or penalties under the Permit ILR10 which could be passed on to the contractor (See Article 105.03 Conformity with Contract)

Part XVI. Keeping the SWPPP ("plan") Current

IDOT shall amend the plan whenever there is a change in design, construction, operation, or maintenance, which has a significant effect on the potential for the discharge of pollutants to Waters of the United States and which has not otherwise been addressed in the plan or if the plan proves to be ineffective in eliminating or significantly minimizing sediment and/or pollutants identified under paragraph Part II. Water Quality or in otherwise achieving the general objectives of controlling pollutants in storm water discharges associated with construction site activity.

In addition, the plan shall be amended to identify any new contractor and/or subcontractor that will implement a measure of the plan. Amendments to the plan may be reviewed by the IEPA the same manner as the SWPPP and Erosion and Sediment Control Plan (ESCP) submitted as part of the Notice of Intent (NOI). The SWPPP and site map must be modified within 7 days for any changes to construction plans, storm water controls or other activities at the site that are no longer accurately reflected in the SWPPP.

In addition, the NOI shall be modified using the CDX system for any substantial modifications to the project such as:

- address changes
- new contractors
- area coverage
- additional discharges to Waters of the United States, or
- other substantial modifications (e.g. addition of dewatering activities.

The notice of intent shall be modified within 30 days of the modification to the project.

Part XVII: Notifications

In addition to the NOI submitted to IEPA, all MS4 permittees identified in Part I. Site Description shall receive a copy of the NOI.

Part XVIII. Notice of Termination

Where a site has completed final stabilization and all storm water discharges from construction activities that are authorized by this permit are eliminated, the permittee must submit a completed Notice of Termination (NOT) that is signed in accordance with ILR10 permit.

Method of Measurement: NPDES Compliance shall not be measured for payment separately. Measurement for payment for Temporary Erosion and Sediment Control shall be in accordance with Section 280 or as otherwise provided in the contract. Permanent BMPs necessary to comply with this provision shall be measured for payment in accordance with their respective provisions in the contract.

Basis of Payment: NPDES Compliance shall not be paid for separately. Payment for Temporary Erosion and Sediment Control shall be in accordance with Section 280 or as otherwise provided in the contract. Permanent BMPs necessary to comply with this provision shall be paid for in accordance with their respective payment provisions in the contract.

ROUTE: FAI 94 (I-94 (Bishop Ford Expwy))
SECTION: (42-B-11-1) BR,BJR 24
PROJECT: NHPP-2B1H(072)
COUNTY: Cook
CONTRACT: 62W87

Attachment I.3

Pre-Stage

• Install Portable Changeable Message Signs according to highway standard 701400 as directed by the engineer
• Implement the Smart Traffic Monitoring System
• Remove permanent markings and raised reflective pavement markers that will conflict with temporary traffic control
• Tack weld drainage structure frames in inside and outside shoulder that will be under live traffic. Remove welds once traffic is shifted off shoulder at the conclusion of Stage 3. Check and maintain as required throughout project duration.
• Resurface shoulders as required for traffic loads.
• Class D patching, Class B ramp patching, and Class A patching.
• Class A patching work in the existing Lane 2 in both directions shall be limited to six (6) total weekends. These hours shall be limited from 9:00 PM Friday night to Monday morning at 5:00 AM. All lanes must be open by 5:00 AM Monday morning.
• Ramps listed in the table below may be closed as necessary to complete patching. Detour routes shall be provided during these closures as shown in the plans.

Stage 1

• Work shall include mainline PCC pavement patching in Closed Lanes, bridge deck repairs, bridge latex overlay, bridge structure repairs, and overhead sign foundation construction.
• Traffic shall be shifted to the outside lanes in both directions, westbound and eastbound.
• Ramps listed in the table below may be closed as necessary to complete bridge work. Detour routes shall be provided during these closures as shown in the plans.

Stage 2

• Work shall include mainline PCC pavement patching in Closed Lanes, bridge deck repairs, bridge latex overlay, bridge structure repairs, and overhead sign foundation construction.
• Traffic shall be shifted to the inside lanes in both directions, westbound and eastbound.
• Ramps listed in the table below may be closed as necessary to complete bridge work. Detour routes shall be provided during these closures as shown in the plans.

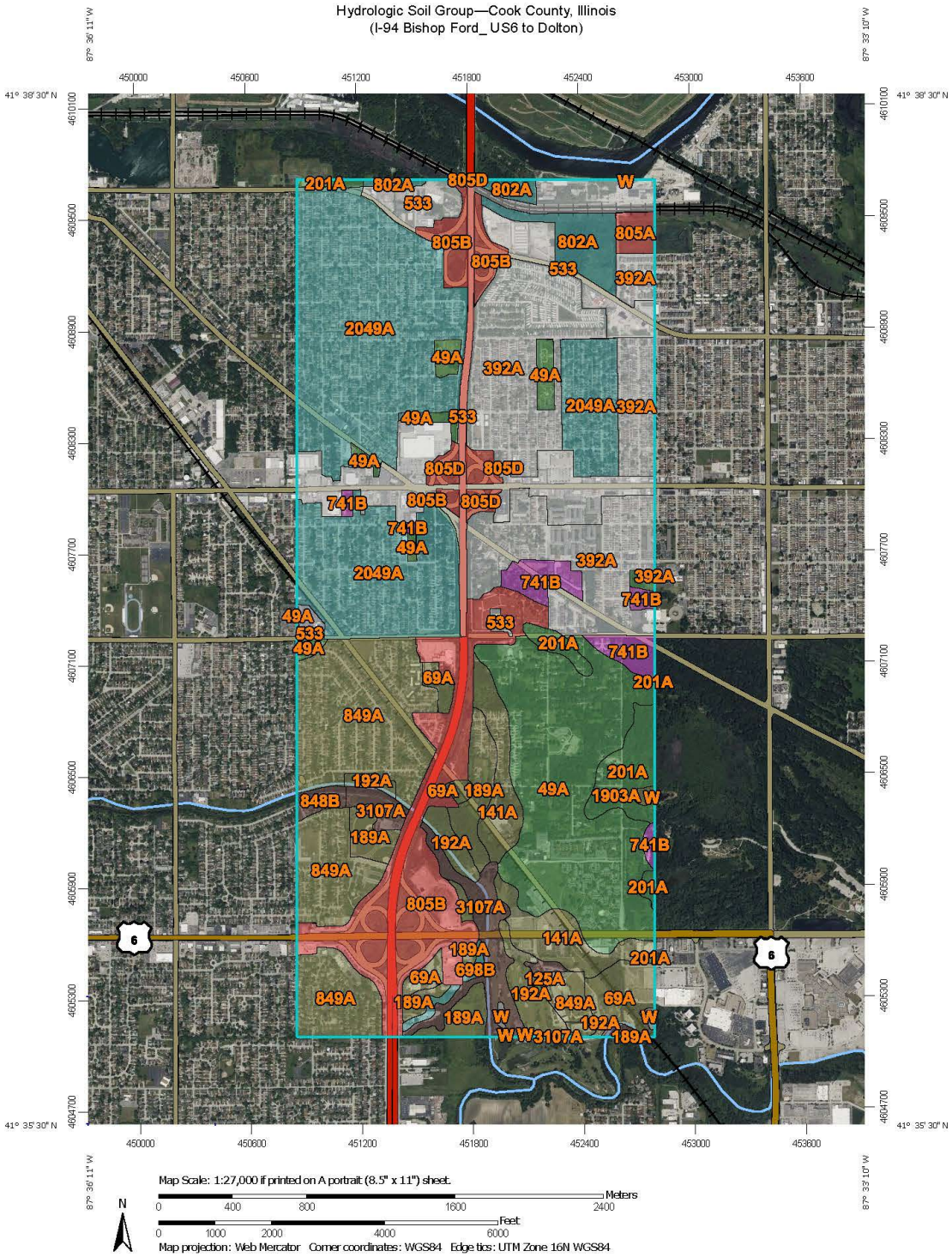
Stage 3

• Work shall consist of Class D patching if not previously completed.
• Work shall include mill and overlay.
• Mill and overlay shall include nightly and weekend closures only.

ROUTE: FAI 94 (I-94 (Bishop Ford Expwy))
SECTION: (42-B-11-1) BR,BJR 24
PROJECT: NHPP-2B1H(072)
COUNTY: Cook
CONTRACT: 62W87

Where possible, permanent stabilization of the initial stage should be completed before work is moved to the subsequent stage. Once grading is completed permanent seeding will be applied to the areas shown on the Landscape Plan.

It is anticipated that construction will begin on May 1, 2025 with a completion date of 7/30/27.



