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January 18, 2019 Letting

Notice to Bidders, Specifications and Proposal

Contract No. 68E20
PEORIA County
Section D4 ITS 2018
Various Routes
District 4 Construction Funds

Prepared by

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Checked by

(Printed by authority of the State of Illinois)

Illinois Department of Transportation

NOTICE TO BIDDERS

1. **TIME AND PLACE OF OPENING BIDS.** Electronic bids are to be submitted to the electronic bidding system (iCX-Integrated Contractors Exchange). All bids must be submitted to the iCX system prior to 10:00 a.m. January 18, 2019 prevailing time at which time the bids will be publicly opened from the iCX SecureVault.

2. **DESCRIPTION OF WORK**. The proposed improvement is identified and advertised for bids in the Invitation for Bids as:

   Contract No. 68E20
   PEORIA County
   Section D4 ITS 2018
   Various Routes
   District 4 Construction Funds

   Installation of fiber optic cable, communications equipment and CCTV for a new traffic signal system in Peoria.

3. **INSTRUCTIONS TO BIDDERS**. (a) This Notice, the invitation for bids, proposal and letter of award shall, together with all other documents in accordance with Article 101.09 of the Standard Specifications for Road and Bridge Construction, become part of the contract. Bidders are cautioned to read and examine carefully all documents, to make all required inspections, and to inquire or seek explanation of the same prior to submission of a bid.

   (b) State law, and, if the work is to be paid wholly or in part with Federal-aid funds, Federal law requires the bidder to make various certifications as a part of the proposal and contract. By execution and submission of the proposal, the bidder makes the certification contained therein. A false or fraudulent certification shall, in addition to all other remedies provided by law, be a breach of contract and may result in termination of the contract.

4. **AWARD CRITERIA AND REJECTION OF BIDS**. This contract will be awarded to the lowest responsive and responsible bidder considering conformity with the terms and conditions established by the Department in the rules, Invitation for Bids and contract documents. The issuance of plans and proposal forms for bidding based upon a prequalification rating shall not be the sole determinant of responsibility. The Department reserves the right to determine responsibility at the time of award, to reject any or all proposals, to readvertise the proposed improvement, and to waive technicalities.

By Order of the
Illinois Department of Transportation

Randall S. Blankenhorn,
Secretary

INDEX
FOR
SUPPLEMENTAL SPECIFICATIONS
AND RECURRING SPECIAL PROVISIONS

Adopted January 1, 2019

This index contains a listing of SUPPLEMENTAL SPECIFICATIONS and frequently used RECURRING SPECIAL PROVISIONS.

SUPPLEMENTAL SPECIFICATIONS

RECURRING SPECIAL PROVISIONS

The following RECURRING SPECIAL PROVISIONS indicated by an "X" are applicable to this contract and are included by reference:

TABLE OF CONTENTS

STATE OF ILLINOIS

SPECIAL PROVISIONS

The following Special Provisions supplement the "Standard Specifications for Road and Bridge Construction," adopted April 1, 2016, the latest edition of the "Manual on Uniform Traffic Control Devices for Streets and Highways," and the "Manual of Test Procedures for Materials" in effect on the date of invitation for bids, and the Supplemental Specifications and Recurring Special Provisions indicated on the Check Sheet included herein which apply to and govern the construction of Various Routes, Section D4 ITS 2018, Peoria County, Contract No. 68E20 and in case of conflict with any part or parts of said Specifications, the said Special Provisions shall take precedence and shall govern.

LOCATION OF PROJECT

This project consists of installing conduit, communication vaults, fiber optic cable, CCTV cameras, central system ATMS software, and performing all related collateral work necessary to complete the improvements on the project.

DESCRIPTION OF PROJECT

The Contractor shall be responsible for locating existing and proposed IDOT electrical facilities (traffic signal, overhead lighting, Intelligent Transportation System, etc.) prior to performing any work at his/her own expense if required. The Contractor shall also be liable for any damage to IDOT facilities resulting from inaccurate locating.

The Contractor may obtain, on request, plans for existing electrical facilities from the Department.

The Contractor shall also be responsible for locating and providing protection for IDOT facilities during all phases of construction. If, at any time, the facilities are damaged, the Contractor shall immediately notify the Department and make all necessary arrangements for repair to the satisfaction of the Engineer. This work will not be paid for separately, but shall be included in the contract bid price.

LOCATION OF UNDERGROUND STATE MAINTAINED FACILITIES
Effective: August 3, 2007 Revised: July 31, 2009

The Contractor shall be responsible for locating existing and proposed IDOT electrical facilities (traffic signal, overhead lighting, Intelligent Transportation System, etc.) prior to performing any work at his/her own expense if required. The Contractor shall also be liable for any damage to IDOT facilities resulting from inaccurate locating.

The Contractor may obtain, on request, plans for existing electrical facilities from the Department.

The Contractor shall also be responsible for locating and providing protection for IDOT facilities during all phases of construction. If at any time the facilities are damaged, the Contractor shall immediately notify the Department and make all necessary arrangements for repair to the satisfaction of the Engineer. This work will not be paid for separately, but shall be included in the contract bid price.

TRAFFIC CONTROL PLAN
Effective: October 25, 2018

Traffic control shall be in accordance with the applicable sections of the "Standard Specifications for Road and Bridge Construction," the applicable guidelines contained in the "Illinois Manual on Uniform Traffic Control Devices for Streets and Highways," these Special Provisions, and any special details and Highway Standards contained herein and in the plans.

Special attention is called to Section 701 and Articles 107.09 and 107.14 of the "Standard Specifications for Road and Bridge Construction" and the following Highway Standards relating to traffic control:

701001	701006	701011	701101	701106	701501
701502	701601	701602	701606	701701	701801
701901					

All traffic control devices shall be furnished, erected, maintained, and removed by the Contractor in accordance with the Standard Specifications. Where possible, all post-mounted signs shall be placed a minimum of two feet (2') (0.6 m) beyond the curb or edge of shoulder. Proposed sign spacing may be modified as approved by the Engineer in order to meet existing field conditions or to prevent obstruction of the motorist’s view of permanent signing and lane restrictions at all times.

Traffic shall be maintained on the associated roadways at all times during construction. All lane closures shall be made during off-peak traffic hours, defined as time periods from 8:30 A.M. to 3:00 P.M. and 5:30 P.M. to 7:00 A.M. The Contractor shall notify the Engineer forty-eight (48) hours before the time of a planned closure. The exact time and duration of all lane closures, however, shall be as determined by the Engineer.

Method of Measurement: Traffic Control and Protection will be measured by the unit "Lump Sum", complete.

Basis of Payment: This work shall be paid for at the contract unit price per Lump Sum for TRAFFIC CONTROL AND PROTECTION, (SPECIAL), which shall be payment in full for all labor, materials, and equipment required to furnish, install, and remove the traffic control with the Highway Standards listed above.

SYSTEM IMPLEMENTATION, EQUIPMENT INTEGRATION AND SUPPORT

The Contractor shall install the CCTV cameras at the locations indicated on the plans.

The Contractor shall be responsible for installing the proposed CCTV cameras in accordance with the plans, specifications, and manufacturers recommended practices.

The CCTV camera along with all related components shall be subject to a 30 day burn-in period. During the "burn-in" period, all components shall perform continuously, without any interruption of operation, for a period of thirty days. In the event that there are operational problems during the burn-in period, the burn-in period shall reset back to day one.

The Department will program the cameras and integrate them into the existing ITS system.

The ATMS software installation shall be subject to a 60-day burn-in period after all intersections have been programmed into the software and the software features are fully operational as described in the special provision for ATMS SOFTWARE.

After the successful completion of the burn-in period, the system will have completed final acceptance.

The Department will install the ATMS software on its existing hardware, configure it as needed, and perform all data entry into the software.

The Contractor shall be responsible for installing the proposed CCTV cameras in accordance with the plans, specifications, and manufacturers recommended practices.

This work will not be paid for separately, but shall be included in the contract bid price.

CONTRACT GUARANTEE

The Contractor shall guarantee all electrical equipment, apparatus, materials, and workmanship provided under the contract for a period of six (6) months after the date of final inspection according to Article 801.15.

All instruction sheets required to be furnished by the manufacturer for materials and supplies and for operations shall be delivered to the Engineer prior to the acceptance of the project, with the following warranties and guarantees:

1. The manufacturer's standard written warranty for each piece of electrical equipment or apparatus furnished under the contract.

2. The Contractor's written guarantee that, for a period of six (6) months after the date of final inspection of the project, all necessary repairs to or replacement of said warranted equipment, or apparatus shall be made by the Contractor at no cost to the Department.

3. The Contractor's written guarantee for satisfactory operation of all electrical systems furnished and constructed under the contract for a period of six (6) months after final inspection of the project.

POT-HOLING FOR LOCATION OF EXISTING UNDERGROUND UTILITIES

Potholing to locate existing underground utilities shall be included in the contract bid price for the conduit pay items.

Removal and replacement of existing sidewalk, pavement, and islands only for utility locating purposes will not be paid for separately, but shall be included in the contract bid price for the conduit pay items.

CONSTRUCTION PERMITS

The Contractor shall be responsible for obtaining all required permits from counties, municipalities, and other entities prior to beginning work. The Contractor shall pay all costs associated with obtaining the permits.

Basis of Payment. This work will not be paid for separately, but shall be included in the contract bid price.

AS-BUILT DOCUMENTATION

The Contractor shall locate all proposed conduit, communication vaults, and camera poles every 100 feet using a GIS locating device that is accurate to the nearest foot.

The Contractor shall provide a GIS based map of the conduit route and a complete listing of all of map coordinates in an electronic format (Google Earth KML or KMZ shape file).

Basis of Payment. This work will not be paid for separately, but shall be included in the contract bid price.

SEEDING, MINOR AREAS
Effective July 1, 1990 Revised January 1, 2007

Seeding, fertilizing, and mulching shall be done in accordance with Article 250 of the Standard Specifications except for the following revisions:

All areas disturbed by the work performed shall be seeded, fertilized, and mulched in accordance with Article 251.03(a). The materials may be purchased locally and placed as directed by the engineer.

The estimated area is approximately .001 acre. The seed mixture shall be applied at 100 pounds/acre (110 kg/ha). The mixture shall be one that contains a high percentage of Kentucky Blue Grass. All seeds shall meet the purity and noxious weed requirements of Article 1081.04 of the Standard Specifications, and be approved by the Engineer.

The fertilizer nutrients shall be applied at a rate of 270 lbs. (300 kg) of actual nutrients per acre (hectare). The fertilizer furnished shall be ready mixed material having a ratio of (1-1-1).

The Contractor shall provide the Engineer with the test results from the seed container and the chemical analysis of the fertilizer nutrients.

Basis of payment: The seed, fertilizer, and mulch will not be measured for payment but shall be included in the contract bid price for the pay item for UNDERGROUND CONDUIT of the size specified.

FIBER OPTIC CABLE 48 FIBERS, SINGLE MODE

This work shall be in accordance with Sections 801, 864, 871, and 1076 of the Standard Specifications except as modified herein.

Each cable shall be clearly labeled in each cabinet utilizing a durable computer-generated label. The label shall contain information in regard to the location where the cable is going to or coming from, buffer tube, and fiber color. The Contractor shall provide numerical foot marking data at each handhole, vault, and cabinet to the Department.

The fibers shall be spliced and terminated as shown on the fiber termination diagram on the plan sheets. All terminated fibers shall be clearly labeled.

All terminated fibers shall be laterally spliced into the mainline fiber inside the nearest handhole or communication vault as shown on the plan sheets. Unused buffer tubers and fiber optic cable strands shall be left intact for future use.

Unused buffer tubes shall be readily accessible for future use. Each buffer tube shall be neatly coiled inside each traffic signal and CCTV cabinet with a minimum length of eight feet.

Fibers not being used shall be labeled "spare", and fibers not attached to a distribution enclosure shall be capped and sealed.

All ancillary components, required to complete the fiber optic cable plant, including but not limited to, moisture and water sealants, cable caps, fan-out kits, weather-proof splice kits, boots, cable trays, splice enclosures, termination panels, etc., shall be supplied under this pay item and will not be paid for separately. These items shall be submitted to the Department for approval.

The fiber optic cable shall be clearly marked in each handhole, communication vault, and cabinet with a brightly colored (orange or yellow) weather resistant label securely attached to the cable.

The Contractor shall provide and install a 12 Ga., stranded (EPR-TYPE RHW or THHN), insulated tracer cable in all conduits that contain fiber optic cable and do not contain an existing tracer wire. This work shall be done at the same time the fiber optic cable is pulled. There will be no additional compensation for this work.

Materials. The single-mode, fiber optic cable shall incorporate a loose, buffer-tube design. The cable shall conform to the requirements of RUS 7 CFR1755.900 (PE-90) for a single sheathed, non-armored cable, and shall be new, unused and of current design and manufacture. The number of fibers in each cable shall be as specified on the plans.

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 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 and equipment 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 for approval by the Engineer.

Installation in Conduit.

During cable pulling operations, the Contractor shall ensure that the minimum bending of the cable is maintained during the unreeling and pulling operations. 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.

The pulling tension shall be continuously measured and shall not be allowed to exceed the maximum tension specified by the manufacturer of the cable. Fuse links and breaks can be used to ensure that the cable tensile strength is not exceeded. 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 upon request.

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" or "Chinese-finger 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.

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. The Contractor shall submit a splicing plan to the Department for approval.

Operation and Maintenance Documentation:

After the fiber optic cable plant has been installed, two (2) 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 terminal connector.
- Complete parts list including names of vendors.
- Electronic Testing Files (OTDR traces, power meter data, etc.)

Testing Requirements:

Testing shall be in accordance with Article 801.13 except where modified by this special provision.

The Contractor shall submit detailed test procedures for approval by the Engineer. All continuous fiber runs shall be tested bi-directionally at both 1310 nm and 1550 nm with a power meter and optical source and OTDR. For testing, intermediate breakout fibers may be concatenated and tested end-to-end. Any discrepancies between the measured results and these specifications will be resolved to the satisfaction of the Engineer.

The Contractor shall provide the date, time and location of any tests required by this specification to the Engineer at least 5 days before performing the test. Upon completion of the cable installation, splicing, and termination, the Contractor shall test all fibers in each link for continuity and attenuation. The test procedure shall be as follows:

A Certified Technician utilizing an Optical Source/Power Meter and OTDR shall conduct the testing. The Technician is directed to conduct the test using the standard operating procedures defined by the manufacturer of the test equipment. All fibers installed shall be tested in both directions.

At the completion of the test, the Contractor shall provide two copies of documentation of the test results to the Engineer. The test documentation shall be bound and shall include the following:

Cable & Fiber Identification:

Cable ID
Cable Location - beginning and end point
Fiber ID, including tube and fiber color
Operator Name
Date & Time
Setup Parameters
Wavelength
Pulse width (OTDR)
Refractory index (OTDR)
Range (OTDR)
Scale (OTDR)
Setup Option chosen to pass OTDR “dead zone”

Test Results:

Optical Source/Power Meter:

Total Attenuation
Attenuation (dB/km)

These results shall be provided in tabular form. The following shall be the criteria for the acceptance of the cable:

The test results shall show that the dB/km loss does not exceed +3% of the factory test or 1% of the cable's published production loss. However, no event shall exceed 0.10 dB. If any event is detected above 0.10 dB, the Contractor shall replace or repair the proposed fiber and/or fusion splice and connector including that event point.

The total dB loss of the cable, less events, shall not exceed the manufacturer's production specifications as follows: 0.5 dB/km at both 1310 and 1550 nm.

If the total loss exceeds these specifications, the Contractor shall replace or repair that cable run at the Contractor's expense, both labor and materials. Elevated attenuation due to exceeding the pulling tension during installation shall require the replacement of the cable run at the Contractor's expense, including labor and materials.

The Contractor shall label the destination of each trunk cable onto the cable in each handhole and termination panel.

Slack Storage of Fiber Optic Cables.

A part of this pay 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 and in the traffic controller cabinets.

The amount of slack cable listed in Article 873.03 shall be revised as follows:

Location	Length of Slack Cable (Ft.)
Communications Vault	100.0
Double Handhole	30.0
Handhole	10.0
CCTV or Signal Cabinet	10.0
Junction Box	10.0
Equipment Cabinet	3.0

Basis of Payment: This work will be paid for at the contract unit price per Foot for FIBER OPTIC CABLE 12 FIBERS, SINGLE MODE or FIBER OPTIC CABLE 48 FIBERS, SINGLE MODE and shall be payment in full for all labor, equipment, and materials required to provide, install, terminate, splice, and test the fiber optic cable described above, complete.

FUSION SPLICING OF FIBER OPTIC CABLES

Description. The Contractor will splice optical fibers from different cable sheaths and protect them with a splice closure at the locations shown on the Plans. Fiber splicing consists of in-line fusion splices for all fibers described in the cable plan at the particular location.

Two types of splices are identified. A mainline splice includes selected fibers from each cable run as shown in the plan sheets. In a lateral splice, the buffer tubes in the mainline cable are dressed out and those fibers identified on the plans are accessed in and spliced to lateral cables.

Materials.

Splice Closures:

Splice closures shall be designed for use under the most severe conditions such as moisture, vibration, impact, cable stress and flex temperature extremes as demonstrated by successfully passing the factory test procedures and minimum specifications listed below:

Physical Requirements:

The closures shall provide ingress for up to four cables in a butt configuration.

The closure shall prevent the intrusion of water without the use of encapsulates.

The closure shall be capable of accommodating splice organizer trays that accept mechanical, or fusion splices. The splice closure shall have provisions for storing fiber splices in an orderly manner, mountings for splice organizer assemblies, and space for excess or un-spliced fiber. Splice organizers shall be re-enterable. The splice case shall be UL rated.

Closure re-entry and subsequent reassembly shall not require specialized tools or equipment. Further, these operations shall not require the use of additional parts.

The splice closure shall have provisions for controlling the bend radius of individual fibers to a minimum of 1.5 in (38 mm).

Factory Testing of Splice Closures:

Compression Test: The closure shall not deform more than 10% in its largest cross-sectional dimension when subjected to a uniformly distributed load of 1335 N at a temperature of 0°F and 100°F (-18ºC and 38ºC). The test shall be performed after stabilizing at the required temperature for a minimum of two hours. It shall consist of placing an assembled closure between two flat parallel surfaces, with the longest closure dimension parallel to the surfaces. The weight shall be placed on the upper surface for a minimum of 15 minutes. The measurement shall then be taken with weight in place.

Impact Test: The assembled closure shall be capable of withstanding an impact of 28 N-M at temperatures of 0°F and 100°F (-18ºC and 38ºC). The test shall be performed after stabilizing the closure at the required temperature for a minimum of 2 hours. The test fixture shall consist of 20 lb. (9 kg) cylindrical steel impacting head with a 2 in. (5 cm) spherical radius at the point where it contacts the closure. It shall be dropped from a height of 12 in. (30 cm). The closure shall not exhibit any cracks or fractures to the housing that would preclude it from passing the water immersion test. There shall be no permanent deformation to the original diameter or characteristic vertical dimension by more than 5%.

Cable Gripping and Sealing Testing: The cable gripping and sealing hardware shall not cause an increase in fiber attenuation in excess of 0.05 dB/fiber @ 1,550 nm when attached to the cables and the closure assembly. The test shall consist of measurements from six fibers, one from each buffer tube or channel, or randomly selected in the case of a single fiber bundle. The measurements shall be taken from the test fibers before and after assembly to determine the effects of the cable gripping and sealing hardware on the optical transmission of the fibers.

Vibration Test: The splice organizers shall securely hold the fiber splices and store the excess fiber. The fiber splice organizers and splice retaining hardware shall be tested per EIA Standard FOTP-II, Test Condition I. The individual fibers shall not show an increase in attenuation in excess of 0.1 dB/fiber.

Water Immersion Test: The closure shall be capable of preventing a 10 ft. (3 m) water head from intruding into the splice compartment for a period of seven (7) days. Testing of the splice closure is to be accomplished by the placing of the closure into a pressure vessel and filling the vessel with tap water to cover the closure. Apply continuous pressure to the vessel to maintain a hydrostatic head equivalent to 10 ft. (3 m) on the closure and cable. This process shall be continued for 30 days. Remove the closure and open to check for the presence of water. Any intrusion of water in the compartment containing the splices constitutes a failure.

Certification: It is the responsibility of the Contractor to insure that either the manufacturer, or an independent testing laboratory has performed all of the above tests, and the appropriate documentation has been submitted to the Department. Manufacturer certification is required for the model(s) of closure supplied. It is not necessary to subject each supplied closure to the actual tests described herein.