Revised 2-22-2025

Hydrologic Soil Group—Cook County, Illinois
(I-94 Bishop Ford_ US6 to Dolton)

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils

Soil Rating Polygons
- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Lines
- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Points
- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:12,000.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Cook County, Illinois
Survey Area Data: Version 18, Aug 21, 2024

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Jun 16, 2022—Jun 27, 2022

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Revised 2-22-2025

Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
49A	Watseka loamy fine sand, 0 to 2 percent slopes	A/D	279.3	12.6%
69A	Milford silty clay loam, 0 to 2 percent slopes	C/D	47.8	2.2%
125A	Selma loam, 0 to 2 percent slopes	B/D	3.9	0.2%
141A	Wesley fine sandy loam, 0 to 2 percent slopes	C/D	73.9	3.3%
189A	Martinton silt loam, 0 to 2 percent slopes	C/D	64.7	2.9%
192A	Del Rey silt loam, 0 to 2 percent slopes	C/D	40.4	1.8%
201A	Gilford fine sandy loam, 0 to 2 percent slopes	A/D	51.5	2.3%
392A	Urban land-Orthents, loamy, complex, nearly level		305.2	13.8%
531B	Markham silt loam, 2 to 4 percent slopes	C	4.4	0.2%
533	Urban land		227.9	10.3%
698B	Grays silt loam, 2 to 4 percent slopes	C	2.9	0.1%
741B	Oakville fine sand, 1 to 6 percent slopes	A	41.7	1.9%
802A	Orthents, loamy, nearly level	C	44.4	2.0%
802B	Orthents, loamy, 1 to 6 percent slopes	C	1.2	0.1%
805A	Orthents, clayey, nearly level	D	11.8	0.5%
805B	Orthents, clayey, undulating	D	215.2	9.7%
805D	Orthents, clayey, rolling	D	20.5	0.9%
848B	Drummer-Barrington-Mundelein complex, 1 to 6 percent slopes	B/D	8.4	0.4%
849A	Milford-Martinton complex, 0 to 2 percent slopes	C/D	245.5	11.1%
1903A	Muskego and Houghton mucks, undrained, 0 to 2 percent slopes	C/D	2.0	0.1%

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
2049A	Orthents, loamy-Urban land-Watseka complex, 0 to 2 percent slopes	C	459.5	20.7%
3107A	Sawmill silty clay loam, heavy till plain, 0 to 2 percent slopes, frequently flooded	B/D	58.9	2.7%
W	Water		4.3	0.2%
Totals for Area of Interest			**2,215.2**	**100.0%**

Description

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

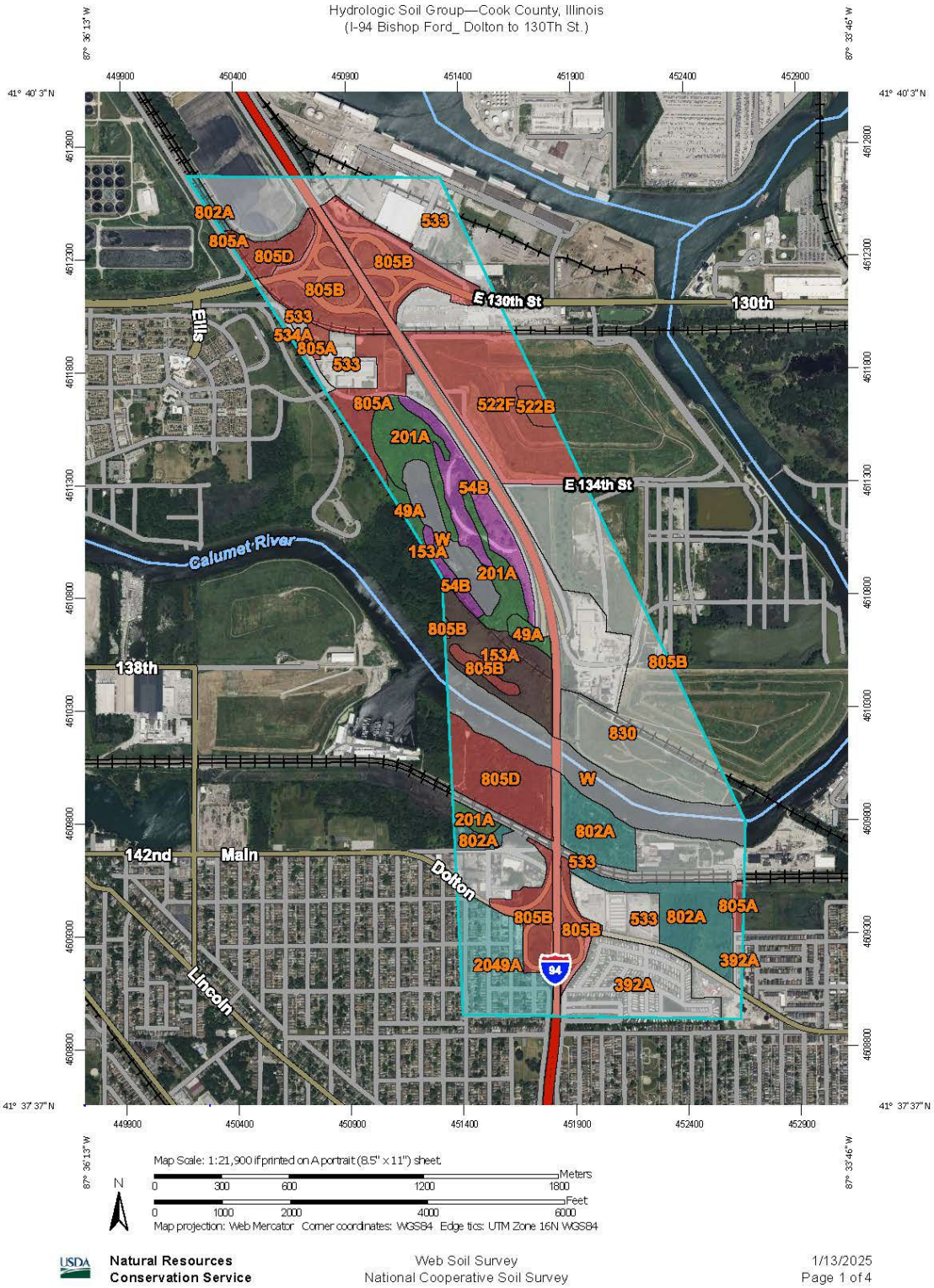
Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

Revised 2-22-2025



Revised 2-22-2025

Hydrologic Soil Group—Cook County, Illinois
(I-94 Bishop Ford_ Dolton to 130Th St.)

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils

Soil Rating Polygons
- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Lines
- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Points
- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

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Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

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This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Cook County, Illinois
Survey Area Data: Version 18, Aug 21, 2024

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Jun 16, 2022—Jun 27, 2022

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Revised 2-22-2025

Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
49A	Watseka loamy fine sand, 0 to 2 percent slopes	A/D	8.2	0.8%
54B	Plainfield loamy sand, 1 to 6 percent slopes	A	33.6	3.4%
153A	Pella silty clay loam, 0 to 2 percent slopes	B/D	31.7	3.2%
201A	Gilford fine sandy loam, 0 to 2 percent slopes	A/D	38.2	3.9%
392A	Urban land-Orthents, loamy, complex, nearly level		47.8	4.8%
522B	Orthents, clayey, refuse substratum, undulating	D	4.9	0.5%
522F	Orthents, clayey, refuse substratum, steep	D	66.6	6.8%
533	Urban land		267.4	27.1%
534A	Urban land-Orthents, clayey, complex, nearly level		5.3	0.5%
802A	Orthents, loamy, nearly level	C	62.8	6.4%
805A	Orthents, clayey, nearly level	D	27.1	2.7%
805B	Orthents, clayey, undulating	D	101.6	10.3%
805D	Orthents, clayey, rolling	D	48.2	4.9%
830	Landfills		125.7	12.7%
2049A	Orthents, loamy-Urban land-Watseka complex, 0 to 2 percent slopes	C	40.0	4.1%
W	Water		77.3	7.8%
Totals for Area of Interest			**986.4**	**100.0%**