CONSTRUCTION REQUIREMENTS

The closure shall be installed according to the manufacturer's recommended guidelines. For all splices, the cables shall be fusion spliced.

The Contractor shall prepare the cables and fibers in accordance with the closure and cable manufacturers' installation practices. A copy of these practices shall be provided to the Engineer 21 days prior to splicing operations.

Using a fusion splicer, the Contractor shall optimize the alignment of the fibers and fuse them together. The Contractor shall recoat the fused fibers and install mechanical protection over them.

Upon completing all splicing operations for a cable span, the Contractor shall measure the mean bi-directional loss at each splice using an Optical Time Domain Reflectometer. This loss shall not exceed 0.1 dB.

The Contractor shall measure the end-to-end attenuation of each fiber optic link, from connector to connector, using an optical power meter and source. This loss shall be measured from both directions and shall not exceed 0.5 dB per installed kilometer of single mode cable. Measurements shall be made at both 1,300 nm and 1,550 nm for single mode cable. For multimode cable, power meter measurements shall be made at 850 and 1,300 nm. The end-to-end attenuation shall not exceed 3.8 dB/installed kilometers at 850nm or 1.8 dB per installed kilometer at 1,300 nm for multimode fibers.

As directed by the Engineer, the Contractor at no additional cost to the Department shall replace any cable splice not satisfying the required objectives.

The Contractor shall secure the Splice Closure to the side of the splice facility using cable support brackets. All cables shall be properly dressed and secured to rails or racks within the handhole or traffic signal cabinet. No cables or enclosures will be permitted to lie on the floor of the splice facility. Cables that are spliced inside a building will be secured to the equipment racks or walls as appropriate and indicated on the Plans.

Basis of Payment. This work will not be paid for separately, but shall be included in the bid price for the fiber optic cable pay items.

TERMINATION OF FIBER OPTIC CABLES WITH FUSION SPLICED ST CONNECTORS

Description. The Contractor shall terminate a single mode fiber by fusion splicing a factory-formed ST connector (from a pre-formed fiber optic pigtail) onto a field fiber at the locations shown on the Plans.

Materials. The Contractor shall be responsible for ensuring that the pre-formed pigtail fiber is compatible with the field fiber that it will be fusion splice to.

The splice shall be protected with a protection sleeve/enclosure that will secure both cables and prevent cable movement.

The fiber optic patch cords shall meet or exceed the following specifications:

- High-quality 125um fiber optics
- 900um tight buffer construction
- Aramid yarn individually protected
- Duplex construction
- Stress relief boots color coded (Tx/Rx)
- ST connectors with high-grade zirconia ferrule
- Insertion Loss < 0.2 dB @ 1,310/1,550 nm
- Return Loss < -58 dB @ 1,310/1,550 nm
- Compliant with ANSI/TIA/EIA 568-B.3
- TIA/EIA-604, FOCIS-2

The Contractor shall submit a shop drawing of all proposed components to the Engineer for approval prior to commencing construction.

CONSTRUCTION REQUIREMENTS

The Contractor shall prepare the cables and fibers in accordance with the cable manufacturers' installation practices. A copy of these practices shall be provided to the Engineer 21 days prior to splicing operations.

Using a fusion splicer, the Contractor shall optimize the alignment of the fibers and fuse them together. The Contractor shall recoat the fused fibers and install mechanical protection over them.

Upon completing all splicing operations for a cable span, the Contractor shall measure the mean bi-directional loss at each connector using an Optical Time Domain Reflectometer. This loss shall not exceed the loss of the fusion splice (0.1 dB) plus the loss of the connector (typically 0.75 dB).

As directed by the Engineer, the Contractor at no additional cost to the Department shall replace any cable splice and/or connector not satisfying the required objectives.

Basis of Payment: This work will not be paid for separately, but shall be included in the bid price for the fiber optic cable pay items.

CLOSED-CIRCUIT TELEVISION DOME CAMERA, IP BASED

Description. This work shall consist of furnishing and installing an integrated Closed-Circuit Television (CCTV) Dome Camera Assembly, camera brackets, and all other items required for installation and operation. This assembly shall contain all components identified in the Materials Section and shall be configured as indicated on the plan sheets.

Materials.

The CCTV camera shall be an Axis Model Q6055-E Dome Camera Assembly for integration into the existing District 4 ITS system.

The Contractor shall provide all materials required to install the proposed camera on the proposed sign structure camera mast as shown on the plan sheets.

The Contractor shall submit catalog cut sheets to the Department for all items (mounting brackets, hardware, etc.) that will be utilized for review prior to commencing work.

The Department will program the cameras.

The camera shall meet or exceed the following specifications:

CAMERA

VIDEO:	60 Hz (NTSC), 50 Hz (PAL)
IMAGE SENSOR:	1/2.8" progressive scan CMOS
LENS:	4.44–142.6 mm, F1.6–4.41 Horizontal angle of view: 62.8°–2.23° Vertical angle of view: 36.8°–1.3° Autofocus, auto-iris
DAY AND NIGHT:	Automatically removable infrared-cut filter
MINIMUM ILLUMINATION:	Color: 0.3 lux at 30 IRE F1.6 B/W: 0.03 lux at 30 IRE F1.6 Color: 0.5 lux at 50 IRE F1.6 B/W: 0.04 lux at 50 IRE F1.6
SHUTTER TIME: NTSC:	1/33000 s to 1/3 s with 50 Hz 1/33000 s to 1/4 s with 60 Hz

PAN/TILT/ZOOM:	Pan: 360° endless, 0.05° - 450°/s Tilt: 220°, 0.05°-450°/s 32x optical zoom and 12x digital zoom, total 384x zoom E-flip, 256 preset positions, Tour recording, Guard tour, Control queue, On-screen directional indicator, Set new pan 0°, Adjustable zoom speed

VIDEO

VIDEO COMPRESSION:	H.264 (MPEG-4 Part 10/AVC), Motion JPEG
RESOLUTIONS:	HDTV 1080p 1920x1080 to 320x180 HDTV 720p 1280x720 to 320x180
FRAME RATE (H.264):	Up to 60/50 fps (60/50 Hz) in HDTV 720p Up to 30/25 fps (60/50 Hz) in HDTV 1080p
VIDEO STREAMING:	Multiple, individually configurable streams in H.264 and Motion JPEG, Axis' Zipstream technology, Controllable frame rate and bandwidth, VBR/MBR H.264
IMAGE SETTING:	Manual shutter time, compression, color, brightness, sharpness, white balance, exposure control, exposure zones, fine tuning of behavior at low light, rotation: 0°, 180°, text and image overlay, 32 individual 3D privacy masks, image freeze on PTZ, automatic defog, backlight compensation Wide Dynamic Range (WDR): Up to 120 dB depending on scene, highlight compensation

NETWORK

SECURITY:	Password protection, IP address filtering, HTTPSa encryption, IEEE 802.1Xa network access control, Digest authentication, User access log, Centralized Certificate Management
PROTOCOLS:	IPv4/v6, HTTP, HTTPSa, SSL/TLSa, QoS Layer 3 DiffServ, FTP, CIFS/SMB, SMTP, Bonjour, UPnPTM, SNMP v1/v2c/v3 (MIB-II), DNS, DynDNS, NTP, RTSP, RTP, SFTP, TCP, UDP, IGMP, RTCP, ICMP,DHCP, ARP, SOCKS, SSH, NTCIP

SYSTEM INTEGRATION

APPLICATION PROG INTERFACE:	Open API for software integration, including VAPIX® and AXIS Camera Application Platform; specifications at www.axis.com, AXIS Video Hosting System (AVHS) with One-Click Connection, ONVIF Profile S, specification at www.onvif.org

ANALYTICS:	Video motion detection, Autotracking, Active Gatekeeper Basic Analytics (not to be compared with third-party analytics): Object removed, Enter/Exit detector, Fence detector, Object Counter, Highlight compensation, Support for AXIS Camera Application Platform enabling installation of third-party applications, see www.axis.com/acap
EVENT TRIGGERS:	Detectors: Live stream accessed, Video motion detection, Shock Detection, Object removed, Enter/Exit detector, Fence detector, Object counter; Hardware: Fan, Network, Temperature, Casing Open; PTZ: Autotracking, Error, Moving, Ready, Preset Reached; Storage: Disruption, Recording; System: System Ready; Time: Recurrence, Use Schedule; Input signal: Manual trigger, Virtual input
EVENT ACTIONS:	Day/night mode, overlay text, video recording to edge storage, pre- and post-alarm video buffering, send SNMP trap PTZ: PTZ preset, start/stop guard tour File upload via FTP, SFTP, HTTP, HTTPS network share and Email; Notification via email, HTTP, HTTPS and TCP
DATA STREAMING	Event data
BUILT IN INSTALLATION AIDS	Pixel Counter

GENERAL

CASING:	IP66-, NEMA 4X- and IK10-rated Metal casing (aluminum), polycarbonate (PC) clear dome, sunshield (PC/ASA)
SUSTAINABILITY:	PVC Ffree
MEMORY:	512 MB RAM, 128 MB Flash
POWER CAMERA:	Axis High PoE midspan 1–port: 100–240 V AC, max 74 W Camera consumption: typical 16 W, max 60 W
CONNECTORS:	RJ45 10BASE-T/100BASE-TX PoE, RJ45 Push-pull Connector (IP66) included
EDGE STORAGE:	Support for SD/SDHC/SDXC card Support for recording to dedicated network-attached storage (NAS); For SD card and NAS recommendations see www.axis.com

OPERATING CONDITIONS:	With 30 W midspan: -20°C to 50°C (-4°F to 122°F) With 60 W midspan: -50°C to 50°C (-58°F to 122°F) Maximum temperature (intermittent): 60°C (140°F) Arctic Temperature Control: Start-up as low as -40°C (-40°F) Humidity 10–100% RH (condensing)
APPROVALS:	EMC: EN 55022 Class A, EN 61000-3-2, EN 61000-3-3, EN 61000-6-1, EN 61000-6-2, EN 55024, FCC Part 15 Subpart B Class A, ICES-003 Class A, VCCI Class A, RCM AS/NZS CISPR 22 Class A, KCC KN32 Class A, KN35 Safety: IEC/EN/UL 60950-1, IEC/EN/UL 60950-22 Environment: EN 50121-4, IEC 62236-4, IEC 60068-2-1, IEC 60068-2-2, IEC 60068-2-6, IEC 60068-2-14, IEC 60068-2-27, IEC 60721-4-3, NEMA 250 Type 4X, IEC 60068-2-30, IEC 60068-2-60, IEC 60068-2-78, IEC/EN 60529 IP66, NEMA TS-2-2003 v02.06, Subsection 2.2.7, 2.2.8, 2.2.9; IEC 62262 IK10, ISO 4892-2 Midspan: EN 60950-1, GS, UL, cUL, CE, FCC, VCCI, CB, KCC, UL-AR
WEIGHT:	3.7 kg (8.2 lb.)
INCLUDED ACCESSORIES:	Axis High PoE 60 W midspan 1-port, RJ45 Push-pull Connector (IP66), Sunshield, Installation Guide, Windows decoder 1-user license
VIDEO MANAGEMENT SOFTWARE:	AXIS Camera Companion, AXIS Camera Station, Video management software from Axis' Application Development Partners available on www.axis.com/techsup/software
WARRANTY:	Axis Three-Year Warranty and AXIS Extended Warranty option

Environmental Enclosure/Housing.

The environmental enclosure shall be designed to physically protect the integrated camera from the outdoor environment and moisture via a sealed enclosure. If the option exists in the standard product line of the manufacturer, the assembly shall be supplied with an integral sun shield. The enclosure shall be fully water and weather resistant with a NEMA 4 rating or better.

The camera dome shall be constructed of distortion free acrylic or equivalent material that must not degrade from environmental conditions. The environmental housing shall include a camera-mounting bracket. In addition, the environmental housing shall include a heater, blower, and power surge protector. An integral fitting compatible with a standard 1-1/2 in (38.1 mm) NPT pipe, suitable for outdoor pendant mounting shall also be provided.

The enclosure shall be equipped with a heater controlled by a thermostat. The heater shall turn on when the temperature within the enclosure falls below 40°F (4.4°C). The heater shall turn off when the temperature exceeds 60°F (15.6°C). The heater will minimize internal fogging of the dome faceplate when the assembly is operated in cold weather.

In addition, a fan shall be provided as part of the enclosure. The fan will provide airflow to ensure effective heating and to minimize condensation.

The enclosure shall be equipped with a hermetically sealed, weatherproof connector, located near the top for external interface with power, video, and control feeds.

Cctv Dome Camera Mounting Supports.

The Contractor shall furnish and install an Axis Pole Mount Bracket T91L61 (Part Number 5801-721) for camera installation on traffic signal mast arms and CCTV camera poles and stainless steel banding as required.

Mounting supports shall be configured as shown on the camera support detail plans and as approved by the Engineer. Mount shall be of aluminum construction with enamel or polyester powder coat finish. Braces, supports, and hardware shall be stainless steel. Wind load rating shall be designed for sustained gusts up to 90 mph (145 km/hr), with a 30% gust factor. Load rating shall be designed to support up to 75 lb. (334 N). For roof or structural post/light pole mounting, mount shall have the ability to swivel inward for servicing. The mounting flange shall use standard 1½ inch (38.1 mm) NPT pipe thread.

Connecting Cables.

The Contractor shall furnish and install outdoor rated, shielded CAT 5E cable. The cable shall be terminated using the IP66 rated RJ-45 connector on the camera end and a shielded RJ-45 connector in the cabinet. The Contractor shall test the cable prior after termination.

Cable will be paid for separately under the pay item CAT 5 ETHERNET CABLE.

CONSTRUCTION REQUIREMENTS

General.

The Contractor shall prepare a shop drawing detailing the complete CCTV Dome Camera Assembly and installation of all components to be supplied for approval of the Engineer. Particular emphasis shall be given to the cabling and the interconnection of all of the components.

The Contractor shall install the CCTV dome camera assembly at the locations indicated in the Plans. The CCTV Dome Camera Assembly shall be mounted on a pole, wall, or other structure.

Testing.

The Contractor shall test each installed CCTV Dome Camera Assembly. The test shall be conducted from the field cabinet using the standard communication protocol and a laptop computer. The Contractor shall verify that the camera can be fully exercised and moved through the entire limits of Pan, Tilt, Zoom, Focus and Iris adjustments, using both the manual control and presets. The Contractor shall maintain a log of all testing and the results. A representative of the Contractor and a representative of the Engineer shall sign the log as witnessing the results. Records of all tests shall be submitted to the Engineer prior to accepting the installation.

Method of Measurement. The closed circuit television dome camera bid item will be measured for payment by the actual number of CCTV dome camera assemblies furnished, installed, tested, and accepted.

Basis of Payment. Payment will be made at the contract unit price for Each CLOSED CIRCUIT TELEVISION DOME CAMERA, IP BASED including all equipment, material, testing, documentation, and labor detailed in the contract documents for this bid item.

CAT 5 ETHERNET CABLE

This work shall be in accordance with Sections 873, 1076, and 1088 of the Standard Specifications except as modified herein.

This work shall consist of furnishing and installing an outdoor rated CAT5E cable in conduits, handholes, and poles.

The cable shall be rated for outdoor use and conform to the following specifications:

- Outdoor CMX Rated Jacket (climate/oil resistant jacket)
- UV Resistant Outer Jacket Material (PVC-UV, UV Stabilized)
- Outer Jacket Ripcord
- Designed For Outdoor Above- Ground or Conduit Duct applications
- Cat5E rated to 350MHz (great for 10/100 or even 1000mbps Gigabit Ethernet)
- Meets TIA/EIA 568b.2 Standard
- Shielded Twist Pair
- 4 Pairs, 8 Conductors
- 24AWG, Solid Core Copper
- UL 444 ANSI TIA/EIA-568.2 ISO/IEC 11801
- RoHS Compliant
- Water Blocking Gel

Basis of Payment: This work will be paid for at the contract unit price per Foot for CAT 5 ETHERNET CABLE, which shall be payment in full for all labor, equipment, and materials required to provide and install the cable described above, complete.

COMMUNICATIONS VAULT

This work shall be in accordance with Sections 814 and 1088 of the Standard Specifications except as modified herein.

This work shall consist of furnishing and installing a communications vault constructed of polymer concrete.

The following items are approved for use in District 4: Hubbel, Quazite, Part Numbers: PG2436HA00 (Cover) and PG2436BA30 (Box).

The communications vault and lid shall conform to the following specifications:

Cover:

Material: Polymer Concrete
Nominal Dimensions 24" W x 36 L"
Gasketed, Heavy Duty Lid with 2 Bolts
Design/Test Load: 15,000/22,500 lbs.
ANSI Tier: 15
Gasketed

Box:

Material: Polymer Concrete
Nominal Dimensions: 24" W x 36" L x 30" D
Open Bottom
Design/Test Load: 22,500/33,750 lbs.
ANSI Tier: 22

The location of the handhole shall be excavated so that the top of the handhole is set flush with the sidewalk or paved surface. When installed in earth shoulder away from the pavement edge, the top surface of the handhole shall be 1 in. (25 mm) above the finished grade. The excavation shall be deep enough to accommodate the depth of the box and french drain.

The French drain shall be constructed underneath the proposed handhole according to Article 601.06 and in accordance with Highway Standard 814006.

The conduits shall enter the vault at between 24" and 30" and the Contractor shall install six (6") inches of CA 5 or CA 7 in the bottom of the vault.

The Contractor shall submit testing reports to verify that the communications vaults and lids meet the requirements of ANSI Tier 15 and ANSI Tier 22 loading.

The locating cable shall be continuous and accessible on the outside of each communication vault. The Contractor shall utilize appropriate corrosion resistant hardware (stainless steel) and connections to the locating wire. The Contractor shall submit material and installation methods to the Department for review.

The communications vault lid shall be engraved with the legend IDOT FIBER OPTIC CABLE. The Contractor may elect to furnish and install a permanent weatherproof embossed placard onto the lid in lieu of marking from the factory.

Basis of Payment: This work will be paid for at the contract unit price of Each for COMMUNICATIONS VAULT, which shall be payment in full for all labor, equipment, and materials required to provide and install the equipment described above, complete.

HANDHOLE, PORTLAND CEMENT CONCRETE (SPECIAL)

This work shall consist of furnishing the materials and constructing a handhole in accordance with the applicable Articles of Section 814 and 1088 of the Standard Specifications with the following modifications:

The Contractor shall remove the existing communications pedestals, dispose of them off site, and modify the existing conduits (extend, trim, etc.) as required to accommodate the proposed concrete handhole.

The lift ring for the cover shall consist of a solid closed ring of stainless steel at least 3/8 inch in diameter. The lift ring shall be attached to the cover by a loop of stainless steel at least 3/8 inch in diameter. The lift ring and loop shall be recessed in the cover.

The Contractor shall install heavy-duty, fully-galvanized hooks, with a minimum diameter of ½" in the proposed handhole. The Contractor shall submit this material to the Engineer prior to construction of the handholes.

The lid shall be marked with the legend "Traffic Signals".

Pre-cast handholes are not allowed.

All unsuitable materials shall be disposed of by the Contractor outside the job limits.

Basis of Payment: This work will be paid for at the contract unit price Each for HANDHOLE, PORTLAND CEMENT CONCRETE (SPECIAL) which price shall be payment in full for all labor, materials, and equipment required to provide the handhole described above as well as any necessary excavating, backfilling, disposal of unsuitable materials, and furnishing all materials within the limits of the handhole.

HANDHOLE, PORTLAND CEMENT CONCRETE

This work shall consist of furnishing the materials and constructing a handhole in accordance with the applicable Articles of Section 814 and 1088 of the Standard Specifications with the following modifications:

The lift ring for the cover shall consist of a solid closed ring of stainless steel at least 3/8 inch in diameter. The lift ring shall be attached to the cover by a loop of stainless steel at least 3/8 inch in diameter. The lift ring and loop shall be recessed in the cover.

The Contractor shall install heavy-duty, fully-galvanized hooks, with a minimum diameter of ½" in the proposed handhole. The Contractor shall submit this material to the Engineer prior to construction of the handholes.

The lid shall be marked with the legend "Traffic Signals".

Pre-cast handholes are not allowed.

All unsuitable materials shall be disposed of by the Contractor outside the job limits.

Basis of Payment: This work will be paid for at the contract unit price Each for HANDHOLE, PORTLAND CEMENT CONCRETE which price shall be payment in full for all labor, materials, and equipment required to provide the handhole described above, as well as, any necessary excavating, backfilling, disposal of unsuitable materials, and furnishing all materials within the limits of the handhole.

FULL-ACTUATED CONTROLLER IN EXISTING CABINET

This work shall be in accordance with the applicable Articles of Sections 857, 1073, and 1074 of the Standard Specifications with the following modifications:

This pay item shall consist of furnishing a traffic signal controller and installing it inside an existing traffic signal cabinet.