Description

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

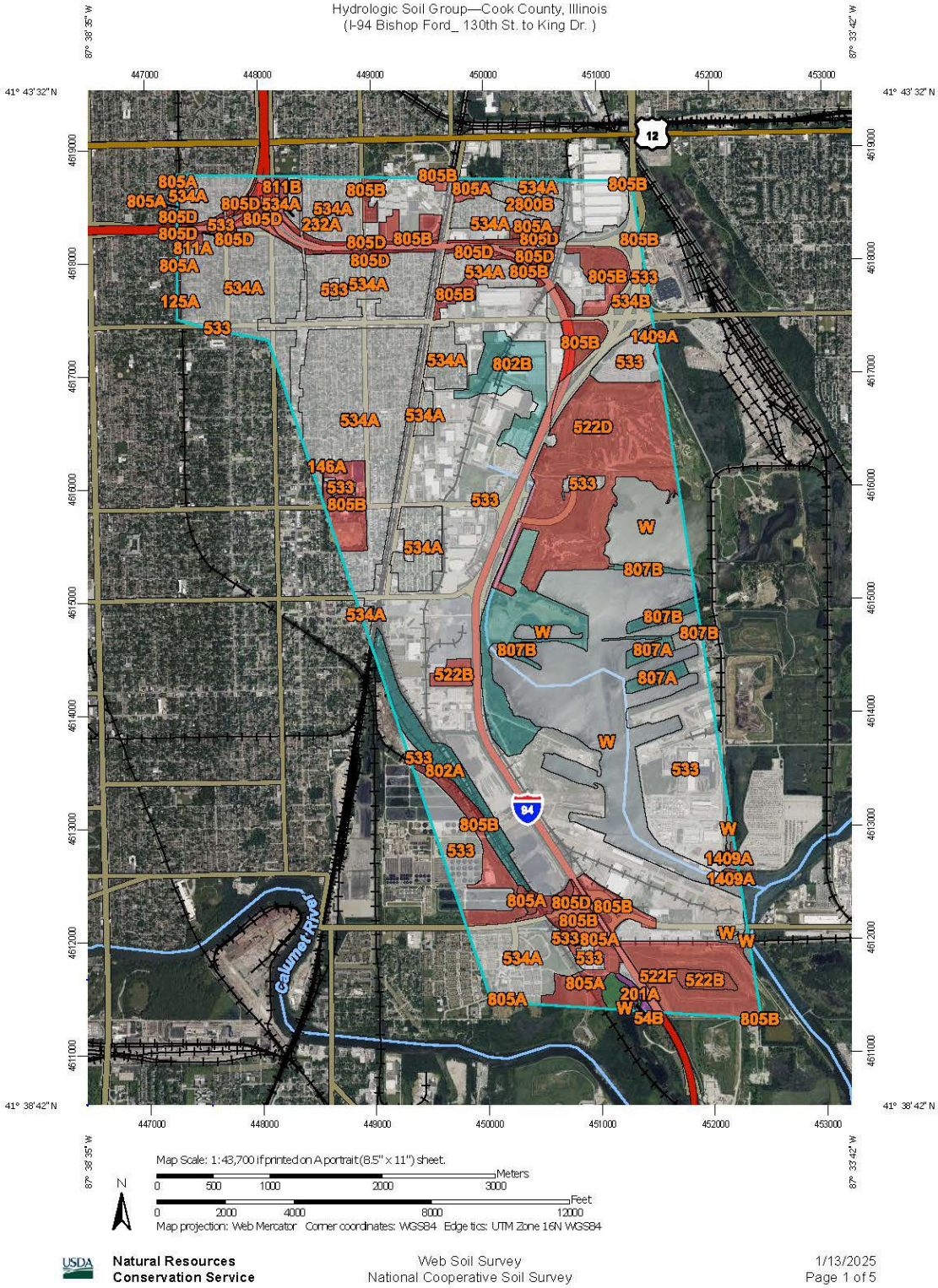
If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

Rating Options

Aggregation Method: Dominant Condition

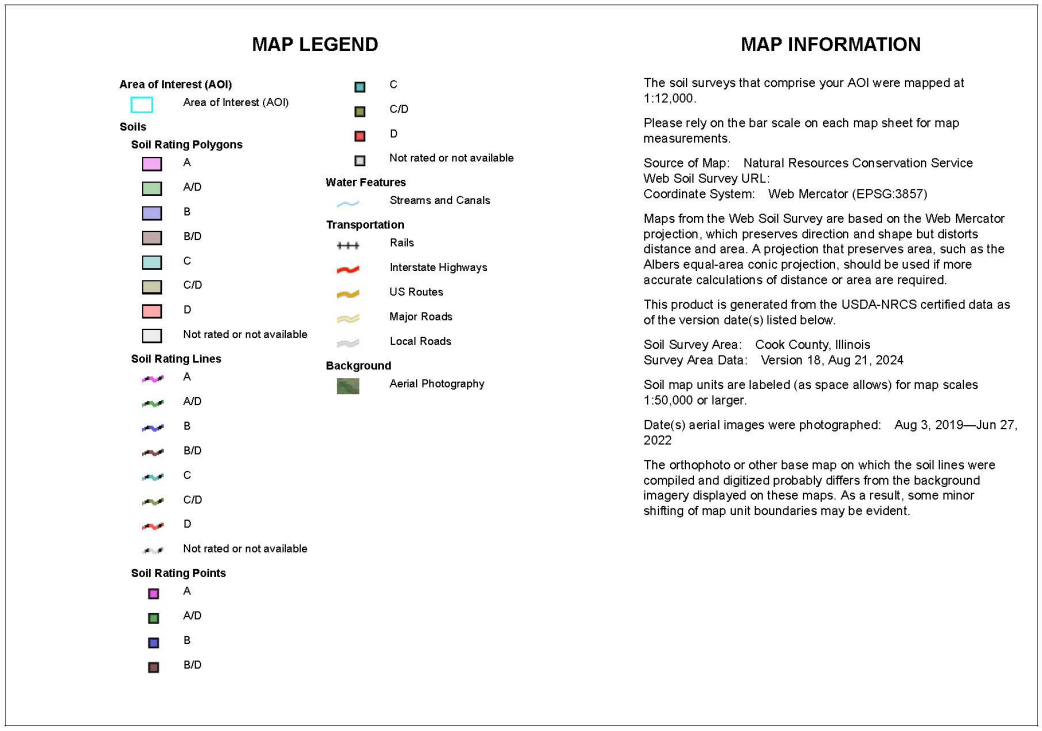
Component Percent Cutoff: None Specified

Tie-break Rule: Higher



Revised 2-22-2025

Hydrologic Soil Group—Cook County, Illinois
(I-94 Bishop Ford_ 130th St. to King Dr.)



Revised 2-22-2025

Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
54B	Plainfield loamy sand, 1 to 6 percent slopes	A	7.1	0.1%
125A	Selma loam, 0 to 2 percent slopes	B/D	1.8	0.0%
146A	Elliott silt loam, 0 to 2 percent slopes	C/D	1.8	0.0%
201A	Gilford fine sandy loam, 0 to 2 percent slopes	A/D	17.3	0.3%
232A	Ashkum silty clay loam, 0 to 2 percent slopes	C/D	2.2	0.0%
522B	Orthents, clayey, refuse substratum, undulating	D	37.6	0.7%
522D	Orthents, clayey, refuse substratum, rolling	D	375.5	6.6%
522F	Orthents, clayey, refuse substratum, steep	D	139.4	2.4%
533	Urban land		2,083.6	36.5%
534A	Urban land-Orthents, clayey, complex, nearly level		1,214.8	21.3%
534B	Urban land-Orthents, clayey, complex, gently sloping		118.3	2.1%
802A	Orthents, loamy, nearly level	C	86.7	1.5%
802B	Orthents, loamy, 1 to 6 percent slopes	C	101.8	1.8%
805A	Orthents, clayey, nearly level	D	82.9	1.5%
805B	Orthents, clayey, undulating	D	333.9	5.9%
805D	Orthents, clayey, rolling	D	111.8	2.0%
807A	Orthents, loamy-skeletal, nearly level	C	35.4	0.6%
807B	Orthents, loamy-skeletal, undulating	C	184.6	3.2%
811A	Anthroportic Udorthents, 0 to 2 percent slopes	D	4.0	0.1%
811B	Anthroportic Udorthents, 2 to 6 percent slopes	D	6.3	0.1%

Revised 2-22-2025

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
1409A	Aquents, clayey, undrained, nearly level	D	6.6	0.1%
2800B	Urban land-Psamments complex, gently sloping		30.6	0.5%
W	Water		720.0	12.6%
Totals for Area of Interest			**5,704.7**	**100.0%**

Description

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If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

GENERAL NOTES

1. THE CONTRACTOR SHALL CALL "J.U.L.I.E." AT (800) 892-0123 OR 811 CHICAGO AT LEAST 48 HOURS BEFORE BEGINNING CONSTRUCTION.
2. THE CONTRACTOR SHALL COORDINATE CONSTRUCTION ACTIVITIES WITH AFFECTED UTILITY COMPANIES IN THE CITIES OF CHICAGO AND CALUMET.
3. THE CONTRACTOR SHALL NOT SET UP A YARD OR FIELD OFFICE ON STATE PROPERTY WITHOUT WRITTEN PERMISSION FROM THE DEPARTMENT.
4. THE CONTRACTOR SHALL CONTACT THE DISTRICT ONE TRAFFIC CONTROL SUPERVISOR KALPANA KANNAN-HOSADURGA, AT KALPANA.KANNAN-HOSADURGA@ILLINOIS.GOV A MINIMUM OF 72 HOURS IN ADVANCE OF BEGINNING ANY WORK.
5. THE ENGINEER SHALL CONTACT THE SOUTH COOK TRAFFIC FIELD AREA ENGINEER PATRICE HARRIS, AT PATRICE.HARRIS@ILLINOIS.GOV A MINIMUM OF TWO (2) WEEKS PRIOR TO THE PLACEMENT OF PAVEMENT MARKINGS.
6. THE REMOVAL OF GUARDRAIL TERMINAL SECTIONS SHALL BE INCLUDED IN THE UNIT PRICE PER FOOT FOR "GUARDRAIL REMOVAL."
7. THE CONTRACTOR SHALL VERIFY THE EXISTING TYPE/HEIGHT OF EXISTING GUARDRAIL BEFORE ORDERING THE NEW TERMINAL SECTION. COST INCLUDED WITH THE COST OF THE TERMINAL. THE TERMINAL SECTION SHALL MATCH THE HEIGHT OF THE EXISTING GUARDRAIL.
8. WHEN THE MILLED PAVEMENT IS OPEN TO TRAFFIC THE MAXIMUM GRADE DIFFERENTIAL BETWEEN PASSES OF THE MILLING MACHINE SHALL NOT EXCEED 1 1/2 INCHES (40 mm) WHERE THE SPEED LIMIT IS 40 MPH (80 km/h) OR LESS AND 1 INCH (25 mm) WHERE THE SPEED LIMIT IS GREATER THAN 40 MPH (80 km/h). WITH WRITTEN APPROVAL OF THE ENGINEER, A MAXIMUM GRADE DIFFERENTIAL OF 3 INCHES (75 mm) MAY BE ALLOWED IF THE EDGE OF THE MILLING IS SLOPED A MINIMUM 1:3 (V:H) OR A NOTCHED LONGITUDINAL WEDGE IS USED.
9. THE CONTRACTOR SHALL USE CARE NEAR ANY AND ALL EXISTING ITEMS THAT WILL NOT BE REMOVED. ANY DAMAGE DONE TO EXISTING ITEMS BY THE CONTRACTOR SHALL BE REPAIRED OR REPLACED TO THE SATISFACTION OF THE ENGINEER AT THE CONTRACTOR'S OWN EXPENSE.
10. THE LOCATION OF THE EXISTING DRAINAGE STRUCTURES, STORM SEWERS, WATER MAINS, SANITARY SEWERS, AND ANY OTHER PUBLIC OR PRIVATE UTILITIES SHOWN ON THE PLANS IS APPROXIMATE AND THEIR EXACT LOCATION IS TO BE DETERMINED IN THE FIELD BY THE CONTRACTOR.
11. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE PROTECTION OF ALL UNDERGROUND AND SURFACE UTILITIES EVEN THOUGH THEY MIGHT BE SHOWN IN THE PLANS. ANY UTILITY PROPERTY DAMAGED DURING CONSTRUCTION SHALL BE REPAIRED OR REPLACED TO THE SATISFACTION OF THE ENGINEER.
12. ANY LOOSE MATERIAL DEPOSITED IN THE FLOW LINE OF DRAINAGE STRUCTURES WHICH OBSTRUCTS THE NATURAL FLOW OF WATER SHALL BE REMOVED AT THE CLOSE OF EACH WORKING DAY. PRIOR TO ACCEPTANCE OF THE IMPROVEMENT, ALL DRAINAGE STRUCTURES SHALL BE FREE OF DIRT AND DEBRIS. THIS WORK WILL NOT BE PAID FOR SEPARATELY, BUT SHALL BE CONSIDERED AS INCLUDED IN THE UNIT BID PRICES OF THE CONTRACT.
13. IT SHALL BE THE CONTRACTORS RESPONSIBILITY TO VERIFY ALL DIMENSIONS AND CONDITIONS EXISTING IN THE FIELD PRIOR TO CONSTRUCTION AND ORDERING MATERIALS.
14. BEFORE BEGINNING ANY WORK, THE CONTRACTOR SHALL RETAIN AND RECORD FOR FUTURE REFERENCE, ALL EXISTING PAVEMENT MARKING LINES (AND RAISED REFLECTIVE PAVEMENT MARKERS) IN ORDER THAT THESE LOCATIONS CAN BE RE-ESTABLISHED FOR STRIPING. EXACT LOCATIONS OF ALL PAVEMENT MARKINGS SHALL BE AS DIRECTED BY THE ENGINEER.
15. ALL PAVEMENT MARKINGS SHALL BE PLACED THROUGHOUT THE IMPROVEMENT ACCORDING TO THE DISTRICT 1 PAVEMENT MARKINGS STANDARD DETAILS.
16. ANY REFERENCE TO A STANDARD IN THESE PLANS SHALL BE INTERPRETED TO MEAN THE EDITION AS INDICATED BY THE SUB NUMBER SHOWN IN THE LIST OF STANDARDS OR THE COPY INCLUDED IN THESE PLANS.
17. THE SUBGRADE STABILITY SHALL BE VERIFIED BY PROOF ROLLING WITH A FULL LOADED TANDEM AXLE TRUCK.
18. ANY AGGREGATE SUBGRADE IMPROVEMENT CONTAMINATED AND/OR DAMAGED BY THE CONTRACTORS VEHICLES AND/OR EQUIPMENT IS TO BE REMOVED AND REPLACED AS DIRECTED BY THE ENGINEER AT THE CONTRACTOR'S EXPENSE.
19. THE THICKNESS OF HMA SHOWN ON THE PLANS IS THE NOMINAL THICKNESS. DEVIATIONS FROM THE NOMINAL THICKNESS WILL BE PERMITTED WHEN SUCH DEVIATIONS OCCUR DUE TO IRREGULARITIES IN THE EXISTING SURFACE OR BASE ON WHICH THE HMA IS PLACED.
20. GEOTECHNICAL FABRIC FOR GROUND STABILIZATION AND/OR AGGREGATE SUBGRADE IMPROVEMENT (CU YD) HAVE BEEN PROVIDED FOR USE AT THE LOCATIONS INDICATED FOR SOILS THAT TEND TO BE UNSTABLE AND/OR UNSUITABLE. THE ACTUAL NEED FOR REMOVAL AND REPLACEMENT WITH ABOVE ITEM WILL BE DETERMINED IN THE FIELD AT THE TIME OF CONSTRUCTION BY THE GEOTECHNICAL ENGINEER. ALL POTENTIALLY UNSTABLE SOILS SHOULD BE TESTED WITH STATIC OR DYNAMIC CONE PENETROMETER AND TREATED IN ACCORDANCE WITH ARTICLE 301.04 OF THE SSRBC AND IDOT SUBGRADE STABILITY MANUAL IF UNSTABLE AND/OR UNSUITABLE SOILS ARE NOT ENCOUNTERED, THEN THE QUANTITY SHALL BE DEDUCTED AND NO ADDITIONAL COMPENSATION WILL BE DUE TO THE CONTRACTOR.
21. FOR WORK OUTSIDE THE LIMITS OF BRIDGE APPROACH PAVEMENT, ALL REFERENCES IN THE HIGHWAY STANDARDS AND STANDARD SPECIFICATIONS FOR REINFORCEMENT, DOWEL BARS AND TIE BARS IN PAVEMENT, SHOULDERS, CURB, GUTTER, COMBINATION CURB AND GUTTER AND MEDIAN, AND CHAIR SUPPORTS FOR CRC PAVEMENT, SHALL BE EPOXY COATED, UNLESS NOTED ON THE PLAN.
22. LOCATION OF COMBINATION CONCRETE CURB AND GUTTER REMOVAL AND REPLACEMENT (OR COMBINATION CURB AND GUTTER (THE TYPE SPECIFIED ON THE PLANS)), WILL BE DETERMINED IN THE FIELD BY THE ENGINEER.
23. WHERE SECTION OR SUB-SECTION MONUMENTS ARE ENCOUNTERED, THE ENGINEER SHALL BE NOTIFIED BEFORE SUCH MONUMENTS ARE REMOVED. THE CONTRACTOR SHALL PROTECT AND CAREFULLY PRESERVE ALL PROPERTY MARKERS AND MONUMENTS UNTIL THE OWNER, AN AUTHORIZED SURVEYOR OR AGENT HAS WITNESSED THEIR LOCATION.
24. THE RAMP ALIGNMENTS AND SUPPORTING DATA SHOWN IN THE PLANS WERE DEVELOPED FROM PREVIOUS PLANIMETRICS AND AERIAL PHOTOGRAPHY AND IS NOT THE RESULT OF A GROUND SURVEY. THEREFORE, THE RAMP ALIGNMENTS AND SUPPORTING DATA SHOWN IN THE PLANS IS FOR REFERENCE PURPOSES ONLY. THE RELATIVE ACCURACY OF THE INFORMATION IS UNKNOWN AND CANNOT BE GUARANTEED. THE CONTRACTOR MAY BE REQUIRED TO ADJUST LAYOUT TO MATCH ACTUAL FIELD CONDITIONS AND THE INTENT OF THE PLANS.
25. AN EXISTING CURB AND GUTTER UNDER THE HMA SURFACE ALONG THE INSIDE SHOULDER MAY BE ENCOUNTERED DURING HMA SURFACEREMOVAL. IF ENCOUNTERED, THE CURB SHALL BE MILLED TO MEET THE SPECIFIED DEPTH OF HMA SURFACE REMOVAL COSTS SHALL BE INCLUDED IN THE UNIT PRICE FOR HMA SURFACE REMOVAL.
26. CONTACT IDOT ROADSIDE DEVELOPMENT UNIT AT 847-705-4171 TO SCHEDULE A FIELD REVIEW TO DETERMINE TREES FOR TREE REMOVAL, STUMP REMOVALS, SELECTIVE CLEARING, AND PRUNING AT LEAST 14 DAYS PRIOR TO COMMENCEMENT OF FORESTRY WORK.
27. DURING CONSTRUCTION OPERATIONS, WHENEVER ANY LOOSE MATERIAL IS DEPOSITED IN THE FLOW LINE OF DRAINAGE STRUCTURES SUCH THAT THE NATURAL FLOW OF WATER IS OBSTRUCTED, IT SHALL BE REMOVED AT THE CLOSE OF EACH WORKING DAY. AT THE CONCLUSION OF CONSTRUCTION OPERATIONS, ALL UTILITY STRUCTURES SHALL BE CLEANED AND FREE FROM DIRT AND DEBRIS. THE WORK SPECIFIED ABOVE WILL NOT BE PAID FOR SEPARATELY BUT SHALL BE INCIDENTAL TO THE CONTRACT.
28. THE CONTRACTOR SHALL TAKE EXTRA CARE IN GRADING AND EXCAVATING NEAR TREES WHICH ARE NOT MARKED FOR REMOVAL SO AS NOT TO CAUSE INJURY TO THE ROOT SYSTEM OR TRUNKS. ANY DAMAGE DONE TO EXISTING ITEMS BY THE CONTRACTOR SHALL BE REPAIRED BY THE CONTRACTOR AT THE CONTRACTOR'S OWN EXPENSE.
29. USE #8 EPOXY-COATED TIE BARS, CONFORMING TO ART. 1006.10 OF THE STANDARD SPECIFICATIONS, FOR ALL TIE BARS. USE THE "LONGITUDINAL CONSTRUCTION JOINT (TIE BAR GROUTED IN PLACE)" DETAIL SHOWN ON HIGHWAY STANDARD 420001 FOR ALL LONGITUDINAL JOINTS.
30. THE "ARTERIAL ROAD INFORMATION SIGN (TC-22)" IS APPLICABLE ONLY TO ARTERIAL ROADS AND SHALL NOT BE APPLIED TO EXPRESSWAYS.
31. THE CONTRACTOR SHALL ERECT A TEMPORARY FENCE AROUND ALL TREES WITHIN THE CONSTRUCTION AREA TO ESTABLISH A "TREE PROTECTION ZONE" BEFORE ANY WORK BEGINS OR ANY MATERIAL IS DELIVERED TO THE JOBSITE. NO WORK IS TO BE PERFORMED (OTHER THAN TREE CARE PAY ITEMS), MATERIALS STORED OR VEHICLES DRIVEN OR PARKED WITHIN THE "TREE PROTECTION ZONE." REMOVE PROTECTIVE TEMPORARY FENCE ONLY AFTER ALL CONSTRUCTION WORK HAS BEEN COMPLETED.
32. THE AGGREGATE GRADATION FOR THE AGGREGATE SUBGRADE IMPROVEMENT 12" LOWER LIFT SHALL BE CS 1 OR RR 1.
33. THE CONTRACTOR SHALL NOTIFY MOHAMMAD.SAYES@ILLINOIS.GOV AND ALLAN.MA@ILLINOIS.GOV UPON COMPLETION OF SIGN STRUCTURE INSTALLATION.
34. PIPE UNDERDRAINS SHALL BE INSTALLED ACCORDING TO SECTION 601 OF THE STANDARD SPECIFICATIONS AND STANDARD 606001-05. TOP OF PIPE UNDERDRAINS SHALL BE MINIMUM OF 6" BELOW THE AGGREGATE SUBGRADE LAYER. THE COST OF MAKING UNDERDRAINS CONNECTIONS TO DRAINAGE STRUCTURES SHALL BE INCLUDED IN THE COSTS OF THE PIPE UNDERDRAINS.
35. BACKFILLING STORM SEWER CONSTRUCTED UNDER THE ROADWAY SPECIFIED UNDER ART. 550.07(b,c) OF THE SSRBC WILL NOT BE ALLOWED.
36. THE DEPARTMENT HAS NOT OBTAINED ANY PERMITS FOR OFFSITE BORROW, WASTE, USE (BWU) AREAS. PRIOR TO WORKING IN BWU AREAS, IF THE CONTRACTOR CHOOSES TO USE ACTIVITIES REQUIRING PERMITS IT IS THE CONTRACTOR'S RESPONSIBILITY TO SECURE THE PROPER PERMITS. IN ADDITION TO THE BORROW REVIEW (BDE 2289) and USE/WASTE REVIEW (BDE 2290) SUBMITTALS, THE CONTRACTOR SHALL SUBMIT AN EROSION AND SEDIMENT CONTROL (ESC) PLAN FOR EVERY BWU SITE TO THE DEPARTMENT FOR ACCEPTANCE. GUIDELINES FOR ACCEPTABLE BWU PRACTICES CAN BE FOUND IN SECTION B.G.1 AND 2 of the SWPPP. THE COST OF ALL MATERIALS AND LABOR NECESSARY TO COMPLY WITH THE ABOVE PROVISIONS TO PREPARE AND IMPLEMENT ESC PLANS WILL NOT BE PAID FOR SEPARATELY, BUT SHALL BE CONSIDERED AS INCLUDED IN THE UNIT BID PRICES OF THE CONTRACT AND NO ADDITIONAL COMPENSATION WILL BE ALLOWED. (1)