The traffic signal controller shall be a NEMA TS-2 Type 2, ATC, NTCIP 1201/1202 compliant controller that meets or exceeds the following specifications:

Hardware Features:

- 4 Standard 10/100 Mbit Ethernet Ports
- 2 USB Ports
- Keypad & 6 Programmable Special Function Keys
- Latest ATC5201 draft standard compliant engine board
- Complaint with ATC 5.2b
- 16 Line X 40 Character (240 X 120 Graphics) LCD Display
- 7 configurable Serial Ports (5 are SDLC capable)
- Power 95 – 250 VAC 50/60 Hz Auto Sensing
- -40 to +80o C operating environment
- 64MB Flash / 64MB DRAM memory / 1MB SRAM

Software Features:

- Compliant with all current NTCIP – ASC requirements
- Open Architecture Embedded Linux Multi-Processing Operating System
- Full support for all required ATC 5.2b software drivers under the latest Linux kernel release v3.4
- ATC Standard API for third party application support
- Runtime libraries per ATC 5.2b Standard
- One touch updates via Network or USB interface
- Compliant with latest TS 2 with NTCIP Standards
- Support for 50 Signal Phases each assignable to one of 16 rings
- Programming of Phases across multiple rings which can operate simultaneously per NTCIP established Phases concurrencies
- Support for Flashing Yellow Arrow Sequencing

The Contractor shall deliver the controller either to the Department or the city of Peoria (depending on the intersection maintenance jurisdiction) a minimum of seven (7) days for programming prior to installation in the existing traffic signal cabinet.

Basis of Payment: This work shall be paid for at the contract unit price per Each for FULL-ACTUATED CONTROLLER IN EXISTING CABINET which price shall be payment in full for all labor, equipment, and materials required to furnish the controller described above and deliver it to the Department.

FULL ACTUATED CONTROLLER AND TYPE IV CABINET, SPECIAL

This work shall be in accordance with Sections 857, 1073, and 1074 of the Standard Specifications except as modified herein.

The cabinet and controller shall be compatible with the proposed ATMS software.

The Contractor shall remove the existing traffic signal cabinets and deliver them to the city of Peoria maintenance facility located at 3505 North Dries Lane, Peoria.

The Contractor shall remove existing photocell relays, DIN rail mounted communications equipment, traffic signal interconnect equipment, and fiber optic enclosures from existing traffic signal controller cabinets and install the equipment in the proposed controller cabinets at each location.

The Contractor shall relocate battery backup system cabinets and components from the existing traffic signal controller cabinets to the proposed controller cabinets.

The traffic signal cabinet shall have a NEMA TS-2 back panel. The cabinet shall include a malfunction management unit to allow enhanced fault monitoring capabilities. The malfunction management unit shall support flashing yellow arrow operation and be a Reno A&E model MMU-1600G equipped with a graphical display and Ethernet port or an EDI MMU-16LEip with graphical display and Ethernet port.

The controller shall be a fully complaint NTCIP 1201/1202 ATC NEMA TS-2 Type 2 controller equipped with an Ethernet port, USB port, and data key.

The malfunction management unit shall be equipped with the latest software and firmware revisions.

The cabinet shall be equipped with a plexi-glass shield that covers the power panel which houses the mercury bus relay, line filter, circuit breakers, and other electrical components.

The cabinet shall be equipped with a plexi-glass shield that covers the thermostat and a fluorescent lighting assembly that turns on when the door is opened. The fluorescent lighting assembly shall be equipped with a cold weather ballast and mounted in a location that will not interfere with cabinet maintenance.

The traffic signal cabinet shall be equipped with a 16-position load switch back panel to accommodate future expansion.

The cabinet shall be furnished with a compact heater strip (to be used for moisture reduction during cold weather. The heater shall be thermostatically controlled, operate at 120 volts, have a minimum wattage of 150 watts, a maximum wattage of 250 watts, have a shield to protect service personnel and equipment from damaging heat, be separately fused, and be mounted where it does not interfere with a person working in the cabinet.

The traffic signal cabinets shall be equipped with two non GFCI duplex NEMA 5-15R receptacles to be used to provide power to auxiliary equipment.

The cabinet shall be equipped with toggle switch guards for all switches located on the door to prevent accidental switching. The cabinet shall include a high quality deluxe pleated filter.

The cabinet shall be equipped with additional surge protection for the controller, malfunction management unit, and detector amplifiers, and/or video detection system. The surge protector shall be a Transtector model ACP100BWN3 and shall be included in addition to an EDCO SHA-1250 IRS protector. The EDCO SHA-1250 IRS surge protector is to be provided in accordance with Section 1085.47 A(4a) and shall be wired to provide surge protection for the controller, malfunction management unit, and detector amplifiers. The Transtector surge suppressor may be wired to the equipment protected power terminals of the EDCO SHA-1250 IRS unit provided that the controller, MMU, and detection system are protected.

The Contractor shall set up each cabinet in his or her shop for inspection by the Engineer. All phases that are utilized shall be hooked up to a light board to provide observation for each signal indication. The Engineer shall be notified when the setup is complete so that all pertinent timings may be entered into each traffic signal controller. The facility shall be subject to a seven day burn-in period before installation will be allowed.

After installing the cabinet in the field, prior to resuming normal signal operation, the Contractor shall test the cabinet by connecting a jumper to the cabinet field terminals to ensure that all conflicting signals will place the cabinet into conflict flash and to verify that the cabinet, controller, and malfunction management unit are operating correctly. The Contractor shall make arrangements with the local police agency to provide traffic control during the conflict test.

Basis of Payment: This work will be paid for at the contract unit price Each for FULL ACTUATED CONTROLLER AND TYPE IV CABINET SPECIAL and shall be payment in full for all labor, materials, and equipment required to remove the existing traffic signal cabinet and furnish, install, and test the traffic signal cabinet described above, complete.

INDUCTIVE LOOP DETECTOR

This work shall be in accordance with Sections 885 and 1079 of the Standard Specifications except as modified herein.

The detector amplifier shall be equipped with an LCD display that is capable of displaying the loop frequency and inductance and shall conform to the following specifications:

- Custom LCD displays complete status and function settings of the detector.
- All functions are programmable from the front panel LCD "Menu" – no removing of detector to change function settings.
- LCD displays loop frequency, loop inductance, & -L/L% values.
- LCD displays the accumulated number of loop failure incidents since the detector was last reset - helps diagnose intermittent systems.
- LCD bar graph displays loop inductance change to verify ideal sensitivity level setting.
- Selectable "Continuous-CALL" and "Channel-Off" to aid system troubleshooting.
- 8 loop frequencies and 9 levels of sensitivity.
- 2 Selectable modes of operation: Presence or Pulse.
- 255 second CALL Delay and 25.5 second Extension timers.
- 999 second Max. Presence Timer. NEMA TS 2 Status Output.
- EOG (end of green) reset synchronization for Max. Presence timer.
- Super bright LEDS indicate vehicle detection or loop failure.
- Environmentally sealed push button switches to insure trouble-free service.
- Phase Green (Delay Override) input.

The detector amplifier shall be equipped with relay or solid state outputs to ensure that the detectors fail in a constant call mode.

The RENO A&E Model C-1200 Series and EDI Oracle Series are currently approved for use within the District.

Basis of Payment: This work shall be paid for at the contract unit price Each for INDUCTIVE LOOP DETECTOR which price shall be payment in full for all labor, equipment, and materials required to supply and install the inductive loop detector described above, complete.

ETHERNET SWITCH, LAYER 3, 24 FIBER PORTS (MATERIAL ONLY)

The Contractor shall furnish an Ethernet switch and deliver it to the Department.

The Ethernet switch shall be an Extreme Networks Summit X460-24X equipped Extreme Advanced Core software license and a one-year Software and TAC Support Agreement that meets the following specifications:

General Specifications.

Switching Throughput:

- Bandwidth, Gbps: non-blocking
- 176 Gbps Aggregated Switch Fabric Bandwidth Capacity
- Less than 4ms latency
- 128 load sharing trunks, up to 8 members per trunk

Forwarding Rate:

- 130.9 Mpps million packets/second
- Max Packet Size: 9,216 byte (Jumbo Frame)

Ports:

- 24 100/1000BASE-X unpopulated SFP
- 8 port 10/100/1000BASE-T (4 10/100/1,000BASE-T ports shared with SFP ports)
- 4 SFP (mini-GBIC)
- 1 Serial Port (control port)
- 1 10/100BASE-T out-of-band management port
- Maximum Active GBE Ports : 28
- Maximum Active 10GBE Ports : 6

Expansion:

- Stack Port: Yes
- Expansion Slots: 6
- Expansion Slot Type: SFP, Stacking Module

General:

- Number of QoS Queues/Port: 8
- Number of VLANs: 4,096
- VLAN Types: Port, IEEE 802.1Q, and MAC-based Number of ACL Rules/lines: 3,072 (can be applied to either ingress or egress)
- Less than 4 mms latency (64-byte)
- 128 Load Sharing Trunks, up to 8 Members per Trunk

Forwarding Tables:

- Layer 2/MAC addresses: 32K
- Layer 3 IPv4 LPM Entries: 12K
- Layer 3 IPv6 LPM Entries: 6K
- Layer 3 Interfaces: 512
- OSPF External Routes: >100K

CPU and Memory:

- 64-bit MIPS Processor, 600 MHz clock
- 1GB ECC DRAM
- 1GB Compact Flash
- USB port for external USB flash

Rate Limiting:

- 4.096 ingress bandwidth meters
- Ingress bandwidth policing/rate limiting: packets are classified after Ingress into flows using ACLs and a rate limiter is assigned to a given flow
- 8 QoS egress/queues per port
- Rate Limiting Granularity: 8Kbps

Physical Specifications:

- Height: 1RU 1.73 inches/4.4 cm (Nominal)
- Width: 17.4 inches/44.1 cm (Nominal)
- Depth: 17.0 inches/43.2 cm (Nominal)
- Weight: 13.2lbs/6.01kg
- Operating Temperature Range: -0°C to 45°C (32°F to 113°F)
- Storage Temperature Range - Degrees/Degrees Celsius: -40°C to +70°C (-40°F to 158°F)
- Humidity Range: 10-95% (RH) non-condensing
- Altitude: 0 – 3,000 meters (9,850 feet)
- Shock (half sine): 30 m/s2 (3G), 11 ms, 60 shocks
- Random Vibration: 3 – 500 Hz at 1.5G rms

Power:

- Min Voltage/Associated Current: 85VAC/4A
- Max Voltage/Associated Current: 264VAC/2A
- Heat Dissipation, 90 Watts Minimum (304 BTU/hr), 107 Watts Maximum (365 BTU/hr)

Acoustic:

- 43.3 dB Fan Noise, 63.0 dB Acoustic Noise

Management Features:

- Serial management port on the front panel for ease of installation
- Extensive management through SNMP, RMON and CLI
- Secure remote management with strong encryption using SSH2
- Port mirroring

Software Features:

(Refer to section titled ETHERNET SWITCH SOFTWARE SUPPORTED PROTOCOLS AND STANDARDS for a complete listing of required protocol and standard support)

QOS:

- 8 priority queues
- 802.1p priority marking
- Layer 2 classification
- Layer 3 DiffServ

Routing:

- RIP v1/v2
- OSPF v2

Multicast:

- IGMP v1/v2/v3
- IGMP snooping
- PIM-SM
- Ethernet Automatic Protection Switching edge (EAPS-edge)
- Network Address Translation
- Multicast VLAN registration

Security:

- Network Login
- 802.1x
- Web-based Network Login
- SSH2 server
- Layer 2/3/4 ACLs
- DoS
- RADIUS support
- TACACS+ support
- MAC Address Security (lockdown + limit)
- IP Address Security: Disable ARP learning
- Management Security: SNMPv3, SSH2-client, SCP/SFTP
- DoS Protect
- IP Address Security: DHCP Option 82

Resiliency:

- Software Redundant Port
- ESRP (in Advanced Edge license)
- VRRP (in Advanced Edge license)
- Loop detection via Lbdetect and ELRP CLIEAPS
- STP: 802.1w Rapid Spanning Tree
- STP: Compatibility mode for PVST+, EMISTP (1 domain per port)

Extensibility and Scalability:

- Static Multicast Routes
- Multicast: static IGMP membership
- LACP for edge deployment (server connectivity)
- Stacking

Environmental Specifications:

- EN/ETSI 300 019-2-1 v2.1.2 – Class 1.2 Storage
- EN/ETSI 300 019-2-2 v2.1.2 – Class 2.3 Transportation
- EN/ETSI 300 019-2-3 v2.1.2 – Class 3.1e Operational
- EN/ETSI 300 753 (1997-10) – Acoustic Noise
- ASTM D3580 Random Vibration Unpackaged 1.5G

Telecom Standards:

- ETSI EN 300 386:2001 (EMC Telecommunications)
- ETSI EN 300 019 (Environmental for Telecommunications)
- NEBS Level 3 compliant to portions of GR-1089 Issue 4 and GR-63 Issue 3 as defined in SR3580 with exception to filter requirement
- MEF 9 compliant
- MEF 14 compliant
- IEEE 802.3 Media Access Standards
- IEEE 802.3ab 1000BASE-T
- IEEE 802.3z 1000BASE-X
- IEEE 802.3ae 10GBASE-X
- IEEE 802.3at PoE Plus

Software Support Agreement:

- ExtremeWorks Software and TAC – One-Year Term
- Manufacturer Part Number: 97,000-16,503
- Provided Support: Phone Support
- Service Description: 24x7
- Service Duration: One-Year
- Service Main Type: Technical
- Service Sub Type: Electronic and Physical

Warranty:

- Limited Lifetime with Express Advanced Hardware Replacement

Basis of Payment: This work will be paid for at the contract unit price per Each for ETHERNET SWITCH, LAYER 3, 24 FIBER PORTS (MATERIAL ONLY) which price shall be payment in full for all labor, materials, and equipment required to furnish the Ethernet switch described above complete with software, and accessories and deliver it to the Department.

LAYER 3 ETHERNET SWITCH SOFTWARE SUPPORTED PROTOCOLS AND STANDARDS

The Ethernet switch software shall support the following protocols and standards:

Switching:

- IEEE 802.1D – 1998 Spanning Tree Protocol (STP)
- IEEE 802.1D – 2004 Spanning Tree Protocol (STP and RSTP)
- IEEE 802.1w – 2001 Rapid Reconfiguration for STP, RSTP
- IEEE 802.1Q – 2003 (formerly IEEE 802.1s) Multiple Instances of STP, MSTP
- EMISTP, Extreme Multiple Instances of Spanning Tree Protocol
- PVST+, Per VLAN STP (802.1Q interoperable) Draft-ietf-bridge-rstpmib-03.txt – Definitions of Managed Objects for Bridges with Rapid Spanning Tree Protocol
- Extreme Standby Router Protocol (ESRP)
- IEEE 802.1Q – 1998 Virtual Bridged Local Area Networks
- IEEE 802.3ad Static load sharing configuration and LACP based dynamic configuration
- Software Redundant Ports
- Multi-Switch Link Aggregation Groups (M-LAG)
- IEEE 802.1AB – LLDP Link Layer Discovery Protocol
- LLDP Media Endpoint Discovery (LLDP-MED), ANSI/TIA-1057, draft 08
- Extreme Discovery Protocol (EDP)
- Cisco Discovery Protocol (CDP) v1
- Extreme Loop Recovery Protocol (ELRP)
- Extreme Link State Monitoring (ELSM)
- IEEE 802.1ag L2 Ping and traceroute, Connectivity Fault Management
- ITU-T Y.1731 Frame delay measurements
- RFC 3619 Ethernet Automatic Protection Switching (EAPS) Version 1 and Version 2
- ITU G.8032 Ethernet Ring Protection Switching

Management and Traffic Analysis:

- RFC 2030 SNTP, Simple Network Time Protocol v4
- RFC 5905 1 – Network Time Protocol Version 4: Protocol and Algorithms Specification
- RFC 854 Telnet client and server
- RFC 783 TFTP Protocol (revision 2)
- RFC 951, 1542 BootP
- RFC 2131 BOOTP/DHCP relay agent and DHCP server
- RFC 3315, Dynamic Host Configuration Protocol for IPv6 (DHCPv6), Relay Functions Only with secondary IP address
- RFC 1591 DNS (client operation)
- RFC 6106, IPv6 Router Advertisement Options for DNS Configuration
- RFC 1155 Structure of Management Information (SMIv1)
- RFC 1157 SNMPv1
- RFC 1212, RFC 1213, RFC 1215 MIB-II, Ethernet-Like MIB & TRAPs
- RFC 1573 Evolution of Interface
- RFC 1650 Ethernet-Like MIB (update of RFC 1213 for SNMPv2)
- RFC 1901 to – 1908 SNMPv2c, SMIv2 and Revised MIB-II
- RFC 2576 Coexistence between SNMP Version 1, Version 2 and Version 3 of the Internet standard Network Management Framework
- RFC 2578 – 2580 SMIv2 (update to RFC 1902 – 1903)
- RFC 3410 – 3415 SNMPv3, user based security, encryption and authentication
- RFC 3416 – Protocol Operations for Version 2 of SNMP
- RFC 2418 – Management Information Base for SNMP
- RFC 3826 – The Advanced Encryption Standard (AES) Cipher Algorithm in the SNMP User-based Security Model
- IEEE 802.1AB LLDP Basic MIB, LLDP-EXT-DOT1-MIB, LLDPEXT-DOT3-MIB
- RFC 1757 RMON 4 groups: Stats, History, Alarms and Events
- RFC 2021 RMON2 (probe configuration)
- RFC 2613 SMON MIB
- RFC 2925 Ping/Traceroute MIB
- RFC 2665 – Definitions of Managed Objects for the Ethernet-like Interface types
- RFC 2668 802.3 Medium Attachment Units (MAU) MIB
- draft-ietf-hubmib-maumib-v3-02.txt
- RFC 1643 Ethernet MIB
- RFC 1493 Bridge MIB
- RFC 2096 IPv4 Forwarding Table MIB
- RFC 2737 Entity MIB v2
- RFC 3621 PoE-MIB (PoE switches only)
- PIM MIB draft-ieft-pim-mib-v2-01.txt
- IEEE-8021-PAE-MIB
- IEEE-8021x-EXTENSIONS-MIB
- EAPS MIB supports get functions
- RFC 1657 Definitions of Managed Objects for BGPv4 using SNMPv2
- IEEE 802.1ag MIB

- Secure Shell (SSH-2) client and server
- Secure Copy (SCP-2) client and server
- Secure FTP (SFTP) server sFlow version 5

Management and Traffic Analysis: *(continued)*

- Configuration logging
- Multiple Images, Multiple Configs
- RFC 3164 BSD Syslog Protocol with Multiple Syslog Servers
- 999 Local Messages (criticals stored across reboots)
- Extreme Networks vendor MIBs (includes statistics, FDB, PoE, CPU, Memory, ACL, CLEAR-Flow etc MIBs)
- XML APIs over Telnet/SSH and HTTP/HTTPS
- Web-based device management interface – ExtremeXOS ScreenPlay
- IP Route Compression
- IPv6 Router Advertisement Filtering
- Stacking – SummitStack
- Stacking – SummitStack-V
- Stacking – SummitStack-V80

Power Over Ethernet (POE):

- RFC 3621 Power over Ethernet MIB
- IEEE 802.3af standard

Security, Switch, and Network Protection:

- Secure Shell (SSH-2), Secure Copy (SCP-2) and SFTP client/server with encryption/authentication
- SNMPv3 user based security, with encryption/authentication
- RFC 1492 TACACS+
- RFC 2138 RADIUS Authentication
- RFC 2139 RADIUS Accounting
- RFC 3579 RADIUS EAP support for 802.1x
- RADIUS Per-command Authentication
- Access Profiles on All Routing Protocols
- Network Login – 802.1x, Web and MAC-based mechanisms
- IEEE 802.1x – 2001 Port-Based Network Access Control for Network Login
- Multiple supplicants with multiple VLANs for Network Login (all modes)
- Fallback to local authentication database (MAC and Web-based methods)
- Guest VLAN for 802.1x
- RFC 1866 HTML – used for Web-based Network Login and ExtremeXOS ScreenPlay
- SSL/TLS transport – used for Web-based Network Login and ExtremeXOS ScreenPlay
- MAC Security – Lockdown and Limit
- IP Security – RFC 3046 DHCP Option 82 with port and VLAN ID
- IP Security – Trusted DHCP Server