HBM ENGINEERING GROUP, LLC | DESIGNED - AMI | DRAWN - AMI | CHECKED - RTB | DATE - 12/9/2024 | REVISED - 2/18/2025 ADS | REVISED - | REVISED - | REVISED -

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

GENERAL NOTES
I-94 (BISHOP FORD EXPY)

SCALE: | SHEET 1 OF 1 SHEETS | STA. | TO STA.

F.A.I. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
94	(42-B-11-1) BR, BJR 24	COOK	761	4
		CONTRACT NO. 62W87		
		ILLINOIS FED. AID PROJECT		

EROSION CONTROL NOTES

1. ALL ESC MEASURES WILL BE MAINTAINED IN ACCORDANCE WITH THE IDOT EROSION AND SEDIMENT CONTROL FIELD GUIDE FOR CONSTRUCTION INSPECTION FOUND ON THE CONSTRUCTION TAB AT: (HTTPS://IDOT.ILLINOIS.GOV/CONTENT/DAM/SOI/EN/IWER/IDOT/DOCUMENTS/TRANSPORTATION-SYSTEM/MANUALS-GUIDES-AND-HANDBOOKS/HIGHWAYS/ENVIRONMENT/EROSION-AND-SEDIMENT-CONTROL-FIELD-GUIDE-FOR-CONSTRUCTION-INSPECTION.PDF).
2. THE CONTRACTOR WILL ASSUME RESPONSIBILITY FOR MAINTENANCE OF ALL SOIL EROSION CONTROL DURING CONSTRUCTION.
3. THE CONTRACTOR SHALL CHECK ALL ESC MEASURES WEEKLY AND AFTER EACH RAINFALL, 0.5 INCHES OR GREATER IN A 24 HOUR PERIOD, OR EQUIVALENT SNOWFALL. DURING WINTER MONTHS, ALL MEASURES SHOULD BE CHECKED BY THE CONTRACTOR AFTER EACH SIGNIFICANT SNOWMELT.
4. THE CONTRACTOR SHALL PROVIDE THE RE A PLAN TO ENSURE THAT A STABILIZED FLOW LINE WILL BE PROVIDED DURING STORM SEWER CONSTRUCTION. THE USE OF A STABILIZED FLOW LINE BETWEEN INSTALLED STORM SEWER AND OPEN DISTURBANCE WILL REDUCE THE POTENTIAL FOR THE OFFSITE DISCHARGE OF SEDIMENT-BEARING WATERS, ESPECIALLY WHEN RAIN IS FORECASTED, SO THAT FLOW WILL NOT ERODE. LACK OF APPROVED PLAN OR FAILURE TO COMPLY WILL RESULT IN AN ESC DEFICIENCY DEDUCTION.
5. ANY LOOSE MATERIAL DEPOSITED IN THE FLOW LINE OF DRAINAGE STRUCTURES, WHICH OBSTRUCTS THE NATURAL FLOW OF WATER, SHALL BE REMOVED AT THE CLOSE OF EACH WORKING DAY. PRIOR TO ACCEPTANCE OF THE IMPROVEMENT, ALL DRAINAGE STRUCTURES SHALL BE FREE OF DIRT AND DEBRIS. THIS WORK WILL NOT BE PAID FOR SEPARATELY BUT SHALL BE CONSIDERED AS INCIDENTAL.
6. TEMPORARY OR PERMANENT STABILIZATION SHALL BE INITIATED IMMEDIATELY UPON COMPLETION OF DISTURBANCE OR IF THE WORK AREA IS TO BE LEFT UNDISTURBED FOR 14 DAYS OR MORE.
7. UNDER NO CIRCUMSTANCES SHALL THE CONTRACTOR PROLONG FINAL GRADING AND SHAPING SO THAT THE ENTIRE PROJECT CAN BE PERMANENTLY SEEDED AT ONE TIME.
8. EROSION CONTROL ITEMS ARE CONSIDERED TO BE A HIGH PRIORITY ON THIS CONTRACT. THE CONTRACTOR IS RESPONSIBLE FOR INSTALLATION OF ANY ADDITIONAL EROSION CONTROL MEASURES NECESSARY TO PREVENT EROSION AND SEDIMENTATION AS DETERMINED BY THE RE.
9. "WETLANDS EXCLUSION FENCING AND WETLANDS NO INTRUSION" SIGNAGE SHOULD BE PROVIDED AT THE BOUNDARY OF ALL UNIMPACTED WETLANDS AND/OR WATERS OF THE U.S. (WOUS). THE CONTRACTOR CAN BORROW THE SIGNS FROM IDOT BUREAU OF MAINTENANCE.

(2) ADDED SHEET

HBM ENGINEERING GROUP, LLC | DESIGNED - AMI | DRAWN - AMI | CHECKED - RTB | DATE - 2/17/2025 | REVISED - 2/18/2025 ADS | REVISED - | REVISED - | REVISED -

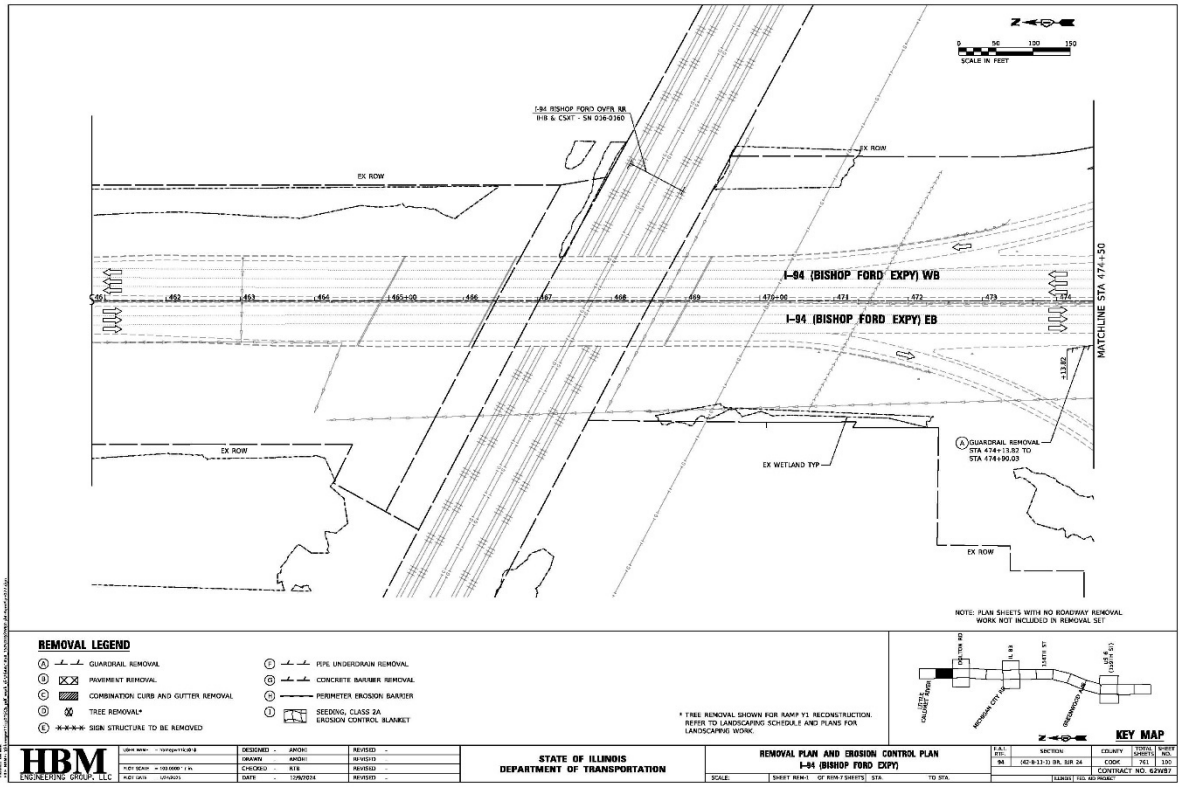
STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

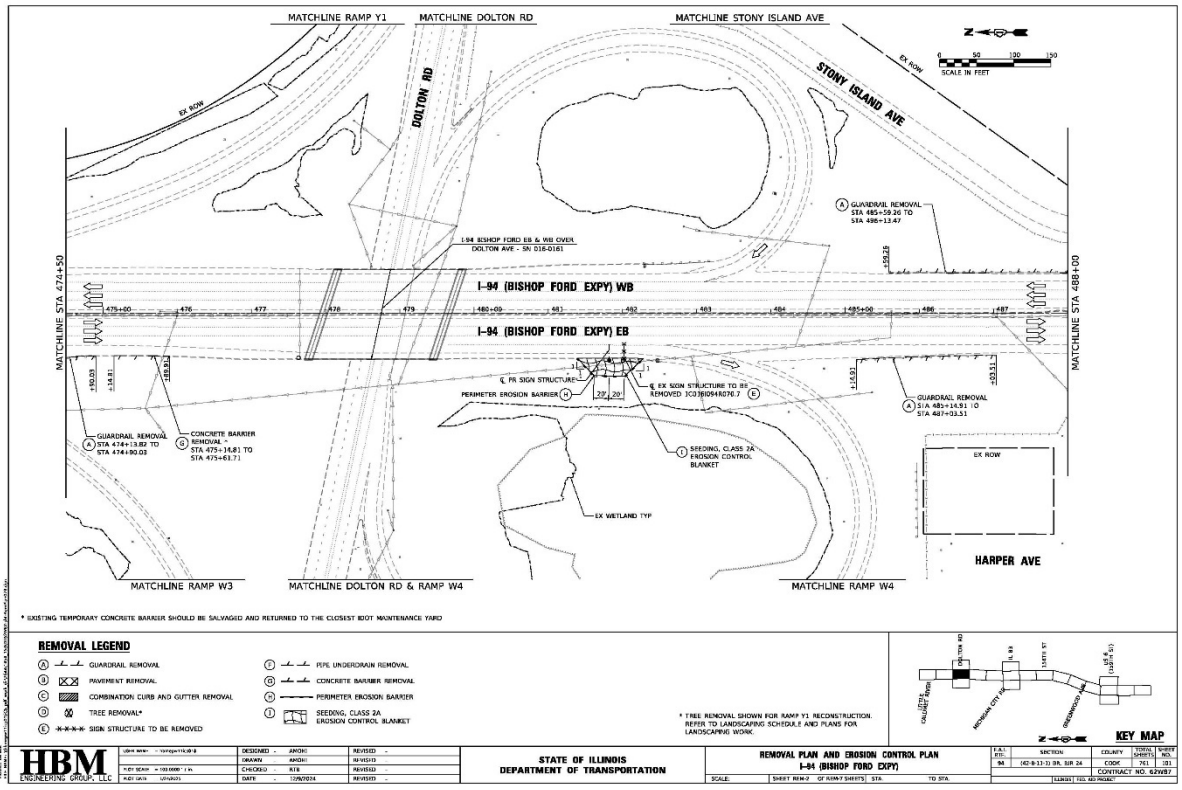
EROSION CONTROL NOTES
I-94 (BISHOP FORD EXPY)

SCALE: | SHEET 1 OF 1 SHEETS | STA. | TO STA.

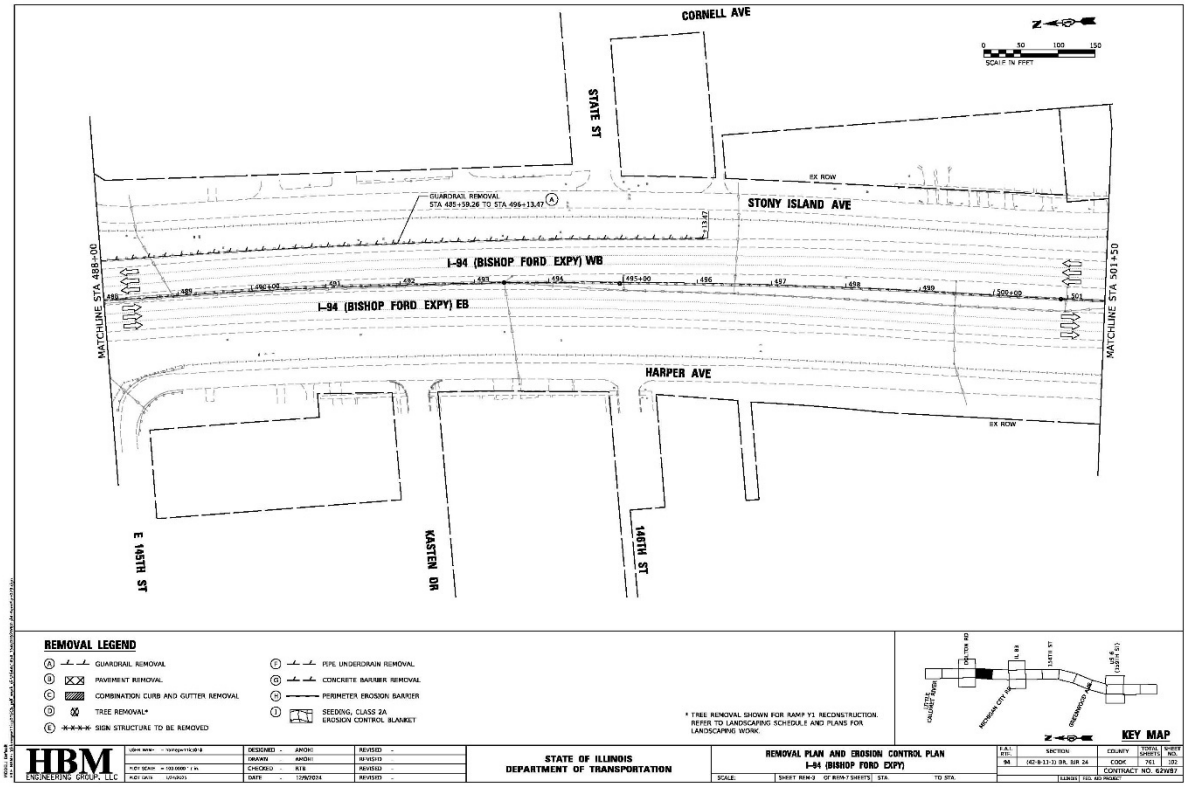
F.A.I. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
94	(42-B-11-1) BR, BJR 24	COOK	761	99A
		CONTRACT NO. 62W87		
		ILLINOIS FED. AID PROJECT		