- Layer 2/3/4 Access Control Lists (ACLs)
- RFC 2267 Network Ingress Filtering
- RPF (Unicast Reverse Path Forwarding) Control via ACLs
- Wire-speed ACLs
- Rate Limiting/Shaping by ACLs
- IP Broadcast Forwarding Control

Security, Switch, and Network Protection: *(continued)*

- ICMP and IP-Option Response Control
- SYN attack protection
- CPU DoS Protection with traffic rate-limiting to management CPU

Security, Router Protection:

- IP Security via Disable ARP Learning
- IP Security – Gratuitous ARP Protection
- IP Security – DHCP Secured ARP/ARP Validation
- Routing protocol MD5 authentication

Security Detection and Protection:

- CLEAR-Flow, threshold-based alerts and actions
- Identity Manager

IP4 Host Services:

- RFC 1122 Requirements for internal hosts – Communication Layers
- RFC 768 User Datagram Protocol (UDP)
- RFC 791 Internet Protocol (IP)
- RFC 792 Internet Control Message Protocol (ICMP)
- RFC 793 Transmission Control Protocol (TCP)
- RFC 826 Address Resolution Protocol (ARP)
- RFC 894 IP over Ethernet
- RFC 1027 Proxy ARP
- RFC 2068 HTTP server
- IGMP v1/v2/v3 Snooping with Configurable Router Registration Forwarding
- IGMP Filters
- PIM Snooping
- Static IGMP Membership
- Multicast VLAN Registration (MVR)

IPV4 Router Services:

- Static Unicast Routes
- Static Multicast Routes
- RFC 1112 IGMP v1
- RFC 2236 IGMP v2
- RFC 3376 IGMP v3
- RFC 2933 IGMP MIB
- RFC 1812 Requirements for IP Version 4 Routers
- RFC 1519 An architecture for IP Address allocation with CIDR
- RFC 1256 IPv4 ICMP Router Discovery (IRDP)
- RFC 1058 RIP v1
- RFC 2453 RIP v2
- Static ECMP

IPV4 Router Services: *(continued)*

- RFC 2096 IPv4 Forwarding Table MIB
- RFC 1724 RIPv2 MIB
- RFC 2338 Virtual Router Redundancy Protocol
- RFC 3768 VRRPv2
- RFC 2787 VRRP MIB
- RFC 2328 OSPF v2 (Edge-mode)
- OSPF ECMP
- OSPF MD5 Authentication
- RFC 1587 OSPF NSSA Option
- RFC 1765 OSPF Database Overflow
- RFC 2370 OSPF Opaque LSA Option
- RFC 3623 OSPF Graceful Restart
- RFC 1850 OSPFv2 MIB
- RFC 2362 Protocol Independent Multicast – Sparse Mode PIM-SM (Edge-mode)
- RFC 2934 Protocol Independent Multicast MIB
- RFC 3569, draft-ietf-ssm-arch-06.txt PIM-SSM PIM Source Specific Multicast
- draft-ietf-pim-mib-v2-o1.txt Mtrace, a "traceroute" facility for IP Multicast: draft-ietf-idmrtraceroute-ipm-07
- Mrinfo, the multicast router information tool based on Appendix-B of draft-ietf-idmrdvmrp-v3-11

IPV6 Host Services:

- RFC 3587, Global Unicast Address Format
- Ping over IPv6 transport
- Traceroute over IPv6 transport
- RFC 5095, Internet Protocol, Version 6 (IPv6) Specification
- RFC 4861, Neighbor Discovery for IP Version 6, (IPv6)
- RFC 2463, Internet Control Message Protocol (ICMPv6) for the IPv6 Specification
- RFC 2464, Transmission of IPv6 Packets over Ethernet Networks
- RFC 2465, IPv6 MIB, General Group and Textual Conventions
- RFC 2466, MIB for ICMPv6
- RFC 2462, IPv6 Stateless Address Auto configuration – Host Requirements
- RFC 1981, Path MTU Discovery for IPv6, August 1996 – Host Requirements
- RFC 3513, Internet Protocol Version 6 (IPv6) Addressing Architecture
- Telnet server over IPv6 transport
- SSH-2 server over IPv6 transport
- RFC 4193, Unique Local IPv6 Unicast Addresses
- RFC 5722, Handling of Overlapping IPv6

IPV6 Interworking and Migration:

- RFC 2893, Configured Tunnels
- RFC 3056, 6to4

IPV6 Router Services:

- RFC 2462, IPv6 Stateless Address Auto Configuration – Router Requirements
- RFC 1981, Path MTU Discovery for IPv6, August 1996 – Router Requirements
- RFC 2710, IPv6 Multicast Listener Discovery v1 (MLDv1) Protocol
- RFC 3810, IPv6 Multicast Listener Discovery v2 (MLDv2) Protocol
- RFC 4541, Considerations for Internet Group Management Protocol (IGMP) and Multicast
- Listener Discovery (MLD) Snooping Switches
- Static Unicast routes for IPv6
- RFC 6164, Using 127-Bit IPv6 Prefixes on Inter-Router Links
- RFC 2080, RIPng
- RFC 2740 OSPF v3 for IPv6 (Edge-mode)
- Static ECMP
- RFC 5798 Virtual Router Redundancy Protocol (VRRP) Version 3 for IPv4 and IPv6
- draft-ietf-vrrp-unified-mib-08.txt - Definitions of Managed Objects for VRRPv3

Core Protocols for Layer 2, IPV4, and IPV6:

- EAPS multiple rings
- EAPSv2 Shared ports
- PIM-DM Draft IETF PIM Dense Mode draft-ietf-idmr-pim-dm-05.txt, draft-ietf-pim-dm-new-v2-04.txt
- Draft-ietf-idr-bgp4-mibv2-02.txt – Enhanced BGP-4 MIB
- draft-ietf-idr-restart-10.txt Graceful Restart Mechanism for BGP
- IOS 10589 OSI IS-IS Intra-Domain Routing Protocol (RFC 1142)
- Draft-ietf-isis-ipv6-06 Routing IPv6 with IS-IS
- Draft-ietf-isis-restart-02 Restart Signaling for IS-IS
- Draft-ietf-isis-wg-multi-topology-11 Multi Topology (MT) Routing in IS-IS
- RFC 1195 Use of OSI IS-IS for Routing in TCP/IP and Dual Environments (TCP/IP transport only)
- RFC 1657 BGP-4 MIB
- RFC 1745 BGP4/IDRP for IPOSPF Interaction
- RFC 1771 Border Gateway Protocol 4
- RFC 1965 Autonomous System Confederations for BGP
- RFC 1997 BGP Communities Attribute
- RFC 2283 Multiprotocol Extensions for BGP-4
- RFC 2385 TCP MD5 Authentication for BGPv4
- RFC 2439 BGP Route Flap Damping
- RFC 2545 Use of BGP-4 Multiprotocol Extensions for IPv6 Inter-Domain Routing
- RFC 2740 OSPFv3, OSPF for IPv6
- RFC 2763 Dynamic Hostname Exchange Mechanism for IS-IS
- RFC 2858 Multiprotocol Extensions for BGP-4 (Obsoletes RFC 2283)
- RFC 2796 BGP Route Reflection (supersedes RFC 1966)
- RFC 2918 Route Refresh Capability for BGP-4
- RFC 2966 Domain-wide Prefix Distribution with Two-Level IS-IS
- RFC 2973 IS-IS Mesh Groups
- RFC 3107 Carrying Label Information in BGP-4
- RFC 3373 Three-way Handshake for IS-IS Point-to-Point Adjacencies
- RFC 3392 Capabilities Advertisement with BGP-4
- RFC 3446 Anycast RP using PIM and MSDP
- RFC 3618 Multicast Source Discovery Protocol (MSDP)
- RFC 4271 A Border Gateway Protocol 4 (BGP-4) (Obsoletes RFC 1771)
- RFC 4273 Definitions of Managed Objects for the Fourth Version of the Border Gateway Protocol (BGP-4) using SMIv2
- RFC 4360 BGP Extended Communities Attribute
- RFC 4456 BGP Route Reflection: An alternative to full mesh internal BGP (Obsoletes RFC 1966)
- RFC 4486 Subcodes for BGP Cease Notification message
- RFC 4274 Graceful Restart Mechanism for BGP (Obsoletes draft-ietf-idr-restart-10.txt)
- RFC 4760 Multiprotocol extensions for BGP-4

- RFC 4893 BGP Support for Four-octet AS Number Space
- RFC 5065 Autonomous System Confederations for BGP
- RFC 5396 Textual Representation of Autonomous System (AS) Attributes

QOS and VLAN Services:

- IEEE 802.1D – 1998 (802.1p) Packet Priority
- RFC 2474 DiffServ Precedence, including 8 queues/port
- RFC 2598 DiffServ Expedited Forwarding (EF)
- RFC 2597 DiffServ Assured Forwarding (AF)
- RFC 2475 DiffServ Core and Edge Router Functions
- Weighted Random Early Detection (WRED)

Traffic Engineering:

- RFC 3784 IS-IS Externs for Traffic Engineering (wide metrics only)

VLAN Services: VLANS, VMANS:

- IEEE 802.1Q VLAN Tagging
- IEEE 802.1v: VLAN classification by Protocol and Port
- IEEE 802.3ad Static Load sharing configuration & LACP based dynamic configuration
- Port-based VLANs
- Protocol-based VLANs
- MAC-based VLANs
- Multiple STP domains per VLAN
- Upstream Forwarding Only/Disable Flooding
- VLAN Translation
- IEEE 802.1ad Provider Bridge Network, virtual MANs (vMANs)
- vMAN Ethertype Translation/Secondary vMAN Ethertype
- Multicast Support for PVLAN
- Multicast Support for VLAN Aggregation
- VLAN Aggregation
- VLAN Bridging
- IEEE 802.1AK MVRP and MRP

Timing Protocol:

- Network Time Protocol
- ITU-T G.8262 Synchronous Ethernet

Data Center:

- Data Center Bridging eXchange (DCBX) (IEEE P802.1Qaz/D2.3)
- XNV (ExtremeXOS Network Virtualization)
- SDN OpenStack

Basis of Payment: This work will not be paid for separately, but shall be included in the bid prices for ETHERNET SWITCH, LAYER 3 of the port density and port type specified.

FIBER OPTIC ETHERNET DROP AND REPEAT SWITCH

The Contractor shall furnish a fiber optic drop and repeat switch (material only) complete with the accessories specified below and deliver it to the Department.

The fiber optic drop and repeat switch shall meet or exceed the following minimum specifications:

Approved Models: Antaira (Aaxeon) Technologies Model LNX-0702C-SFP-T (7-Port (5-port 10/100T + 2 10/100/1000T SFP ports Industrial Ethernet Switch, Wide Operating Temperature) or approved equal.

Features:	• 5-Port 10/100TX + 2-Port 10/100/1000T/Mini-GBIC Combo • Store-and-Forward Switching Architecture • 10Gbps Back-Plane (Switching Fabric) • 1 Mbits Memory Buffer • 8K MAC Address Table • Wide-Range Redundant Power Design • Power Polarity Reserve Protect • Provides EFT Protection 3,000 VDC for Power Line • Supports 6000 VDC Ethernet ESD Protection • IP30 Rugged Aluminum Case Design • Five-Year Warranty
Standard:	• IEEE 802.3 10BaseT Ethernet • IEEE 802.3u 100BaseTX Fast Ethernet • IEEE 802.z Gigabit Fiber • IEEE 802.3x Flow Control and Back-Pressure
Protocol:	• CSMA/CD
Switch Architecture:	• Back-Plane (Switching Fabric): 10Gbps
Transfer Rate:	• 14,880pps for Ethernet Port • 148,800pps for Fast Ethernet Port • 1,488,000pps for Gigabit Fiber Ethernet Port
MAC Address:	• 8K MAC Address Table
Memory Buffer:	• 7,926 pps (default)

LED:	• Unit: Power 1, Power 2, Fault • 10/100 TX: Link/Activity, Full Duplex/Collision • Gigabit Copper: Link/Activity, Speed • SFP: Link/Activity
Connector:	• 10/100T: 5 x RJ-45 • 100/1000T: 2 x 100/1000 SFP Sockets
Network Cable:	• 10BaseT: 2-pair UTP/STP Cat. 3, 4, 5 cable EIA/TIA-568 100-ohm (100m) • 100BaseTX: 2-pair UTP/STP Cat. 5 cable EIA/TIA-568 100-ohm (100m)
Power Supply:	• DC 12 ~ 48V, Redundant Power with Polarity Reverse Protect Function and Removable Terminal Block
Power Consumption:	• 6 Watts
Reverse Polarity Protection:	• Present
Overload Current Protection:	• Present
Mechanical:	• Casing: IP30 Metal Case • Dimension (W x H x D): 30 x 99 x 142 mm • Installation: DIN-Rail/Wall Mountable
Weight:	• Unit Weight: 1.3 lbs. • Shipping Weight: 1.7 lbs.
Operation Temperature:	• Wide Operating Temperature: -40°C to 75°C (-40°F to 176°F)
Operation Humidity:	• 5% to 95% (Non-condensing)
Storage Temperature:	• -40°C to 85°C
EMI:	• FCC Class A • CE EN6100-4-2/EN6100-4-3/EN6100-4-4/EN6100-4-5/EN6100-4-6 • /EN6100-4-8/EN6100-4-11/EN6100-4-12/EN6100-6-2/EN6100-6-4

Stability Testing:	• Shock: IEC60068-2-27 • Free Fall: IEC60068-2-32 • Vibration: IEC60068-2-6
Warranty:	• Five-Year Warranty

The following items shall also be included with each switch:

- SFP Fiber Optic Module – Qty. 2 (Antaira SFP-M2-T, 1.0 Gbps Ethernet SFP Transceiver, Multimode 2KM / LC / 1310nm, -40ºC~85ºC)

- Fiber Optic Patch Cables – Qty. 2 (multimode fiber, 1 meter length, duplex, LC/ST connectors)

- Power Supply – Qty. 1 (Antaira DR-45-12, 45 Watt Series Industrial, Single Output, DIN Rail Power Supply, 12V DC, 3.5 Amps)

Basis of Payment: This work will be paid for at the contract unit price per Each for FIBER OPTIC ETHERNET DROP AND REPEAT SWITCH which price shall be payment in full for all labor, materials, and equipment required to provide the fiber optic Ethernet drop and repeat switch and associated equipment and deliver it to the Department.

ETHERNET MANAGE SWITCH

The Contractor shall furnish an Ethernet switch (material only) complete with the accessories specified below and deliver it to the Department.

The Ethernet switch shall meet or exceed the following minimum specifications:

Approved Models: Antaira (Aaxeon) Technologies Model LNX-804G-SFP-T (8-Port (4-port 10/100/1000TX + 4 10/100/1000T SFP slots Industrial Ethernet Switch, Wide Operating Temperature) or approved equal.

Technology.

Total Ports:	8
Ethernet Ports:	4 x Gigabit ports (10/100/1,000BaseTx), auto negotiation speed, full/half duplex mode and auto MDI connection
Fiber Ports:	4 x 100/1,000 SFP Slots
Wavelength:	Refer to SFP Module

Standards:	IEEE 802.3, 802.3u, 802.3ab, 802.3x, 802.3ad, 802.1d, 802.1w, 802.1s, 802.1Q, 802.1X, 802.1p, ITU-T G.8032/Y.1344 ERPS protocol
Protocol:	IGMPv1/v2, SNMPv1/v2c/v3, TFTP, SNTP, SMTP, RMON, HTTP, HTTPS, Telnet, Syslog, DHCP Option 66/67/82, SSH/SSL, Modbus/TCP, LLDP, IPv4/IPv6
Industrial Protocol:	ModbusTCP
Jumbo Frame:	9.6 Kbytes
MAC Table Size:	8K

Network Management.

Network Redundancy:	STP, RSTP, MSTP, G.8032 ERPS Ring Redundancy Recovery <50ms
IEEE 802.1Q VLAN:	Port Based, Tag Based, 1 ~ 4094
IGMP Snooping / GMRP:	IGMP v1, v2 and Query Mode. Up to 256 Groups
IEEE 802.1x Authentication:	RADIUS Support
QoS:	Provides 4 Priority Queues per Port
System Alert Email:	By Exception Through Email
Serial Console:	RS-232 (RJ45 jack) with console cable, 115.2Kbps, 8,N,2
Configuration Backup:	USB Port
System Configuration:	Web Console, Telnet, CLI

Power.

Input Voltage:	12 - 48VDC, Redundant
Power Consumption:	15 Watts
Connection:	1 Removable 6-Contact Terminal Block
EFT Protection:	2,000 VDC
ESD Protection:	6,000 VDC
Relay Alarm Contact:	1A @ 24VDC

Reverse Polarity Protection:	Yes
Overload Protection:	Yes

Mechanical.

Enclosure:	Metal, IP30 Protection
Dimensions:	54 x 142 x 99 mm
Weight:	2.5 lbs.
Mounting:	DIN-rail or wall mount
Shock / Vibration:	IEC60068-2-27, IEC60068-2-32, IEC60068-2-6

Ratings

Operating Temperature:	Standard: -10 to 70°C or Extended: -40 to 75°C
Storage Temperature:	-40°C to 85°C
Humidity:	5% to 95% non-condensing
RoHS Compliant:	Yes
Certifications:	FCC, CE, UL-61010-2-201 (Pending)
EMC:	FCC Class A, CE EN6100-4-2, EN6100-4-3, EN6100-4-4, EN6100-4-5, EN6100-4-6, EN6100-4-8, EN6100-6-2, EN6100-6-4
Warranty:	Five-Year Warranty

The following items shall be included with each switch:

- SFP Fiber Optic Module – Qty. 2 (Aaxeon SFP-S10-T, 1.25Gbps Ethernet SFP Transceiver, Single Mode 10KM / LC / 1310nm, -40ºC~85ºC)
- Fiber Optic Patch Cables – Qty. 2 (single mode fiber, 1 meter length, duplex, LC/ST connectors)
- Power Supply – Qty. 1 (Antaira DR-45-12, 45 Watt Series Industrial, Single Output, DIN Rail Power Supply, 12V DC, 3.5 Amps)

Basis of Payment: This work will be paid for at the contract unit price per Each for ETHERNET MANAGE SWITCH, which price shall be payment in full for all labor, materials, and equipment required to furnish the Ethernet switch described above complete with accessories and deliver it to the Department.

NETWORK SECURITY APPLIANCE

The Contractor shall furnish a network security appliance and deliver it to the Department (material only).

The network security appliance shall be a Fortinet 101E UTM Services Bundle (NGFW, AV, Web Filtering, and Antispam) with a three year subscription (Mfg. Part Number FG-101E-BDL-900-36) or approved equal.

The firewall shall be a rack mounted security appliance that meets or exceeds the following minimum specifications:

Features:

The network security appliance shall have the following features:

Security:

- Protects against known exploits, malware and malicious websites using continuous threat intelligence provided by FortiGuard Labs security services.
- Identify thousands of applications including cloud applications for deep inspection into network traffic.
- Detects unknown attacks using dynamic analysis and provides automated mitigation to stop targeted attacks.

Performance:

- Delivers industry's best threat protection performance and ultra-low latency using purpose built-security processor (SPU) technology.
- Provides industry-leading performance and protection for SSL encrypted traffic.

Certification:

- Independently tested and validated best security effectiveness and performance.
- Received unparalleled third-party certifications from NSS Labs, ICSA, Virus Bulletin and AV Comparatives.

Networking:	• Delivers an extensive routing, switching, wireless controller and high performance IPsec VPN capabilities to consolidate networking and security functionality. • Enables flexible deployment such as Next Generation Firewall and Secure SD-WAN.
Management:	• Single Pane of Glass with Network Operations Center (NOC) view provides 360° visibility to identify issues quickly and intuitively. • Predefined compliance checklist analyzes the deployment and highlights best practices to improve overall security posture.
Security Fabric:	• Enables Fortinet and Fabric-ready partners' products to collaboratively integrate and provide end-to-end security across the entire attack surface. • Automatically builds Network Topology visualizations which discover IoT devices and provide complete visibility into Fortinet and Fabric-ready partner products.

Technical Specifications:

The network security appliance shall conform to the following specifications:

Firewall Throughput (1518/512/64 byte UDP):	7.4 / 7.4 / 4.4 Gbps
Firewall Latency:	3 µs
Firewall Throughput (Packets Per Second):	6.6 Mpps
Concurrent Sessions:	2 Million
New Sessions/Sec:	30,000
Firewall Policies:	10,000

IPsec VPN Throughput (512 byte):	4 Gbps
Max G/W to G/W IPSEC Tunnels:	2,000
Max Client to G/W IPSEC Tunnels:	10,000
SSL VPN Throughput:	250 Mbps
Concurrent SSL VPN Users (Recommended Maximum, Tunnel Mode):	300
IPS Throughput 1 (HTTP / Enterprise Mix):	1.9 Gbps / 500 Mbps
SSL Inspection Throughput (IPS, HTTP):	190 Mbps
Application Control Throughput (HTTP 64K):	1 Gbps
CAPWAP Throughput (1444 byte, UDP):	1.5 Gbps
Virtual Domains (Default / Maximum):	10 / 10
NGFW Throughput:	360 Mbps
Threat Protection Throughput:	250 Mbps
Max FortiAPs (Total / Tunnel):	64/32
Max FortiSwitches:	24
Max FortiTokens:	1,000
Max Registered FortClient:	600
Virtual Domains (Default/Max):	10/10
Local Storage:	480 GB
Power Supplies:	Single AC PS
Form Factor:	Rack Mount, 1 RU
Interfaces:	USB Port, Console Port, 2x GE RJ45 MGMT/DMZ Ports, 2x GE RJ45 WAN Ports, 2x GE RJ45 HA Ports, 14x GE RJ45 Ports, 2x GE RJ45/SFP Shared Media Pairs.

Hardware Support and Software Subscription:	Hardware plus 8x5 FortiCare and FortiGuard UTM Protection. *Hardware Unit, Hardware Replacement, Firmware and General Upgrades, 8x5 Enhanced Support, UTM Services Bundle (NGFW, AV, Web Filtering, and Antispam) for 36 months.

Basis of Payment: This work will be paid for at the contract unit price per Each for NETWORK SECURITY APPLIANCE which price shall be payment in full for all labor, materials, and equipment required to furnish the network security appliance, subscription software, and accessories described above and deliver it to the Department.

ETHERNET SWITCH

The Contractor shall furnish a pair of ethernet switches (material only) complete with the accessories specified below and deliver it to the Department.

The ethernet switch shall meet or exceed the following minimum specifications:

Approved Models: NetSys Industrial Grade VDSL2 Ethernet Bridge, Model NV-500I (Qty. 2) or approved equal.

Product Kit Contents

- 1 X Industrial-Grade VDSL2 Ethernet Bridge (NV-500I)
- 1 X User Manual CD
- 1 X Straight-through Ethernet Cables
- 1 X RJ-11 Cables
- 1 X DIN-Rail mounting plate
- 2 X Screws
- Protective caps (1 X Console, 1 X RJ-11, 3 X RJ-45)
- 1 X 6 pin Terminal Block
- 1 X 2 pin Terminal Block

Line Port Features

- Provides high-speed, full-duplex, auto-sensing/auto-configuring link (no configuration required)
- Provides high-speed, full-duplex, auto-sensing/auto-configuring link (no configuration required)
- 100Mbps symmetrical (200Mbps aggregate bandwidth) at distances exceeding 1,000 feet (300m)
- Maximum distances over 4,265 feet (1,300 m) at asymmetrical speeds exceeding 25.5 Mbps downstream and 2.4 Mbps Upstream
- Only one twisted-pair of network grade or telephone grade copper required
- RJ-11 connector with built-in surge protection
- Terminal Block connector
- Compliant with IEEE802.3 / IEEE802.3u and ITU-T G993.2 VDSL2 standards

Ethernet Port Features

- 4 X 10/100 Mbps auto-sensing RJ-45 Ethernet ports
- Supports Auto MDIX
- Supports flow control (IEEE 802.3x) for full-duplex operation
- Supports back pressure for half-duplex operation
- Compliant with IEEE 802.3 & 802.3u Ethernet Standards

Terminal Blocks (Power)

- 1 X Removable 6-contact terminal block for Power1 and alarm contact
- 1 X Removable 2-contact terminal block for Power2

DIP Switch

- Selectable CO and CPE Modes
- Selectable Low Band/High Band (25K~30MHz/500K~30MHz)
- Selectable SNR (6bb/9db)
- Selectable Interleave/INP (1ms/INP=0 / 8ms/INP=2)

LEDs

- 1 X Power (PWR) LED
- 1 X Link/WAN LED
- 4 X Ethernet LEDs (Link/Activity)
- 1 X CO Mode Indicator LED
- 1 X CPE Mode Indicator LED

VDSL2 Line Code

- Discrete multitone (DMT) modulation

VDSL2 Transmission Mode

- Packet Transfer Mode (PTM)

Typical Power Consumption

- 6W

Dimensions

- 6.7" x 4.76" x 1.37" (170 x 121 x 35 mm)

Shipping Weight

- 2 lbs. (0.907 Kg)

Power Requirements

- Input Voltage: 12 to 48VDC
- Input Current: 0.5~0.125A

Operating Temperature

- -4°F to 158°F (-20°C to 70°C)
- Humidity •5% to 95% Non-Condensing

Agency Compliance

- CE, FCC, VCCI

Warranty

- 2 years (parts only)

The following items shall also be included with this pay item:

- Power Supply – Qty. 1 (Antaira, DR-45-12, 45 Watt Series Industrial Single Output DIN Rail Power Supply)

- Surge Protector Power Strip – Qty. 3 (Tripp-Lite, Model Number SK6-6, 8-Outlet Surge Protector, 8 Ft. Cord, 1080 Joules, Space-Saving Plug)

- Surge Protector for Analog/DSL Phone Lines – Qty. 2 (APC ProtectNet, Model PTEL2, 2 Lines, 4 Wires)

Basis of Payment: This work will be paid for at the contract unit price per Each for ETHERNET SWITCH which price shall be payment in full for all labor, materials, and equipment required to furnish the pair of ethernet switches described above along with the associated equipment and deliver it to the Department.

EQUIPMENT CABINET

The Contractor shall furnish a locking server cabinet and accessories and have all items drop-shipped to the IDOT District 8 Headquarters located at 1102 Eastport Plaza Drive, Collinsville, Illinois.

The server cabinet shall be an APC NetShelter SX AR3100 42U rack or approved equal that meets the following specifications:

The server cabinet shall be furnished with the following items:

- 19" Sliding Keyboard Tray – Qty. 1
- 19" Fixed Shelf – Qty. 4
- Roof Fan Tray (440 CFM, Audible Noise at 1 meter from surface of unit: 51.00 dBA, 120V) – Qty. 1
- Floor Bolt Kit – Qty. 1

Features:

- Adjustable front vertical mounting rail
- Adjustable mounting depth
- Cable access
- Casters
- Deep form factor (42"/1070mm)
- Door ventilation exceeds 830 in2 (5355 cm2)
- Expanded cable management (facilitates overhead cable management, facilitates overhead power distribution, facilitates rear/vertical cable management)
- Leveling feet
- Lockable doors and side panels
- Multi-contractor equipment compatibility
- Numbered u positions
- Protective grounding provisions
- Quick release doors
- Quick release side panels
- Removable doors and side panels
- Reversible doors
- Split rear doors
- Tool-less mounting
- UBC zone 4 stabilization provisions
- Ventilated doors with scalable cooling options
- Vertical mounting rails with square holes

Specifications:

Physical Specifications:

Maximum Height:	1991.00 mm
Maximum Width:	600.00 mm
Maximum Depth:	1070.00 mm
Net Depth with Stabilizing Feet:	1278.00 mm
Weight Capacity (static load):	1363.64 KG
Weight Capacity (dynamic load):	1022.73 KG
Minimum Mounting Depth:	191.00 mm
Maximum Mounting Depth:	934.00 mm
Rack Height:	42U
Color:	Black
Vertical Posts:	16 gauge
Front Door:	16 gauge
Rear Door:	18 gauge
Roof:	18 gauge
EIA Mounting Rails:	14 gauge
Side Panels:	18 gauge

1.0 General Requirements

1.1 The unit shall be designed to provide a secure, managed environment for server and networking equipment. The unit shall be equipped with locking front and rear doors.

1.2 The unit shall conform to EIA-310 Standard for Cabinets, Racks, Panels and Associated Equipment and accommodate industry standard 19" rack mount equipment.

1.3 The unit shall be designed with four (4) vertical posts to allow rack mount equipment installation utilizing four (4) vertical mounting rails.

1.4 The unit shall be available with a vertical equipment mounting space of 42U (1U=1.75" or 44.45mm).

1.5 The unit shall be available to order with one part number configured with all enclosure components pre-assembled.

2.0 Physical Specifications

2.1 Enclosure dimensions, rack mounting compatibility and weight load ratings:

Internal Height	EIA-310	External Height	External Width	External Depth	Static Rating	Dynamic Rating
42U	19”	1991mm (78.40”)	600mm (23.62”)	1070mm (42.13”)	1364kg (3000lbs)	1023kg (2250lbs)

2.2 The unit shall have exterior maximum height measurement of 1991mm (78.40") to allow passage through a standard 2 Meter or 7 Ft. (84") doorway without tipping.

2.3 The unit shall support a static load (weight supported by the casters and leveling feet) of at least 1,364 kg. (3,000 lbs.) total installed equipment weight.

2.4 The unit shall support a dynamic load (rolling on the casters) of at least 1,023 kg. (2,250 lbs.) total installed equipment weight.

2.5 The unit shall ship with a perforated front door, perforated split rear doors, left and right two-piece solid side panels, tool-less roof, four (4) vertical frame posts, four (4) adjustable vertical mounting rails, two (2) vertical PDU mount cable organizers, four (4) leveling feet and four (4) casters, pre-installed by the manufacturer.

2.6 The unit shall ship with baying hardware pre-installed by the manufacturer.

2.6.1 Baying brackets must provide two sets of mounting holes for standard enclosure spacing of 24” or 600 mm.

2.7 The unit shall ship with grounding hardware pre-installed by the manufacturer.

3.0 Equipment Access & Mounting

3.1 The unit shall provide 42U of equipment vertical mounting space.

3.2 The vertical mounting rails shall be easily adjustable to allow different mounting depths.

3.2.1 The vertical mounting rails shall have a second set of EIA mounting holes perpendicular to the primary mounting holes to allow devices to be mounted in the side channel.

3.2.2 Each vertical mounting rail shall be marked on both sides with lines showing the top and bottom of each U and the number U space next to the middle hole. Each U consists of three square holes and is 1.75 inches (44.45 mm) high.

3.3 The unit shall include at least 60 sets of M6 caged nuts, bolts and cup washers, and caged nut tool for the mounting of equipment inside the unit.

3.3.1 The manufacturer shall offer an optional hardware kit containing additional M6 caged nuts, screws and cup washers.

3.4 Both the front and rear doors shall be designed with quick release hinges allowing for quick and easy detachment without the use of tools.

3.4.1 The front and rear doors shall open a minimum of 130 degrees to allow easy access to the interior.

3.4.2 The front door of the unit shall be reversible so that it opens from either side.

3.4.3 Split rear doors are provided for increased service clearance.

3.4.4 The front door of the unit shall be capable of being installed on the rear of the unit, and the rear doors shall be capable of being installed on the front of the unit.

3.5 The unit shall include two-piece removable side panels that are removed without tools using easy finger latches for fast access to cabling and equipment.

3.5.1 The side panels on the unit shall double as privacy panels when the units are bayed together

4.0 Material Requirements

4.1 All weight bearing components shall be constructed from steel with a thickness no less than 0.9mm (20 gauge).

4.2 All metal parts shall be painted using a powder coat paint process.

4.3 Plastic materials shall comply with Underwriters Laboratory Specification 94 with V-1 rating (UL94 V-1) or better.

5.0 Grounding Requirements

5.1 All enclosure panels and rack-mounted equipment shall be inherently earthed or grounded directly to the frame.

6.0 Environmental Requirements

6.1 The unit shall have a minimum of IP 20 rating for protection against touch, ingress of foreign bodies, and ingress of water.

7.0 Safety Requirements

7.1 The enclosure shall both protect the user from mechanical hazards and generally meet the requirements for a mechanical enclosure (stability, mechanical strength, aperture sizes, etc.) as defined in IEC 60950 Third Edition.

8.0 Ventilation

8.1 The unit shall provide adequate ventilation to provide airflow required by the major server manufacturers.

8.2 The unit shall provide a minimum total ventilation area for the front door, split rear doors, and roof as specified below:

Internal Height	External Width	External Depth	Perforated Front Door	Perforated Rear Doors
42U	600mm (23.62")	1070mm (42.13")	5930 cm2 (919 in2)	6689 cm2 (1036 in2)

8.3 The unit shall provide the means to mount an optional fan-tray in the roof of the unit and other cooling accessories for high-density.

8.4 The manufacturer shall offer an optional tool-less blanking panel kit to prevent the recirculation of hot exhaust air.

8.5 The manufacturer shall offer an optional air baffle kit to prevent the recirculation of hot exhaust air.

9.0 Cable Management

9.1 The unit shall have clearance for wiring access of at least 3" between the inside surface of the front door and front mounting face of the vertical mounting rails.

9.2 The unit shall have clearance for wiring access of at least 1.5" between the side panel and the vertical mounting rails.

9.3 Top cable management openings provided in the enclosure roof:

Internal Height	External Width	External Depth	Openings Located on Roof	Opening with Roof Removed
42U	600mm (23.62")	1070mm (42.13")	Two 75mm (2.96") x 644mm (1.64"), One 240mm (9.45") x 92mm (3.61"), and Five 71mm (6.75") x 54mm (2.14") Rectangular Openings	567mm (22.31") x 892mm (35.10")

9.3.1 The five 171mm (6.75") x 54mm (2.14") rectangular roof cable management openings are protected with plastic grommets and caps preinstalled by the manufacturer.

9.4 Bottom cable management opening provided in the enclosure base:

Internal Height	External Width	External Depth	Main Base Opening
42U	600mm (23.62")	1070mm (42.13")	567mm (22.31") x 831mm (32.71")

9.5 Side cable management openings provided in the vertical PDU mount cable organizers:

Internal Height	External Width	External Depth	Side Cable Management Openings
42U	600mm (23.62")	1070mm (42.13")	Two 61mm (2.4") x 55mm (2.16") and Four 61mm (2.4") x 200mm (7.88") Rectangular Openings on each Side

10.0 Security

10.1 The unit shall include front door lock, rear door lock and side panel lock that are keyed the same; two keys included.

10.1.1 Replacement key lock cylinders should be available to provide a minimum of 300 unique key combinations on front and rear doors.

10.2 The roof shall not be removable from the interior of the enclosure without tools.

10.3 The manufacturer shall provide optional products and accessories that allow the enclosure environment to be monitored for temperature, humidity, and door access.

10.4 The unit shall have mounting provisions for optional door alarm switch to monitor access to the enclosure doors.

11.0 Stabilization

11.1 The unit shall ship with provisions for adding stabilization in the field.

11.2 The manufacturer shall have optional stabilizer plate kit, consisting of a plate, and mounting hardware that can be attached to the enclosure frame, and that can be bolted to the floor.

11.2.1 The unit shall have mounting provisions for the stabilizer plate on the front and rear (on the interior or exterior) of the unit.

11.3 The manufacturer shall have optional bolt down brackets, consisting of four (4) brackets and mounting hardware that attach to the enclosure frame on the front and rear (on the interior or exterior), and which must be anchored to the sub-floor for compliance with the local Uniform Building Code (UBC).

11.4 The manufacturer should supply structural calculations by a professionally registered engineering firm showing compliance with the local UBC for floor anchoring.

11.5 The unit shall have four (4) adjustable leveling feet to help provide a stable base in the event of an uneven floor surface and to prevent rolling.

12.0 Packaging

12.1 The unit shall ship on a wooden pallet. Optional packaging should be available for shipping racks with 1,250 lbs. and 2,000 lbs. of installed equipment.

12.2 The unit shall be bolted to the wooden pallet for stability during shipment.

12.3 The unit shall be protected by corrugated corners, which are stretch-wrapped to limit damage during handling.

12.4 The unit shall have a "damage report" sticker on the outside of the packaging which instructs customers to call a toll-free customer support number to resolve possible shipping damage issues.

13.0 Delivery & Installation

13.1 The unit shall be shipped fully assembled as one orderable SKU.

13.2 The manufacturer shall offer an inside-delivery shipping option which includes reasonable delivery to the inside of a customer’s building and removal and disposal of shipping material and packaging.

13.3 The unit shall roll through a standard 2-meter or seven (7) foot office doorway.

14.0 Miscellaneous

14.1 The unit shall include free configuration software, available separately from the manufacturer, which enables customers to graphically populate the unit with network equipment, calculate BTU’s and power draws, and print out a list of required accessories.

14.2 The unit shall be available pre-configured with the equipment and accessories offered from the unit’s manufacturer for an additional flat charge.

15.0 Warranty

15.1 The manufacturer shall warrant the unit to be free from defects in materials and workmanship for a minimum period of five years from the date of purchase. The manufacturer's obligation under this warranty shall be to repair or replace the unit, at its own sole option. This warranty shall not apply to equipment that has been damaged by accident, negligence, or misapplication or has been altered or modified in any way.

15.2 The manufacturer shall warrant all accessories and options to be free from defects in materials and workmanship for a minimum period of two years from the date of purchase. The manufacturer's obligation under this warranty shall be to repair or replace the equipment, at its own sole option. This warranty shall not apply to equipment that has been damaged by accident, negligence, or misapplication or has been altered or modified in any way.

16.0 Accessories

16.1 *RM LCD Monitor/Keyboard Drawer*: The manufacturer shall offer a 1U high, rack-mounted LCD monitor/keyboard drawer to maximize space in a data center environment.

16.2 *Keyboard Drawers & Keyboards*: The manufacturer shall offer 17" and 19" keyboard drawers, and a 17" keyboard with built-in track-ball or touch-pad.

16.3 *Cooling*: The manufacturer shall offer roof-mounted fan trays, rack-mounted fan trays, door fan modules, and monitoring devices for maintaining a cool environment.

16.3.1 Thermal simulation capabilities should be available to support proposed configurations.

16.5 *Cable Management*: The manufacturer shall offer a variety of cable management accessories to neatly organize the routing of data and power cables within the enclosure.

16.6 *Shelving*: The manufacturer shall offer as optional accessories various fixed and sliding shelves with the ability to support up to 250 lbs. of non-rack mount equipment.

16.11 *Stabilization*: The manufacturer shall offer a stabilizer plate kit to be anti-tip device and bolt-down bracket kit for floor anchoring.

The Contractor shall also furnish one rack mounted power distribution unit. The power distribution unit shall be a Tripp Lite Monitored 16 Outlet Vertical Rack Mounted Power Strip (PDUMNV15LX) that meets or exceeds the following specifications:

Features

Distributes Network-Grade Single-Phase Power

- 1.4kW 120V monitored PDU with single-phase input/output
- NEMA 5-15P with 10 ft. cord connects to compatible AC power source
- Firmware upgrades support future product enhancements

16 Outlets Distribute AC Power

- 16 NEMA 5-15R outlets deliver power to connected equipment
- Cord retention brackets help prevent cables from becoming accidentally disconnected

Digital Ammeter

- Reports total connected equipment load
- Supports IP-address self-ID
- Rotates 180° for easy reading at either angle

Built-In LX Platform Interface

- Allows full remote access for power monitoring with email notifications via secure web browser, SNMP, telnet or SSH
- Supports 10/100 Mbps auto-sensing for communication with an Ethernet network
- Optional EnviroSense2 modules (sold separately) provide a variety of environmental monitoring capabilities
- No Java required

Broad Communications Compatibility

- Supports HTTP, HTTPS, SMTP, SNMPv1, SNMPv2, SNMPv3, telnet, SSH, FTP, DHCP and NTP
- Supports automatic and manual assignment of IP address

Easy 0U Installation in EIA-Standard 19 in. Racks

- Mounts vertically using included toolless buttons or rack-mounting brackets
- Included PDUMVROTATEBRKT allows mounting with rear-facing outlets

OUTPUT

- Output Capacity Details 1.52kW (127V), 1.44kW (120V), 1.2kW (100V)/15A total capacity (Agency de-rated to 12A); 12A max per outlet
- Frequency Compatibility 50/60 Hz
- Output Receptacles (16) 5-15R
- Output Nominal Voltage 100; 120; 127
- Overload Protection n/a

INPUT

- PDU Input Voltage 100; 120; 127
- Recommended Electrical Service 15A 120V
- Maximum Input Amps 15
- PDU Plug Type NEMA 5-15P
- Input Cord Length (ft.) 10
- Input Phase Single-Phase

USER INTERFACE, ALERTS & CONTROLS

- Reported Load Segments Supports local and remote monitoring of PDU output current in amps
- Front Panel LCD Display Digital meter reports PDU output current in amps and Scroll IP-address information; Display can be rotated 180 degrees for installation with the input cable at the top
- Front Panel LEDs n/a
- Switches Press the SCROLL IP / ROTATE button and release after one second to display the configured IP address in 2-digit intervals; Press and release after two seconds to rotate the display 180 degrees

PHYSICAL

- Shipping Dimensions (hwd/in.) 5.10 x 6.30 x 52.40
- Shipping Weight (lbs.) 9.10
- Unit Dimensions (hwd/in.) 49 x 2.19 x 1.75
- Unit Weight (lbs.) 7
- Material of Construction Metal
- Form Factors Supported 0U vertical rackmount installation supported with included mounting brackets; supports tool-less mounting in button-mount compatible racks
- PDU Form Factor Vertical (0U)

ENVIRONMENTAL

- Storage Temperature Range 5°F to 140°F (-15°C to 60°C)
- Relative Humidity 5-95% non-condensing
- Operating Elevation (ft.) 0-10,000
- Operating Elevation (m) 0-3000

COMMUNICATIONS

- SNMP Compatibility Pre-installed LX platform interface provides remote monitoring via Java-free HTML5 web interface, telnet, SSH and SNMP management systems

CERTIFICATIONS

- Certifications Tested to UL 60950-1: 2007 (USA), CAN/CSA-C22.2 NO. 60950-1-07 (Canada), FCC Class A Part 15 (Emissions), NOM (Mexico), RoHS compliant, TAA Compliant

WARRANTY

- Product Warranty Period (Worldwide) 2-year limited warranty

Basis of Payment: This work will be paid for at the contract unit price per Each for EQUIPMENT CABINET which price shall be payment in full for all labor, materials, and equipment required to furnish the equipment cabinet and accessories and have all items drop-shipped to the IDOT District 8 Headquarters located in Collinsville as described above, complete.