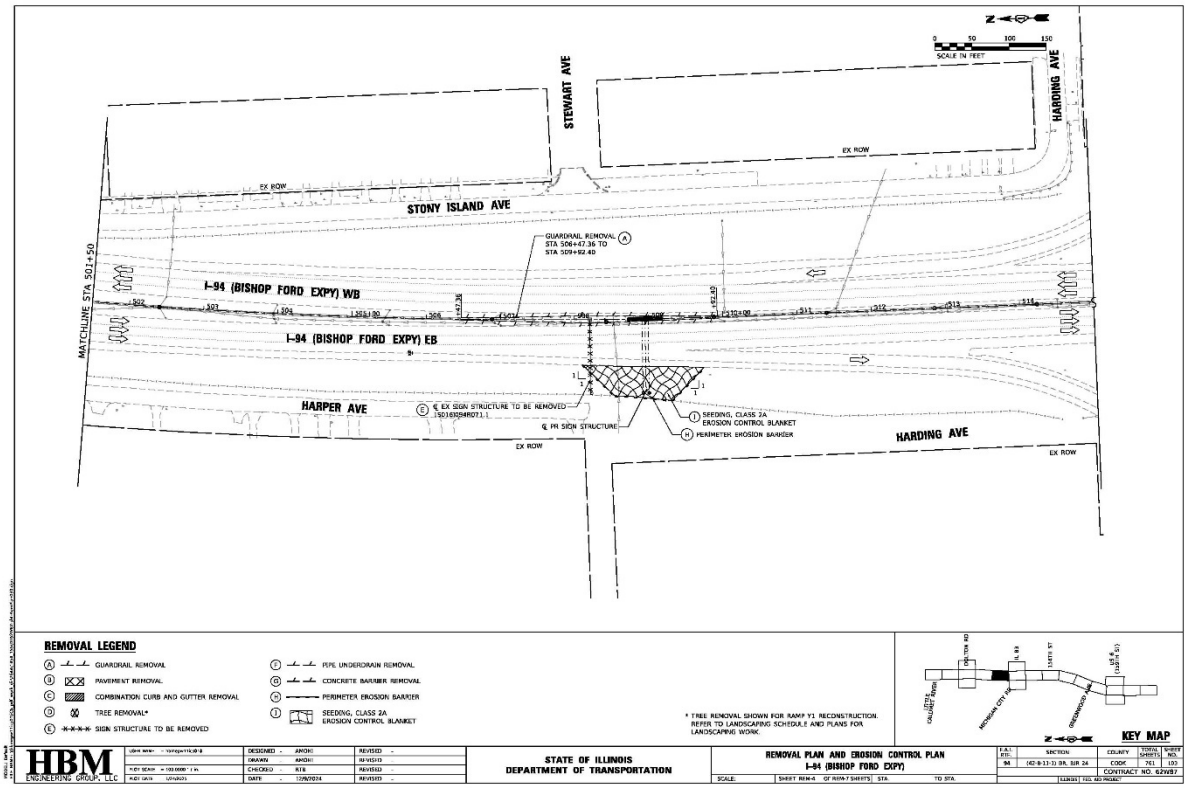
Revised 2-22-2025



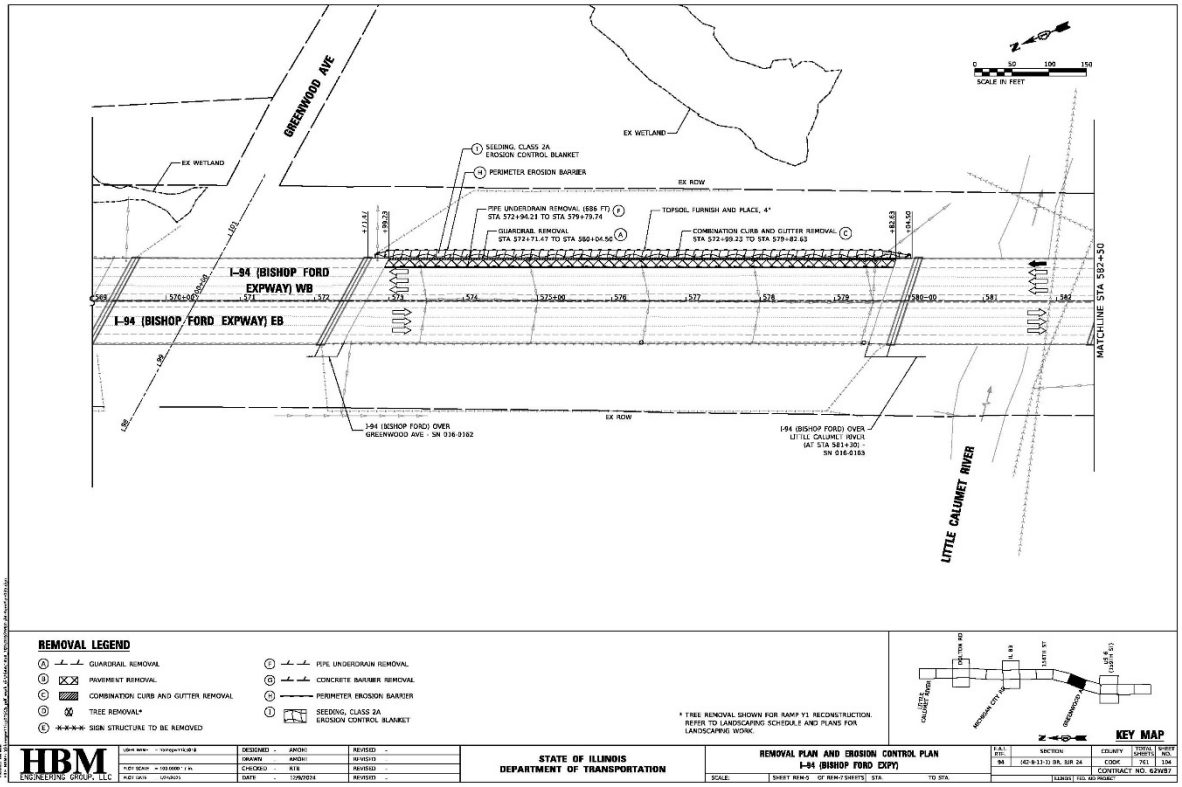


Revised 2-22-2025





Revised 2-22-2025



REMOVAL LEGEND

- A — GUARDRAIL REMOVAL
- B — PAVEMENT REMOVAL
- C — COMBINATION CURB AND GUTTER REMOVAL
- D — TREE REMOVAL*
- E — SIGN STRUCTURE TO BE REMOVED
- F — PIPE UNDERDRAIN REMOVAL
- G — CONCRETE BARRIER REMOVAL
- H — PERIMETER EROSION BARRIER
- I — SEEDING, CLASS 2A EROSION CONTROL BLANKET

* TREE REMOVAL SHOWN FOR RAMP Y1 RECONSTRUCTION. REFER TO LANDSCAPING SCHEDULE AND PLANS FOR LANDSCAPING WORK.

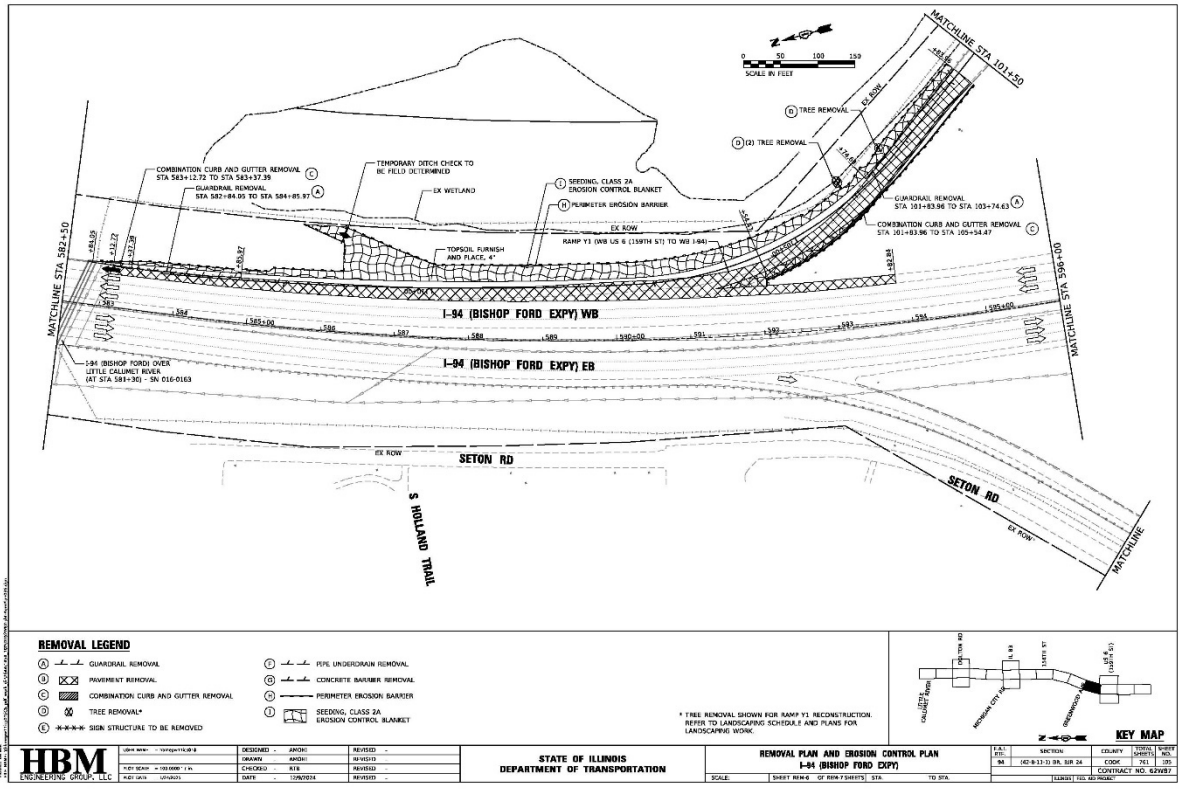
KEY MAP

HBM ENGINEERING GROUP, LLC

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

REMOVAL PLAN AND EROSION CONTROL PLAN
I-94 (BISHOP FORD EXPY)