DATA SERVER

This pay item shall consist of furnishing data servers, hardware, and related items to the Department (material only) and deliver all items to the IDOT District 4 headquarters in Peoria.

The Contractor shall furnish the following items:

Application Server – Configuration 1 – Qty. 1.0
Application Server – Configuration 2 – Qty. 2.0
VCenter Server – Qty. 1.0
Database Server – Qty. 1.0
Ethernet Switches – Qty. 3.0
Uninterruptable Power Supply – Qty. 3.0
SAN Storage System – Qty. 1.0
SFP+ 10GbE Direct Passive Copper Cable, 4 Meter – Qty. 12

All items shall conform to the specifications listed below:

Specifications for APPLICATION SERVER – CONFIGURATION 1

The computer shall be a Dell PowerEdge R730 server, or approved equal that meets or exceeds the following minimum specifications:

Server Features for Application Server – Configuration 1

The server shall have the following features:

Form factor:	2U rack
Dimensions:	H: 8.73 cm (3.44 in), W: 44.40 cm (17.49 in), D: 68.40 cm (26.92 in)
Processor sockets:	2
Cache:	2.5MB per core; core options: 4, 6, 8, 10, 12, 14, 16, 18, 22
Chipset:	Intel C610 series chipset
I/O slots:	Up to 7 x PCIe 3.0 plus dedicated PERC slot
Drive bays:	Up to 16 x 2.5" HDD: SAS, SATA, nearline SAS SSD: SAS, SATA
Embedded NIC:	4 x 1GbE, 2 x 10+2GbE, 4 x 10GbE NDC
Graphics Controller:	Integrated, Matrox G200eR2, 16 MB, VGA Interface
Power supplies:	Platinum efficiency 495W, 750W, 1100W AC power supply
Systems management:	IPMI 2.0 compliant, Dell OpenManage Essentials, Dell OpenManage Mobile, Dell OpenManage Power Center, Dell OpenManage Integrations, Dell OpenManage Integration Suite for Microsoft® System Center, Dell OpenManage Integration for VMware® vCenter™ Dell OpenManage Connections, HP Operations Manager, IBM Tivoli® Netcool® and CA Network and Systems Management, Dell OpenManage Plug-in for Oracle® Database Manager
Rack support:	ReadyRails™ II sliding rails for tool-less mounting in 4-post racks with square or unthreaded round holes or tooled mounting in 4-post threaded hole racks

Server Configuration for Application Server – Configuration 1

The server shall be configured with the following options:

Base:	PowerEdge R730 Server
Trusted Platform Module (TPM):	Trusted Platform Module 2.0 FIPs, Common Criteria
Chassis:	Chassis with up to 8, 2.5" Hard Drives
Processor:	Intel® Xeon® E5-2695 v4 2.1GHz,45M Cache,9.60GT/s QPI,Turbo,HT,18C/36T (120W) Max Mem 2400MHz
Additional Processor:	Intel® Xeon® E5-2695 v4 2.1GHz,45M Cache,9.60GT/s QPI,Turbo,HT,18C/36T (120W) Max Mem 2400MHz
Processor Thermal Configuration:	2 CPU Standard
Hard Drive:	1TB 7.2K RPM SATA 6Gbps 3.5in Hot-plug Hard Drive – Qty. 2
OS Partitions:	None
Removable Storage:	None
Memory DIMM Type and Speed:	2400MT/s RDIMMs
Memory Configuration Type:	Performance Optimized
Memory:	192 GB Total (32GB RDIMM, 2400MT/s, Dual Rank, x4 Data Width – Qty. 6)
RAID Controller:	PERC H730P RAID Controller, 2GB NV Cache
Operating System:	Windows Server®2016 Datacenter Edition,16CORE, FI, No MED, UnLTD VMs, NO CALs
OS Media Kits:	Windows Server® 2016, Datacenter,16CORE, Media Kit
Licenses:	Windows Server® 2016,Datacenter Edition, Add License, 16CORE, NO MEDIA/KEY
OS Partitions:	None
Embedded Systems Management:	iDRAC8 Enterprise, integrated Dell Remote Access Controller, Enterprise

PCIe Riser:	Risers with up to 1 FH, x8 PCIe Slots + 2 FH, x16 PCIe Slots
Network Daughter Card:	Intel Ethernet I350 QP 1Gb Network Daughter Card
Additional Network Cards:	QLogic 57810 DP 10Gb DA/SFP+ Converged Network Adapter
Additional Software Offerings:	None
Internal SD Module:	Internal SD Module with 1x 32GB SD Card
Internal Optical Drive:	DVD+/-RW, SATA, Internal
Cooling:	None
Power Supply:	Dual, Hot-plug, Redundant Power Supply (1+1), 1100W
Power Cords:	NEMA 5-15P to C13 Wall Plug, 125 Volt, 15 AMP, 10 Feet (3m), Power Cord, North America (Qty. 2)
Bezel:	No Bezel
Power Management BIOS Settings:	Performance BIOS Setting
Rack Rails:	Sliding Rails Without Cable Management Arm
System Documentation:	Electronic System Documentation and OpenManage DVD Kit
Virtualization Software:	None
Enabled Virtualization:	None
Database Software:	None
Warranty:	Five-Year ProSupport and Next Business Day On-site Service

Specifications for APPLICATION SERVER – CONFIGURATION 2

The computer shall be a Dell PowerEdge R730 server, or approved equal that meets or exceeds the following minimum specifications:

Server Features for Application Server – Configuration 2

The server shall have the following features:

Form factor:	2U rack
Dimensions:	H: 8.73 cm (3.44 in), W: 44.40 cm (17.49 in), D: 68.40 cm (26.92 in)
Processor sockets:	2
Cache:	2.5MB per core; core options: 4, 6, 8, 10, 12, 14, 16, 18, 22
Chipset:	Intel C610 series chipset
I/O slots:	Up to 7 x PCIe 3.0 plus dedicated PERC slot
Drive bays:	Up to 16 x 2.5" HDD: SAS, SATA, nearline SAS SSD: SAS, SATA
Embedded NIC:	4 x 1GbE, 2 x 10+2GbE, 4 x 10GbE NDC
Graphics Controller:	Integrated, Matrox G200eR2, 16 MB, VGA Interface
Power supplies:	Platinum efficiency 495W, 750W, 1100W AC power supply
Systems management:	IPMI 2.0 compliant, Dell OpenManage Essentials, Dell OpenManage Mobile, Dell OpenManage Power Center, Dell OpenManage Integrations, Dell OpenManage Integration Suite for Microsoft® System Center, Dell OpenManage Integration for VMware® vCenter™ Dell OpenManage Connections, HP Operations Manager, IBM Tivoli® Netcool® and CA Network and Systems Management, Dell OpenManage Plug-in for Oracle® Database Manager
Rack support:	ReadyRails™ II sliding rails for tool-less mounting in 4-post racks with square or unthreaded round holes or tooled mounting in 4-post threaded hole racks

Server Configuration for Application Server – Configuration 2

The server shall be configured with the following options:

Base:	PowerEdge R730 Server
Trusted Platform Module (TPM):	Trusted Platform Module 2.0 FIPs, Common Criteria
Chassis:	Chassis with up to 8, 2.5" Hard Drives
Processor:	Intel® Xeon® E5-2695 v4 2.1GHz,45M Cache,9.60GT/s QPI,Turbo,HT,18C/36T (120W) Max Mem 2400MHz
Additional Processor:	Intel® Xeon® E5-2695 v4 2.1GHz,45M Cache,9.60GT/s QPI,Turbo,HT,18C/36T (120W) Max Mem 2400MHz
Processor Thermal Configuration:	2 CPU Standard
OS Partitions:	None
Removable Storage:	None
Hard Drive:	1TB 7.2K RPM SATA 6Gbps 3.5in Hot-plug Hard Drive – Qty. 2
Memory DIMM Type and Speed:	2400MT/s RDIMMs
Memory Configuration Type:	Performance Optimized
Memory:	192 GB Total (32GB RDIMM, 2400MT/s, Dual Rank, x4 Data Width – Qty. 6)
Operating System:	Windows Server®2016 Datacenter Edition,16CORE, FI, No MED, UnLTD VMs, NO CALs
OS Media Kits:	Windows Server® 2016, Datacenter,16CORE, Media Kit
Licenses:	Windows Server® 2016,Datacenter Edition, Add License, 16CORE, NO MEDIA/KEY
OS Partitions:	None
Embedded Systems Management:	iDRAC8 Enterprise, integrated Dell Remote Access Controller, Enterprise
PCIe Riser:	Risers with up to 1 FH, x8 PCIe Slots + 2 FH, x16 PCIe Slots

Network Daughter Card:	Intel Ethernet I350 QP 1Gb Network Daughter Card
Additional Network Cards:	QLogic 57810 DP 10Gb DA/SFP+ Converged Network Adapter
Additional Software Offerings:	None
Internal SD Module:	Internal SD Module with 1x 32GB SD Card
Internal Optical Drive:	DVD+/-RW, SATA, Internal
Cooling:	None
Power Supply:	Dual, Hot-plug, Redundant Power Supply (1+1), 1100W
Power Cords:	NEMA 5-15P to C13 Wall Plug, 125 Volt, 15 AMP, 10 Feet (3m), Power Cord, North America (Qty. 2)
Bezel:	No Bezel
Power Management BIOS Settings:	Performance BIOS Setting
Rack Rails:	Sliding Rails Without Cable Management Arm
Virtualization Software:	None
Enabled Virtualization:	None
Database Software:	None
Warranty:	5 Year ProSupport and Next Business Day On-site Service

Specifications for VCENTER SERVER

The computer shall be a Dell PowerEdge R330 server, or approved equal that meets or exceeds the following minimum specifications:

Server Features for VCENTER Server

The server shall have the following features:

Form factor:	1U rack server
Dimensions:	H: 42.8 mm (1.68 in.) W: 482.4 mm (18.99 in.) with rack latches; 434.0 mm (17.08 in.) without rack latches D (includes bezel): 677.3 mm (26.66 in.) with redundant power supply unit
Weight:	Weight 4-drive bay chassis: 6.0 kg (13.22 lb.) empty, 13.8 kg (30.42 lb.) maximum configuration
Processor sockets:	1
Chipset:	Intel C236 series chipset
Memory:	Architecture: Up to 2400MT/s DDR4 DIMMs Memory type: UDIMMs Memory module sockets: 4 Maximum RAM: Up to 64GB
I/O slots:	Up to 7 x PCIe 3.0 plus dedicated PERC slot
Drive bays:	Up to 4 x 3.5" cabled HDD plus optional 2 x 1.8" SSD cabled • Up to 4 x 3.5" hot-swap HDD • Up to 8 x 2.5" hot-swap HDD • UP to 4 x 2.5" hot-swap HDD (available via hybrid drive carrier)
Slots:	2 x PCIe 3.0 slots + 1 slot for internal storage
Network controller:	2 x 1GbE
Communications:	2 x 1GbE LOM
Power supplies:	Up to 2 x 350W hot-plug redundant power supplies

Systems management:	IPMI 2.0 compliant, Dell OpenManage Essentials, Dell OpenManage Mobile, Dell OpenManage Power Center, Dell OpenManage Integrations, Dell OpenManage Integration Suite for Microsoft® System Center, Dell OpenManage Integration for VMware® vCenter™ Dell OpenManage Connections, HP Operations Manager, IBM Tivoli® Netcool® and CA Network and Systems Management, Dell OpenManage Plug-in for Oracle® Database Manager
Device access:	5 total USBs: 2 front; 2 rear; 1 internal
Rack support:	ReadyRails™ II sliding rails for tool-less mounting in 4-post racks with square or unthreaded round holes or tooled mounting in 4-post threaded hole racks

Server Configuration for VCENTER Server

The server shall be configured with the following options:

Base:	PowerEdge R330 Server
Trusted Platform Module (TPM):	Trusted Platform Module 2.0 FIPs, Common Criteria
Chassis:	Chassis with up to 4, 3.5" Hot Plug Hard Drives
Processor:	Intel Xeon E3-1240 v6 3.7GHz, 8M cache, 4C/8T, turbo (72W)
PCIe Riser:	PCIe Riser,1FH,1LP w/Fan, R330
Memory DIMM Type and Speed:	2400MT/s UDIMMs
Cooling:	None
Memory Configuration Type:	Performance Optimized
Memory:	16GB (1x16GB) 2400MT/s DDR4 ECC UDIMM
RAID:	RAID 1, H330/H730 for SAS/SATA
RAID Controller:	PERC H730 Integrated RAID Controller, 1GB Cache, for Hot Plug Chassis
Hard Drive:	600GB 15K RPM SAS 12Gbps 2.5in Hot-plug Hard Drive,3.5in HYB CARR – Qty. 2

Additional Network Cards:	On-Board LOM 1GBE Dual Port (BCM5720 GbE LOM)
Embedded Systems Management:	iDRAC8 Enterprise
Internal Optical Drive:	DVD ROM, SATA, Internal
Bezel:	No Bezel
Rack Rails:	ReadyRails™ Sliding Rails Without Cable Management Arm
Internal SD Module:	None
Power Management BIOS Settings:	Performance BIOS Setting
Power Supply:	Dual, Hot-plug, Redundant Power Supply, 350W
Power Cords:	NEMA 5-15P to C13 Wall Plug, 125 Volt, 15 AMP, 10 Feet (3m), Power Cord, North America
System Documentation:	EDOCS for PowerEdge R330
Operating System:	Windows Server® 2016, Standard Edition, 16CORE,Factory Installed, No MED, NO CAL
OS Media Kits:	Windows Server® 2016,Standard,16CORE, Media Kit
OS Partitions:	None
Enabled Virtualization:	None
Virtualization Options:	None
Database Software:	None
Advanced System Configurations:	UEFI BIOS Boot Mode with GPT Partition
Warranty:	Three-Year Basic Hardware Warranty Repair, 5X10 HW-Only, 5x10 NBD On-site

Additional Software to be Furnished with VCENTER Server:

The Contractor shall furnish the following software with the server:

- VmWare VSphere 6 Essentials Plus Kit Basic Support Subscription 3 Year (MFR # VS6-ESP-KIT-3G-SSS-C)
- VmWare vSphere 6 Essentials Plus Kit for 3 Hosts (Maximum 2 Processors per Host), (MFR# #VS6-ESP-KIT-C)

Specifications for DATABASE SERVER

The computer shall be a Dell PowerEdge R440 server, or approved equal that meets or exceeds the following minimum specifications:

Server Features for Database Server

The server shall have the following features:

Processor:	Up to two Intel® Xeon® Scalable processors, up to 22 cores per processor
Memory:	16 DDR4 DIMM slots, Supports RDIMM /LRDIMM, speeds up to 2666MT/s, 512GB max Supports registered ECC DDR4 DIMMs only
Storage controllers:	Internal controllers: PERC H330, H730p, H740p, HBA330, Software RAID (SWRAID) S140 Boot Optimized Storage Subsystem: HWRAID 2 x M.2 SSDs 120GB, 240 GB External PERC (RAID): H840 External HBAs (non-RAID): 12 Gbps SAS HBA
Drive bays:	Front drive bays: Up to 10 x 2.5" SAS/SATA (HDD/SSD) with up to 4 NVMe SSD max 48TB or up to 4 x 3.5 SAS/SATA HDD max 40TB Optional DVD-ROM, DVD+RW
Power supplies:	Gold 450W, Platinum 550W
Fans:	Six hot pluggable fans for N+1 redundancy
Dimensions:	Form factor: Rack (1U) Chassis depth: 728.23 mm Front Bezel to Rear PSU Handle 714.58 mm Front plate (no bezel) to Rear PSU Handle
Bezel:	Optional LCD or Security bezel
Embedded / At-Server:	iDRAC9 with Lifecycle Controller iDRAC Direct iDRAC REST API with Redfish Quick Sync 2 BLE/wireless module
Consoles & Mobile:	OpenManage Enterprise (available soon), OpenManage Essentials, OpenManage Mobile, OpenManage Power Center
Integrations:	OpenManage integrations: Microsoft® System Center, VMware® vCenter™, BMC Software

Connections:	OpenManage connections: Nagios & Nagios XI,Oracle Enterprise Manager, HP Operations Manager, IBM Tivoli Netcool/OMNIbus, IBM Tivoli® Network Manager, CA Network and Systems Management
Tools:	Dell System Update, Dell Server Update, Utility Dell Update, Catalogs Dell Repository Manager, iDRAC Service Module, OpenManage Server Administrator, OpenManage Storage Services
Security:	TPM 1.2/2.0 optional Cryptographically signed firmware Secure Boot System Lockdown System Erase
I/O & Ports:	Network daughter card options 2 x 1GE LOM (optional) OCP 2 x 10 GE SFP+ or BaseT or 2 x 1GE Front ports: Video, 1 x USB 2.0, available USB 3.0, dedicated IDRAC Direct USB Rear ports: Video, serial, 2 x USB 3.0, dedicated iDRAC network port Riser options also available include 2 x HH/HL or 1 x FH/HL

Server Configuration for Database Server

The server shall be configured with the following options:

Base:	PowerEdge R440 Server
Trusted Platform Module (TPM):	Trusted Platform Module 2.0
Chassis:	2.5" Chassis with up to 8 Hot Plug Hard Drives
Processor:	Intel® Xeon® Gold 6126 2.6G,12C/24T,10.4GT/s,19.5M Cache, Turbo,HT (125W) DDR4-2666
Additional Processor:	Intel® Xeon® Gold 6126 2.6G,12C/24T,10.4GT/s , 19.5M Cache, Turbo,HT (125W) DDR4-2666
Processor Thermal Configuration:	2 CPU standard
Memory DIMM Type and Speed:	2666MT/s RDIMMs
Memory Configuration Type:	Performance Optimized
Memory:	96 GB Total (16GB RDIMM, 2666MT/s, Dual Rank – Qty. 6)
RAID:	C4, RAID 5 for 3 or more HDDs or SSDs (Matching Type/Speed/Capacity)

RAID/Internal Storage Controllers:	PERC H730P+ Low Profile Adapter RAID Controller, 2Gb NV Cache
Hard Drive:	480GB SSD SATA Read Intensive 6Gbps 512n 2.5in Hot-plug Drive, S3520, 1DWPD, 945 TBW – Qty. 10
Boot Optimized Storage Cards:	None
Operating System:	Windows Server® 2016, Standard Edition,16CORE,Factory Inst, No MED,NO CAL
OS Media Kits:	Windows Server® 2016, Standard Edition,16CORE, Media Kit
OS Media Kits:	Windows Server® 2016 with Standard Edition, 2012R2 Downgrade Media
Embedded Systems Management:	iDRAC9, Enterprise
Group Manager:	iDRAC Group Manager, Enabled
Password:	iDRAC,Legacy Password
PCIe Riser:	Riser Config 1, 1 x 16 FH
Additional Network Cards:	On-Board LOM 1GBE (Dual Port for Towers, Quad Port for Racks and Blades)
IDSDM and VFlash Card Reader:	ISDM and Combo Card Reader
Internal SD Module:	32GB microSDHC/SDXC Card
Internal Optical Drive:	DVD +/-RW, SATA, Internal
Power Supply:	Dual, Hot Plug, Redundant Power Supply (1+1), 550W – Qty. 2
Power Cords:	NEMA 5-15P to C13 Wall Plug, 125 Volt, 15 AMP, 10 Feet (3m), Power Cord, North America – Qty. 2
Bezel:	No Bezel for x4 and x8 chassis
Quick Sync:	No Quick Sync

BIOS and Advanced System Configuration Settings:	Performance BIOS Setting
Advanced System Configurations:	UEFI BIOS Boot Mode with GPT Partition
Rack Rails:	ReadyRails Sliding Rails Without Cable Management Arm
System Documentation:	Electronic System Documentation and OpenManage DVD Kit, PowerEdge R440/XR2
Enabled Virtualization:	None
iDRAC Server Manager:	iDRAC Server Manager Enabled
Additional Software:	None
Warranty:	Three-Year ProSupport with Next Business Day Onsite Service

Specifications for ETHERNET SWITCH

The ethernet switch shall be a Dell X4012 rack mountable switch (Mfg. Part 463-6162) or approved equal.