F.A.I. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
94	(42-B-11-1) BR, BJR 24	COOK	761	194
		CONTRACT NO. 62W87		



REMOVAL LEGEND

- A — GUARDRAIL REMOVAL
- B — PAVEMENT REMOVAL
- C — COMBINATION CURB AND GUTTER REMOVAL
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KEY MAP

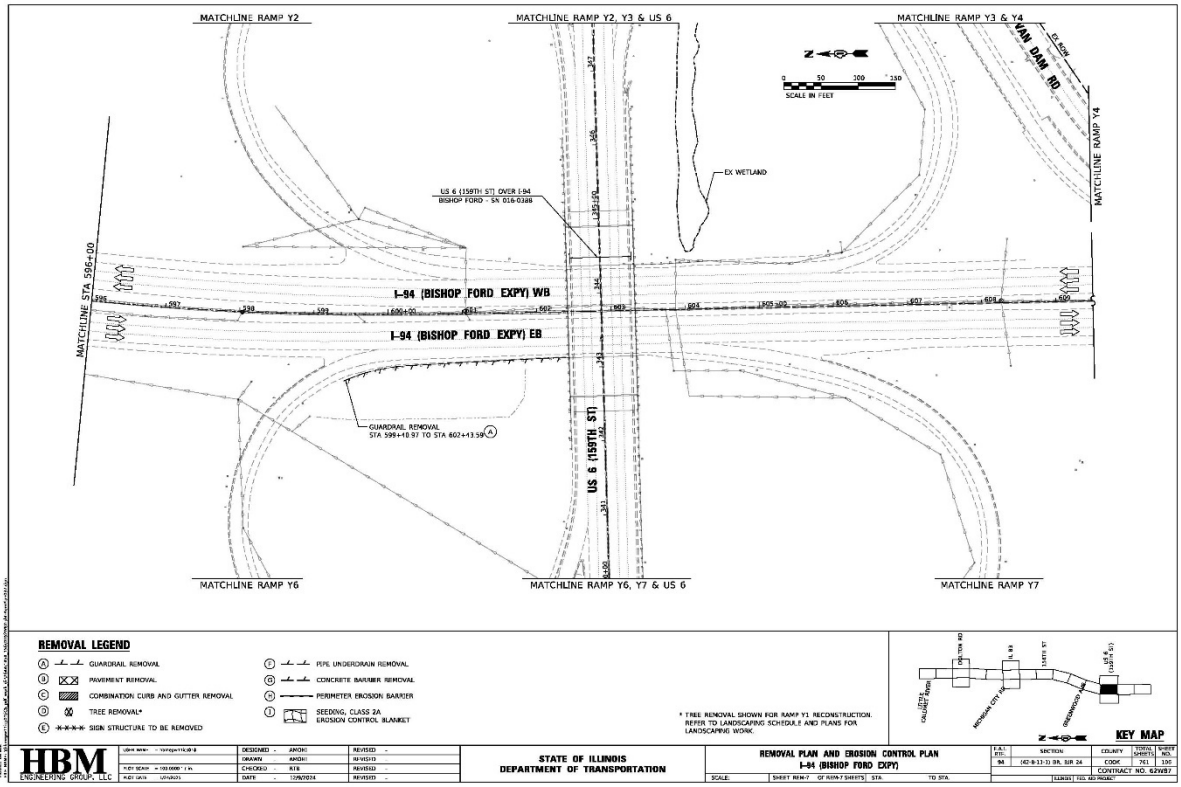
HBM ENGINEERING GROUP, LLC

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

REMOVAL PLAN AND EROSION CONTROL PLAN
I-94 (BISHOP FORD EXPY)

F.A.I. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
94	(42-B-11-1) BR, BJR 24	COOK	761	195
		CONTRACT NO. 62W87		

Revised 2-22-2025



REMOVAL LEGEND

- (A) GUARDRAIL REMOVAL
- (B) PAVEMENT REMOVAL
- (C) COMBINATION CURB AND GUTTER REMOVAL
- (D) TREE REMOVAL*
- (E) SIGN STRUCTURE TO BE REMOVED
- (F) PIPE UNDERDRAIN REMOVAL
- (G) CONCRETE BARRIER REMOVAL
- (H) PERIMETER EROSION BARRIER
- (I) SEEDING, CLASS 2A EROSION CONTROL BLANKET

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KEY MAP

HBM ENGINEERING GROUP, LLC

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

REMOVAL PLAN AND EROSION CONTROL PLAN
I-94 (BISHOP FORD EXPY)

F.A.I. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
94	(42-B-11-1) BR, BJR 24	COOK	761	100
		CONTRACT NO. 62W87		

ILLINOIS FED. AID PROJECT

Revised 2-22-2025

Illinois Department of Transportation

Contractor Certification Statement

Prior to conducting any professional services at the site covered by this contract, the Contractor and every subcontractor must complete and return to the Resident Engineer the following certification. A separate certification must be submitted by each firm. Attach to this certification all items required by Section II.G of the Storm Water Pollution Prevention Plan (SWPPP) which will be handled by the Contractor/subcontractor completing this form.

Route	Marked Route	Section Number
FAI FAI 94	I-94 (Bishop Ford Expwy)	FAI 80 23 Demo

Project Number	County	Contract Number
NHPP-2B1H(072)	Cook	62W87

This certification statement is a part of SWPPP for the project described above, in accordance with the General NPDES Permit No. ILR10 issued by the Illinois Environmental Protection Agency.

I certify under penalty of law that I understand the terms of the Permit No. ILR 10 that authorizes the storm water discharges associated with industrial activity from the construction site identified as part of this certification.

Additionally, I have read and understand all of the information and requirements stated in SWPPP for the above mentioned project; I have received copies of all appropriate maintenance procedures; and, I have provided all documentation required to be in compliance with the Permit ILR10 and SWPPP and will provide timely updates to these documents as necessary.

☐ Contractor
☐ Sub-Contractor

Signature	Date

Print Name	Title

Name of Firm	Phone

Street Address	City	State	Zip Code

Items which this Contractor/subcontractor will be responsible for as required in Section II.G. of SWPPP

OUC APPROVAL LETTER

MEMORANDUM

TO:	Bryan Gallardo Construction Compliance Division
FROM:	Sheetal James Office of Underground Coordination
DATE:	1/21/2025
RE:	**PERMIT ISSUANCE AUTHORIZATION**
REQUESTOR:	**I.D.O.T.**
PROJECT DESCRIPTION :	**FAI 90/94 (Bishop Ford Expressway) west of MLK Drive to US 6 (159th St.): Overlay, Resurfacing and Bridge Rehabilitation. This project is outside of the City of Chicago limits with the exception of few patches (See plans).**
OUC FILE # :	**EFP-**
127616 OUC REVIEW VALIDITY EXPIRE DATE:	**10/13/2025**
INTERNAL PROJECT # :	
NUMBER OF MANHOLES:	
0	

The following project(s) may be released for street openings and/or use of the Public Way permits.

PROJECT LOCATION :	**Alley from 13557 S BISHOP FORD EXPY to 138th Bishop Ford Fwy (Approximate).**

Revised 2-22-2025

EXCAVATION PENETRATION > 12' : / No

Note:

The contractor should be made aware that the conditions of this memorandum are part of the issued permit and any deviations without the approval of the OUC shall result in the cancellation of said permits. No construction shall be performed under this authorization at any other locations. Authorization is given for installation in the subject locations, between the subject limits, only. Contractor must notify 811 Chicago by dialing 811 or (312) 744-7000 at least 2 business days in advance of the start of
work; must comply with all Existing Facility Protection Requirements shown on OUC Review Forms; must coordinate activities with those utilities who have noted involvement; must adhere to Special Existing Facility Requirements provided by:

COORDINATE ALL ACTIVITIES WITH THE AGENCIES BELOW:

ATT - Illinois SBC - Secondary

ATT - Local Network Services

CDOT - Division of Infrastructure Management - PCO

CDOT - Division of Project Development

CDOT - Red Light Cameras

Section ComCast

ComEd - Distribution

Crowncastle

CTA - Engineering - Structure

Department of Water Management - Sewer

Section - 2 Department of Water Management -

Water Section - 3 JC Decaux North America

M W R D

Peoples Gas - Secondary

Provide Copy of this Letter when Applying for Permit