The ethernet switch shall meets or exceed the following minimum specifications:

FEATURES

- Switch, Layer 2+, Managed, 12 x 10 Gigabit SFP+, Rack-Mountable

ENVIRONMENTAL PARAMETERS

- Min Operating Temperature : 32°F
- Max Operating Temperature : 11°F
- Humidity Range Operating : 10% - 90% (non-condensing)
- Min Storage Temperature : -4°F
- Max Storage Temperature : 158°F

INTERFACES

- Management (USB Tyoe A Connector) – Qty. 1
- 10Gbit LAN, SFP+ - Qty. 12
- Micro USB – Qty. 1

MISCELLANEOUS

- Authentication Method: RADIUS, TACACS+
- Height (Rack Units): 1
- Color Category: Black

NETWORKING

- Type: Switch
- Connectivity Technology: Wired
- Remote Management Protocol: CLI, HTTP, RMON, SNMP 1, SNMP 2, SNMP 3
- Compliant Standards: IEEE 802.1ab (LLDP), IEEE 802.1D, IEEE 802.1p, IEEE 802.1Q, IEEE 802.1s, IEEE 802.1v, IEEE 802.1w, IEEE 802.1x, IEEE 802.3ac, IEEE 802.3ad (LACP), IEEE 802.3x
- Ports Qty: 12
- Features: Access Control List (ACL) support, ARP inspection, Auto-negotiation, Back Pressure Support, Broadcast Storm Control, DHCP relay, DHCP server, DHCP snooping, DNS server, GARP VLAN Registration Protocol (GVRP), Head of Line Blocking Prevention, IPv6 support, Link Aggregation Control Protocol (LACP), LLDP support, MLD snooping, Multiple Spanning Tree Protocol (MSTP) support, Port mirroring, Proprietary Protocol Filtering, Quality of Service (QoS), Rapid Spanning Tree Protocol (RSTP) support, SNMP support, SNMP trap, SNTP support, Spanning Tree Protocol (STP) support, Static routing, Syslog support, Trivial File Transfer Protocol (TFTP) support, Uni-Directional Link Detection (UDLD), Virtual Cable Test (VCT) technology, VLAN support
- MAC Address Table Size : 16K entries
- Subcategory : Network hubs and switches
- Power Over Ethernet (PoE) : No
- Advanced Switching : Layer 2+
- Manageable : Yes
- Form Factor : Rack-mountable
- Subtype : 10 Gigabit Ethernet

POWER

- Frequency Required: 50/60 Hz
- Power Provided: 100 Watt
- Power Consumption Operational: 81 Watt
- Nominal Voltage: AC 120/230 V
- Type: Internal power supply

SERVICE

- Support Details Type: Limited warranty
- Support Details Full Contract Period: Lifetime

DIMENSIONS & WEIGHT

- Width: 8.2 in
- Depth: 9.8 in
- Height: 16.2 in

SERVICE & SUPPORT

- Type: Limited lifetime warranty

CAPACITY

- LAG groups: 12
- MAC addresses: 16,000
- Maximum member ports per LAG
- Priority queues per port: 8
- Virtual interfaces (VLANs): 4096
- Forwarding performance: 178.6 Mpps
- Switching fabric bandwidth: 240 Gbps

PORTS

- Qty: 12
- Type: 10 Gigabit SFP+

INCLUDED ACCESSORIES

- Dell Networking Rack Mounting Ears

- A total of two X-Series 1RU Tandem Switch Trays (770-BBNQ) shall be included.

Specifications for UNINTERRUPTABLE POWER SUPPLY

The uninterruptible power supply shall be a rack mounted APC Smart-UPS X 1500VA Rack LCD 120V equipped with network card (SMX1500RM2UNC) or approved equal that meets or exceeds the following specifications:

OUTPUT

Output Power Capacity:	• 1,200 Watts /1,500 VA
Nominal Output Voltage:	• 120V
Efficiency at Full Load:	• 97.7%
Output Voltage Distortion:	• Less than 5% at full load

Output Frequency (sync to mains):	• 47 - 63 Hz for 60 Hz nominal
Waveform Type:	• Sine wave
Output Connections:	• (8) NEMA 5-15R

INPUT

Nominal Input Voltage:	• 120V
Input Frequency:	• 50/60 Hz +/- 3 Hz (auto sensing)
Input Connections:	• NEMA 5-15P
Cord Length	• 8 feet
Input voltage range for main operations:	• 82 - 143V
Input voltage adjustable range for mains operation:	• 75 - 154V
Maximum input current:	• 12A
Input breaker capacity:	• 20.0A

BATTERIES AND RUNTIME

Battery Type:	• Maintenance-free sealed Lead-Acid battery with suspended electrolyte (leak-proof)
Typical recharge time:	• 3 hour(s)
Typical Backup Time at Half Load:	• 17.2 minutes (600 Watts)
Typical Backup Time at Full Load:	• 5.8 minutes (1,200 Watts)
DC overcurrent protection	• 60A

COMMUNICATIONS & MANAGEMENT

Interface Port(s):	• SmartSlot, USB
Pre-Installed SmartSlot™ Cards:	• AP9631 (RJ-45 10/100 Base-T, HTTP,HTTPS,IPv4,IPv6,NTP,SMTP,SNMP v1,SNMP v3,SSH V1,SSH V2,SSL,TCP/IP,Telnet)
Control panel:	• Multi-function LCD status and control console
Audible Alarm:	• Alarm when on battery : distinctive low battery alarm : overload continuous tone alarm

SURGE PROTECTION AND FILTERING

Surge energy rating:	• 600 Joules
Filtering:	• Full time multi-pole noise filtering: 5% IEEE surge let-through: zero clamping response time : meets UL 1449

PHYSICAL

Maximum Height:	• 3.50 inches (89 mm)
Maximum Width:	• 19.30 inches (432 mm)
Maximum depth:	• 18.00 inches (457 mm)
Rack Height:	• 2U
Net Weight:	• 54.60 lbs. (28.64 kg)
Mounting	• Equipped with Sliding Rails

ENVIRONMENTAL

Operating Environment:	• 32°F - 104°F (0°C – 40°C)
Operating Relative Humidity:	• 0% – 95%
Audible noise at 1 meter from surface of unit:	• 40 dBA
Online Thermal Dissipation:	• 133.00 BTU/hr

CONFORMANCE

Regulatory Approvals:	• cUL Listed,UL 1778

WARRANTY

Manufacturer's Warranty	• Three years (materials and workmanship), Two years on batteries

SAN Storage System Specifications

The SAN storage system shall be a rack mounted Hewlett Packard Enterprise HPE MSA 2040 Energy Star SAN Dual Controller SFF Storage/Smart Buy (MSA 2040 ES SAN DC SFF, (Manufacturer Part Number K2R80SB) with the following specifications:

General Information

Product Name:	MSA 2040 ES San DC SFF Storage Smart Buy
Manufacturer Part Number:	K2R80SB
Product Series:	2000
Product Model:	2040
Product Type:	SAN Storage System

Interfaces/Ports:

Fiber Channel:	Yes

Controllers

Number of Controllers:	2
Controller Type:	6Gb/s SAS
RAID Levels:	0, 1, 3, 5, 6, 10, 50

I/O Expansions

Number of Total Expansion Bays:	24
Number of 2.5" Bays:	24

Network & Communication

Ethernet Technology:	10 Gigabit Ethernet

Storage

Number of Hard Drives Supported:	24
Total Hard Drive Capacity Supported:	43 TB
Number of Solid State Drive Supported:	24

Physical Characteristics

Height:	3.5"
Width:	17.6"
Depth:	19.5"
Form Factor:	Rack-mountable
Rack Height:	2U

Warranty

Limited Warranty:	3 Year

Miscellaneous

Energy Star:	Yes
Environmentally Friendly:	Yes

Other Information

Product Family:	2000

Stock Details

Manufacturer:	HPE
Manuf Part#:	K2R80SB

SFP+ 10GbE Direct Passive Copper Cable Specifications

The SFP+ 10GbE Direct Passive Copper Cable shall be an Antaira 10 Gigabit SFP+ direct attach passive copper cable, with male to male interface (part number: CB-SFP+4) with the following specifications:

Backshell:	Zinc alloy. Nickel plated over all 100u" Min
Current:	0.5A/Contact
Electrical Contact Resistance:	EIA-364-06 - Max voltage of 320 mV DC and a current of 10mA
Humidity:	Between 25°C and 65°C at 80% to 100% RH
Mechanical Characteristics:	4 Meter (13.1 ft.); 30AWG; 50N Max. With retention latch disengaged
Operating Temperature:	0°C to 70°C
Raw Cable:	High Speed cable, 2 pairs, 100 ±5 ohms

Shock/Vibration:	EIA 364-27 / EIA 364-28
Signal Difference Waveform:	6.75dBe max
Signal Differential output/input Resistance:	0.01-4.1 GHz: -12 + 2 x SQRT(f) with f in GHz
Storage Temperature:	-40°C to 85°C
Voltage:	30VAC

Basis of Payment: This work will be paid for at the contract unit price per Lump Sum for DATA SERVER which price shall be payment in full for all labor, materials, and equipment required to furnish the servers, hardware, and accessories described above and deliver it to the Department.

ATMS SOFTWARE (CORE MODULE)

The Contractor shall furnish a central system software Advanced Traffic Management System.

The existing closed loop and central traffic signal system software shall remain in operation during the installation and configuration of the proposed software.

The Department will be responsible for installing and configuring the proposed ATMS software on its existing virtual server cluster.

The Contractor shall provide vendor support and technical assistance (on-site, via telephone, web conference, and/or remote access into the system using IDOT furnished VPN client software) during the initial software installation and configuration if requested by the Department.

The Department will be responsible for installing the communications equipment in the traffic signal cabinets, assigning the IP addresses, programming the IP address information into the controllers, and ensuring that each controller has communications to the ATMS server.

The Department will be responsible for adding the existing intersections to the system and programming the ATMS parameters for each intersection.

Once the software has been installed and configured, the Vendor shall provide assistance as requested by the Department to assist with adding intersections to the system and configuring parameters in the software for each intersection.

The ATMS software will be initially be configured to provide communications to each existing closed loop group of controllers as a virtual master controller used to synchronize the controller time clocks and command scheduled TOD program changes to avoid traffic disruptions.

All existing ASC/3 controllers will remain in use as indicated on the plan sheets. The Department can upgrade controller firmware as needed to ensure optimal performance and communications with the ATMS.

Microsoft Database and Server Licenses

The Department will provide all Microsoft licensing for database server and applications servers.

The Contractor shall furnish all licensing for the ATMS software and any other associated licenses required for the ATMS software operation.

ATMS Software Controller Licensing

The ATMS software shall include licenses for 250 traffic signal controllers and a minimum of fifty users.

ATMS Software Maintenance and Upgrade Costs

The bid price for the ATMS software shall include all software maintenance costs for a ten year period and all costs for software version upgrades and licensing costs associated with the software version updates during a two year period that will commence upon the date of final acceptance for the contract.

Additionally, the vendor shall provide software security and bug-fix patches for the life of the software or until the software is no longer supported.

ATMS Software Training

As part of the contract, the Contractor shall provide on-site training for technicians and operators of the ATMS software and associated equipment. This training will address normal operations of the system, routine system maintenance, provisioning and system setup, and fault diagnosis and system repair.

The Contractor shall provide the following training:

- Two (2) 8-hour software operations training sessions with capacity for twelve (12) participants for IDOT District Four and city of Peoria traffic signal personnel to be held at the city of Peoria Dries Lane facility located in Peoria.

- Two (2) 4-hour maintenance training sessions with capacity for ten (10) participants for IDOT District Four and city of Peoria maintenance personnel to be held at the city of Peoria Dries Lane facility located in Peoria.

The training shall include, but not be limited to, the following:

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

Training shall be hands-on with ample time for questions. The Contractor shall submit an agenda for the training and one complete set of training material (manual and schematic) along with the qualification of proposed instructors to the Department for approval at least 30 calendar days before the training is to begin. The Department will review material and approve or request changes.

The Contractor shall furnish training manuals that contain a course outline, ATMS software operation information, hands-on training exercises, and any other pertinent items for each participant.

This work will not be paid for separately but shall be included in the contract bid price for the ATMS software.

ATMS Software Requirements and Specifications

The ATMS software shall conform to the following requirements and specifications:

INTRODUCTION

1.1. SYSTEM SOFTWARE OVERVIEW

1.1.1. The system shall be a Commercially-available Off-the-Shelf (COTS), National Transportation Communication for ITS Protocol (NTCIP) compliant, Advanced Transportation Management System (ATMS) software application.

1.1.2. The software shall provide, as a base, an intersection control and traffic management software platform, from which additional ITS applications can be integrated.

1.1.3. All additional ITS features and functionalities shall be modular and integrated seamlessly into a single user interface.

1.1.4. The system shall utilize the following Microsoft® products for each aspect of the system:

- Core Database: Microsoft SQL 2012 R2+ or newer
- Server OS: Microsoft Server 2012 R2+ Standard or newer
- Workstation OS: Windows 7 Professional or newer
- Laptop OS: Windows 7 Professional or newer

1.2. *SYSTEM SOFTWARE STANDARDS*

1.2.1. NTCIP 1201 and 1202 communications protocol standard shall be implemented in such a manner that the system can adapt to changes in technology and increase functionality over time with minimal impact on individual system components. The system developer and the controller manufacture shall verify that the system and controller firmware are NTCIP compliant and compatible.

1.2.2. The primary communications standards shall be NTCIP 1202 and 1202 based for communicating from Center-to-Field (C2F) and the developer shall document the standards to which the systems level of conformity of each standard is developed.

1.3. SOFTWARE UPDATES

1.3.1. Browser Based System Software: The central software shall allow for the server components to be upgraded or re-installed directly over an existing installation. The software installer shall migrate all system data to a new system database. The software installer shall never overwrite the existing system database when upgrading or reinstalling the software. As additional versions are installed or upgraded, the software shall leave the old system databases provisioned in SQL Server, even though they are no longer used. Every time the client is opened on a client workstation, the central software will automatically check for a new version. If a new version is available, the system shall display a notification asking the user to restart the client to load the newest version. When the client is closed and reopened, the new software version shall be automatically downloaded and installed for use.

1.3.2. Client/Server Based System Software: The central software shall incorporate a means for client workstations and laptop computers to be automatically updated with new versions that are installed on the server. Upon attempting to login to the server, the client software shall determine if a newer version is available at the server installation. If not, the client software shall complete the login normally. If there is a newer version of software, the user shall be able to have it automatically downloaded, installed, and run with no additional action on the part of the user.

1.4. *SYSTEM DEVICE INTEGRATION*

1.4.1. Devices shall be added or deleted from the system by right-clicking on the system devices tree and selecting the proper menu item and/or selecting the menu item from the system menus.

1.4.2. When adding a device, a dialog box shall be used to enter all the required and optional parameters to allow the device to be integrated into the system.

1.4.3. Each device shall be configured to communicate through a device manager service and allowed to be on-line or off-line to reduce failures and alerts for devices not currently connected to the system.

1.4.4. Devices may be added to the system map by clicking and dragging the associated item from the entity tree to its desired location on the map.

1.5. *SYSTEM SUPPORT AND USER MANAGEMENT*

1.5.1. Devices may be added to the system map by clicking and dragging the associated item from the entity tree to its desired location on the map.

1.5.2. The system shall not limit the number of user accounts that can be defined to allow and grant access. The system shall support a minimum of fifty user accounts without regard to licensing.

1.5.3. A valid user account shall be required to access the central software.

1.5.4. The system shall utilize role-based permissions and user groups to define the available functions and allowable actions the user can perform when signed into the system.

1.5.5. The system shall provide for the following user groups:

1.5.5.1.

Group	Privileges
Control - System	Permissions to: • Add, delete or edit Time of Day schedule • Add, delete or edit Manual Control Commands • Add, delete or edit Action Set commands • Acknowledge or unacknowledge system alarms • Get/set controller time. • View database editor/detailed status
Editor - System	Permissions to: • Upload/download database tables • Add, delete or edit a schedule upload • Add, delete or edit Time of Day schedule • Add, delete or edit Manual Control Commands • Add, delete or edit Action Set commands • Acknowledge or unacknowledge system alarms • Get/set controller time. • Add, edit or delete action set plans • Add, edit or delete traffic responsive plans • View database editor/detailed status
View Only – System	Permission to: • View database editor/detailed status

1.5.6.

1.5.6. Devices may be added to the system map by clicking and dragging the associated item from the entity tree to its desired location on the map.

1.1.6.

1.1.6.1. 1.5.7. The system should be able to employ Microsoft Active Directory for user management and to manage access to various system functions.

1.1.6.2.

1.1.6.3.

1.1.6.4. 1.5.8. Where Active Directory is employed by the system, the ATMS client software shall be able to recognize the user's Windows login credentials when starting the client software. Where the Windows login credentials are used, the user shall be able to open the ATMS client software without providing an additional user name and password.

1.1.6.5.

1.1.6.6. 1.5.9. The ATMS administrator shall be able to create and assign user application and jurisdictional permissions based on group definitions.

2. SYSTEM GRAPHICAL USER INTERFACE

2.1. GENERAL DISPLAY FEATURES

2.1.1. The software shall support multiple windows being opened within the main window at the same time.

2.1.2. The system shall allow for the management of open windows using the Window main menu items.

2.1.3. The system shall allow the user to arrange and tile open windows, minimize all windows, restore all windows, and close all windows.

MAIN MAP DISPLAY

2.1.4. The system shall incorporate an agency-wide map as the major portion of the main graphics display.

2.1.4.1. The main map shall have the capability of being resized.

2.1.4.2. The map displays shall have pan and zoom capabilities.

2.1.4.3. The system shall support automatic rendering of icons without user configuration. As a user zooms into the main map, the density of information shall automatically increase to show more detailed data.

2.1.4.4. The system shall support different map views that can be quickly selected for viewing to allow a user to quickly obtain a high-level status overview of the entire system.

2.1.4.5. The system shall allow a user to save a set of viewing preferences and/or allow a user to save a set of devices designated as "Favorites" that will always be visible within the main window.

2.1.4.6. Users shall be able to specify a current map, with its pan and zoom levels as a default map that will be loaded any time a new map is opened for viewing.

2.1.4.7. It shall be possible for a user to interactively enable or disable the display of defined map layers.

2.1.4.8. The system shall have the capability of utilizing a GIS database for the purpose of displaying roadway information and other map elements.

2.1.5. The system shall be capable to employing multiple map sources for the base map. These sources shall include, but not limited to:

- Navtec
- ESRI shape files
- Bing Maps
- WMS Maps

2.1.6. The system shall update the status of all devices on all map display at least once per second, with no more than four seconds latency, once data is retrieved from a field device.

2.1.7. At a minimum, at all zoom levels the agency-wide map display shall dynamically identify the following status for each traffic signal, in real or near-real time:

- Free Operation
- Coordinated Operation
- Transitioning between Free and Coordinated or from one Coordination pattern to another
- Flash
- Preemption
- Loss of Communications

2.1.8. When zooming in, the main map shall automatically provide a greater level of detailed information, at user-set and configured zoom levels, including, but not limited to:

- Signal colors or overlaps (green, yellow, red)
- Active Coordination pattern (if in Coordination Operation)
- Active Preemption plan (in Preemption only)
- Signal colors for all pedestrian phases in use
- Graphical representation of demand on vehicle phases and pedestrian phases
- Graphical representation of active special function outputs
- Detailed timing and controller information to include (when zoomed to intersection level):
- Coordination Status
- Time Space Diagram
- Programmed and actual cycle length
- Programmed and actual offset
- Programmed and actual phase timings
- Alarm status
- Overlap timings and status
- Phase Next
- Signal colors or overlaps (green, yellow, red)

2.1.9. Maps shall be capable of displaying a variety of device and entity types, including, but not limited to:

- CCTV cameras
- Ramp Meters
- RTMS
- Dynamic Message Signs
- Vehicle Detectors
- Asset and maintenance management locations

2.2. MANUAL COMMANDS

2.2.1.1. Manual commands shall offer the same functionality for initiating or terminating events and functionality as the Scheduler, but with the following exceptions:

2.2.1.2.

- Manual commands shall override any normally scheduled event.
- Manual commands shall be implemented using the following modes:
- Immediate and full manual
- Immediate with limited duration
- Scheduled with limited duration

2.3. SCHEDULER

2.3.1. A means shall be provided by which a user can schedule events and functions to be implemented or terminated by TOD/DOW, and shall include means by which the events can be called with the following frequencies:

- Daily
- Weekly
- Annually
- Seasonally
- Holidays
- Special – an event for any situation not described above (IE. sporting events, concerts, etc.)
- One-Time Event – provide the ability to run an event once and only once.

2.3.2. The scheduler shall provide a means by which alerts can be configured to be delivered to different individuals via email or text (SMS) messages by TOD/DOW.

2.3.3. The system shall provide a calendar-based on-call scheduler to allow a user to schedule when specific users or groups of users will receive system generated text and email notifications.

2.4. ADDITIONAL DISPLAYS

2.4.1. The system shall allow additional displays, each of which can be opened or closed at any time, and float or be docked. The system shall include the following displays, at a minimum:

2.4.2. Entity Tree

2.4.2.1. All devices configured in the system shall be displayable on an “entity tree”.

2.4.2.2. The entity tree shall allow the user to sort and filter by device type, allowing the user to easily locate any device.

2.4.2.3. The user shall be able to add any device to the entity tree by right-clicking in the window or on the main map and selecting the appropriate device type to add.

2.4.2.4. The Entity Tree shall list all the installed devices on the system, and shall be common across all workstations.

2.4.2.5. The entity tree shall provide a rapid search window to simplify locating a specific entity by its name or description.

2.4.2.6. The entity tree shall provide a filtering mechanism to only display specific types of entities on the tree to reduce clutter.

2.4.3. Alerts

2.4.3.1. The system shall provide an alert indicator which is always visible on the main window, providing real-time details on the number of open alerts and the criticality of each alert.

2.4.3.2. The system shall provide an alerts window, displaying all alerts from the system or field devices, along with specific details including alert aging.

2.4.3.3. This display shall be updated in real time with the event details, along with a time and date stamp and any acknowledgement information.

2.4.3.4. Alerts shall provide three levels of user-definable criticality:
Critical (highest level)
Warning (medium level)
Information (lowest level)

2.4.3.5. The alert window shall provide a means by which users can acknowledge, un-acknowledge, and close individual critical and warning alerts.

2.4.3.6. All acknowledgements, un-acknowledgements, and closures shall be time and date stamped with the user's credentials upon change of status.

2.4.4. Intersection Display

2.4.4.1. The system shall provide a display where intersection timings, phase details, and ring information is presented in graphical form.

2.4.4.2. Any intersection display shall easily be accessed by selecting the device on the main map or device tree and double-clicking over the selection. The intersection display window shall then open on the top layer for viewing.

2.4.4.3. The intersection display window, when floating, shall be able to be stretched to any size for better visibility.

2.4.4.4. Phase indication arrows shall be programmable for up to 16 phases, including protected/permissive movements and overlaps.

2.4.4.5. Protected/permissive indications shall be configured as one of the following: MUTCD flashing left turn yellow arrow and 5 section left protected/permissive left turn.

2.4.4.6. All intersection-level graphics shall be placed on a zoomed-in portion of the main map or graphical image of the intersection by selecting the graphic from a menu and/or dropping it on the intersection.

2.4.4.7. All intersection-level graphics shall be associated with a phase, overlap, or function (preemption, status, alarms, etc.), and shall change color or appearance upon change of status at the intersection.

2.4.4.8. Intersection graphics configurations shall be transferrable from one intersection to another.

2.4.4.9. Users shall be able to place a remote vehicle and/or pedestrian call to any enabled phase through controls placed on the Intersection Display and/or Intersection Status Window.

2.4.4.10. Remote Front Panel: The system shall provide the ability to launch a front panel to simulate working in the front panel of the controller.

2.5. DEVICE GROUPING

2.5.1. All devices shall be added and configured within a common Entity Tree. Any device shall be allowed to be assigned as a stand-alone entity, not associated with any other entity or device, System, Section, Subsection (Nested Groups), or Group.

2.5.2. Any device in the Device Tree, shall be assigned to one of the following static groups:

2.5.2.1. System – associated with an agency or jurisdiction. System events shall have the lowest priority control over all other scheduled events.

2.5.2.2. Section – associated with a portion of a system. Section events shall have higher priority than System Events, but lower priority than events scheduled on Subsections.

2.5.2.3. Subsection (Nested) – associated with a portion of a Section. Sub-section events have higher priority than events scheduled on Sections, but lower priority than those scheduled for flexible Grouped intersections.

2.5.3. Any device in the Device Tree shall also be included into one or more flexible groupings. These Groups shall allow users to associate entities with common requirements for TOD scheduling, action plan control or manual command operation, and placed into their own unique grouping. Group commands override System, Section or Subsection events. Events scheduled on Groups have higher priority than all the groupings in the section above, but lower priority than a Stand-alone device.

2.5.4. Devices shall also be capable of being added to the entity tree as a Stand-alone device, not associated with any Static or Flexible Grouping. Scheduled events to these devices have highest priority of all, over all other scheduled events.

2.5.5. Devices, Systems, Sections, and Groups shall also be capable of being dynamically grouped by TOD schedule or by manual commands. Any static group, flexible group, device, or combination thereof shall be configured into a single scheduled event, action plan, or manual command and operate as a single entity.

2.5.6. Manual commands shall follow the same prioritization as above for scheduled events with respect to grouping, but they shall override any currently scheduled event for the devices being commanded.

3. SYSTEM FUNCTIONS

3.1. CENTER-TO-FIELD COMMUNICATIONS

3.1.1. The system shall communicate to the field devices using Ethernet or serial communications, using the agency's LAN, licensed band or spread-spectrum radios, private twisted-wire-pair copper (TWP), or fiber-optic cabling or Cellular Modems.

3.1.2. The system shall communicate with field devices using NTCIP protocols, or established proprietary protocols.

3.1.3. The system shall be capable of controlling, receiving status and data from, uploading and downloading field data, and applicable control parameters to and from each device.

3.1.4. The system shall maintain a copy of each field device's database of applicable operational parameters.

3.2. DATABASE ADMINISTRATION, SECURITY, AND SYSTEM ACCESS

3.2.1. The system shall provide, at the top level, the ability to manage the ATMS and all device databases to monitor and control all field devices from one central location and optional remote facilities.

3.2.2. Each system client workstation or laptop shall require a username and password for any user, this is assigned by the system administrator. The username and password may be the same as that used by the operating system, but shall be required to be entered for each new system session.

3.2.3.

3.2.4. The system shall allow for user and group privileges to be defined and assigned by the Administrator.

3.2.5. Operating privileges should be available for the following:

3.2.5.1. System Administrator Configuration – full access to all system functions

3.2.5.2. Inter-jurisdictional control – full access, partial access, read-only access to other agencies field devices, status, and logs.

3.2.5.3. User Profile Configuration – full access or read-only access to functions below (at a minimum), regardless of device type:

- Device configuration – adding, editing, deleting devices, and properties
- Device control – sending commands and instructions to devices
- Database configuration – access to modifying or editing segments (all or portions) of existing device databases
- Database maintenance – backup, restore, archiving, etc
- Database report creation and generation – includes standard and custom reports
- Map display characteristics– base map controls and intersection display editing
- Communications configurations – modifying communications to the field

3.3. CONTROLLER DATABASE MANAGEMENT

3.3.1. Traffic Signal Controller Database

3.3.1.1. Database management shall allow programming of the intersection controller databases.

3.3.1.2. Each device shall have separate database programming pages. These pages shall contain all the programming options unique to each device.

3.3.1.3. Programming entries shall primarily consist of numerical or text values, YES/NO or ON/OFF entries, or appropriate values for each type of device. Check boxes shall be used for flags as appropriate. Hexadecimal or binary code shall not be used as entry values unless the data is represented in a similar encoded form on the controller's front panel display.

3.3.1.4. During program entry, the new data shall overwrite the old data. If the data entered is out of range, changes shall not be permitted, and an error message shall alert the user.

3.3.1.5. The system shall provide contextual help assistance to the user if requested during database editing.

3.3.1.6. When a user is editing data for a specific device, that database shall be "locked" and unavailable for edit by other users.

3.3.1.7. Standard industry accepted traffic engineering terminology shall be used throughout the programming displays.

3.3.1.8. Mnemonic usage shall be minimized and limited to recognized traffic engineering terms.

3.4. CONTROLLER DATABASE UPLOAD/DOWNLOAD

3.4.1. Upload/download shall transfer the programmable database from/to the selected device.

3.4.2. All upload/download data shall be verified for integrity using CRC techniques.

3.4.3. Following an upload, it shall be possible to compare the controller configuration to the database on file.

3.4.4. The system shall provide the ability for users to schedule a database comparison. Based on operator command or TOD/DOW schedule, the system shall automatically upload databases from devices and compare to database versions stored in the central database. The results of this comparison shall be available in a device comparison log. The log shall contain the following information (or similar information) on a per controller basis:

- Device number
- Status (upload failed, databases differ, databases match, no upload present)
- Date and time of last database comparison

3.4.5. It shall be possible to switch between the uploaded data and the central data with a simple menu selection. The differences shall be highlighted on the uploaded data.

3.4.6. It shall be possible to revert a controller database configuration to any previously saved version for that location.

3.4.7. The system's device database management shall provide an operator menu selection interface that is similar to the controller's menu selections.

3.4.8. When the operator of the ATMS selects either an upload or a download of a field device database, it shall be possible for the operator to select only the segments of the database to upload or download provided the field device can accept data transfer in this manner.

3.5. ALERT AND EVENT NOTIFICATION

3.5.1. At a minimum, the system shall be capable of automatically sending alphanumeric messages (SMS – text messaging) to cellular telephones and email addresses upon detecting problems with the system or from any device.

3.5.2. The system shall be configurable to display a system notification (toast notification) and play a sound to notify users when system alarms are received and cleared.

3.5.3. Alert notifications shall also appear as a pop-up alarm, or similar notification, on each workstation logged into the system, provided a user has been configured to receive pop-up alarms, and that user is logged onto the system.

3.5.4. Alert notifications shall consist of at least three (3), user configurable, priority levels, to include “informational” (low priority), “warning” (medium priority) and “critical” (high priority) alerts.

3.5.5. Acknowledgements of incoming alerts shall be required for all medium and high priority on-screen notifications. Low priority alarm notifications shall not require acknowledgements.

3.5.6. The system shall be capable of sending alerts via text (SMS) or email and shall be configurable by TOD/DOW, allowing recipients to be selected based upon severity or priority of event and to issue text/email messages sent to multiple devices or addresses.

3.5.7. Notifications should allow a confirmation to assure that the malfunction has been acknowledged.

3.5.8. If no acknowledgement is received upon expiration of a user programmable time-out period, subsequent notifications shall be configurable to be sent (or escalated) to alternate devices.

3.5.9. The system shall log all malfunction notifications, retries, and acknowledgements with time and date stamps. The first acknowledgement shall be recorded; all others shall be ignored.

3.6. SYSTEM ANALYSIS AND ENGINEERING TOOLS

3.6.1. The system shall include engineering and analysis tools, providing users the ability to comparatively evaluate current system and field operation, historical operation, or proposed changes to operation. These tools shall include, but not limited to:

- Interface to third party traffic plan optimization software
- Time-space diagrams
- Split monitor displays
- Traffic system and operational analysis reports
- Traffic Responsive Report
- Raw Detector Report

4. INTERSECTION CONTROL FUNCTIONS

4.1. INTERSECTION CONTROLLER ACCESS

4.1.1. Access to the intersection controllers shall be controlled by privileges associated with system user logon IDs.

4.1.2. Any field located intersection controllers, connected to the system shall be capable of being represented by objects on the system map.

4.1.3. The system shall provide database management with upload, download and control to Econolite ASC/3 controllers, 2070 controllers running the Econolite ASC/3 2070, Econolite Cobalt controllers running ASC/3 controller software, Intelight Controllers running MaxTime controller software (NEMA X3L, NEMA X3c, and NEMA X3 controllers), and Generic Controllers using NTCIP 1201 and 1202 complaint communications protocols.

4.1.4.

4.2. INTERSECTION CONTROL MODES

4.2.1. Traffic-Responsive (TR) - A controller shall be considered to be in the TR mode when it is operating on-line under central supervision and responding to system commands for plan selection based on the traffic-responsive algorithm.

4.2.2. Time-of-Day (TOD) - A controller shall be considered to be in the TOD mode when the controller is operating in a pre-determined timing plan based on a TOD schedule stored in the central database.

4.2.3. Manual - A controller shall be operating under the MAN mode when it is responding to system commands for plan selection issued from central control using manual override. From the perspective of the controller, this mode shall be identical to TR or TOD.

4.2.4. Failed - A controller shall be deemed “Failed” when the controller fails one or more monitoring checks. Once failed, a controller shall be in the failed mode until the problem has been corrected and the failure state has been cleared by periodic system retry commands.

4.2.5.

4.2.6. Local - A controller shall be in the LOCAL mode when the local intersection controller makes the plan selection decision. The central system can command a local intersection to run in LOCAL mode, or LOCAL mode may result from manual command at the intersection. Communication of detector data and other status information shall continue even when in LOCAL mode.

4.2.7. Flash - Flash mode status shall be logged for each entry or exit from flash. The system shall have the be capable of detecting and reporting Central Flash, Cabinet Flash and Conflict or MMU Flash events provided the controller is able to discriminate between them and report its mode.

5. TRAFFIC RESPONSIVE (TR) CONTROL

5.1. GENERAL DESCRIPTION

5.1.1. The system shall utilize a V+kO (volume plus scaled occupancy) based on the algorithm developed by the US Department of Transportation for traffic-responsive operations.

5.1.2. System detector data shall provide the basis for all TR plan selections by the system.

5.1.3. The system shall utilize a threshold-based algorithm, utilizing computational channels to evaluate system congestion and traffic flows.

5.1.4. The TR operation shall automatically select the timing plans for which traffic flow parameters have been defined that exceed the user-defined threshold of traffic. The TR mode shall be selected by a manual user command or on a TOD basis.

5.1.5. TR database shall identify the system detectors that are to be used for TR plan selection for each section.

5.1.5.1. The detector data shall have smoothing factors to configure importance of most recent data vs. historical data

5.1.5.2. The detector data shall have scaling factors to accommodate loop placement and redundancy as well as establish ratio of detectors used to establish computational channel. A separate weighting factor is used for each detector but each shares the same "k" value.

5.2. PLAN IMPLEMENTATION TECHNIQUES

5.2.1. Plans shall be selected for implementation using the following process sequence:

1. Process vehicle volumes and occupancies from defined system detectors.

2. Calculate weighted sum of volumes plus a factor of occupancies (V+KO).

3. Compare the V+KO value with the programmed thresholds.

4. Select the plan with the closest match to the calculated value and that satisfies the user configured change threshold.

5. The selected timing plan shall be transmitted to the controllers. The plan will be invoked provided that it is available at each controller in the applicable section or system.

5.2.2. The duration of each TR sampling period shall be operator-selectable.

5.2.3. TR operation shall be capable of being overridden by manual selection.

5.2.4. TR operation shall be capable of operating in the background without selecting patterns until a user specified level of demand or occupancy is achieved at which point the user selected pattern will be commanded to the intersections and thus overriding the local or system time-of-day patterns.

5.2.5. System detectors shall provide volume and occupancy data for archived storage and analysis purposes.

5.2.6. Plan changes shall be implemented under TR only if the minimum change threshold has been exceeded.

5.2.7. Plan changes shall be implemented under TR only if the user-specified percentage of valid detection is met or exceeded.

6. SYSTEM ANALYSIS AND ENGINEERING TOOLS

6.1. TIME/SPACE DIAGRAMS

6.1.1. The system shall allow the operator to display time-space diagrams. At a minimum, the operator shall be able perform the following:

6.1.1.1. Display time-space diagrams for both programmed and real-time coordination timings.

6.1.1.2. Display sloping progression bands for each direction of travel on the same diagram.

6.1.1.3. The System shall be able to save time-space diagram offset adjustments to the database and download them to the controller.

6.1.1.4. Display the current offset as a numeric value next to each intersection.

6.1.1.5. Select the phases and/or overlaps for progression phases.

6.1.1.6. Time Space diagrams shall be capable of using GIS data to automatically calculate and display distances between signals.

6.2. SPLIT MONITOR

6.2.1. The system shall include a real-time split monitor that provides, at a minimum, the following functionality:

6.2.1.1. It shall be possible to present the operator with an analysis of the splits of an intersection per phase

6.2.1.2. The system user shall be able to view and process both programmed and actual real-time data.

6.2.1.3. Programmed timing data for each phase shall be obtained from the current database of controller timings stored in the central system.

6.2.1.4. Actual real-time data for each phase shall be obtained by monitoring the controller status on a second-by-second basis.

6.2.1.5. Number of cycles analyzed shall be displayed.

6.2.1.6. It shall be possible to select the period for which the data shall be displayed by start and stop time and date, day of week, the last occurrence of a plan, or the last X minutes (where X is defined by the operator).

6.3. SYSTEM AND OPERATIONAL REPORTS

6.3.1. Each report shall allow users to select report parameters and to customize report filtering and data selection.

6.3.2. Users shall be able to save report parameter selections to a named report that the user can run again at a later time without re-selecting the parameters.

6.3.3. Users shall be able to use the system scheduler or the manual command scheduler to run any user defined reports, as well as system defined reports.

6.3.4. Report output formats shall include at a minimum PDF, Microsoft Word and Microsoft Excel formats.

6.3.5. The system shall provide a list of reports, providing information compiled from data retrieved from the system and any field device capable of logging data. These reports should include, but not be limited to the following:

- Alerts Log Report
- Coordination Report
- Actual/Set Splits Report
- Phase Termination Report
- Manual Control Report
- Preempt Report
- TSP Report
- Detector Reports
- Device Communications Configuration Report
- Scheduler Report
- Detector Failure Report
- Power Failure Report
- Time Drift Report
- Signal Changes Report
- Signal Detector Events Report
- Split Monitor Report
- System Events Report
- Upload and Compare Report

7.0 SYNCHRO SUPPORT

7.1.1. The vendor's ATMS system shall be capable of importing and exporting Synchro UTDF timing data and phasing information.

7.1.2. After importing Synchro UTDF files, the vendor's ATMS shall be capable of storing timing and related data to the ATMS master database and shall be capable of downloading the timing data to the local controllers supported by the ATMS.

7.1.3. The vendor's ATMS shall support Synchro Version 10 UTDF formats.

8.0 Signal Performance Measures

8.1 MOE Reports

8.1.1 The system shall support the following graphical Measure of Effectiveness (MOE) monitors or displays. MOE displays or reports shall be based on high density data, collected by the controller at a frequency of 10 times per second.

8.1.2 The ATMS shall be able to selectively schedule MOE data collection through the system scheduler.

8.1.3 The user shall be able to schedule polling for individual intersections as well as for sections or subsections of intersections.

8.1.4 When MOE polling is enabled, the ATMS system shall upload MOE data once per minute.

8.1.5

8.1.6 The ATMS shall be capable of producing each MOE report based on a user selectable date for any date for which the system has collected MOE data.

8.1.7 MOE reports shall be provided as graphs or data plots over 24 hour periods.

8.1.8 The ATMS shall be capable of printing any of the MOE displays.

8.1.9 The ATMS shall provide means for archiving, restoring and purging MOE data from the ATMS database.

8.1.10 The MOE reports shall include the Purdue Coordination Diagram (PCD)

8.1.10.1 The PCD shall be capable of reporting vehicle arrivals at the time in cycle for each cycle over a 24 hour period.

8.1.10.2 The PCD shall visually map vehicle arrivals against the Green Band, Yellow Band and Red Band portions of the Cycle.

8.1.10.3 The PCD shall visually indicate pattern changes throughout the day

8.1.10.4 The ATMS shall be able to produce a PCD for each phase of a signal.

8.1.11 The MOE reports shall include a Cycle Length Report

8.1.11.1 The Cycle Length Report shall be capable of reporting cycle lengths for each cycle over a 24 hour period.

8.1.11.2 The Cycle Length Report shall be capable of displaying data in a scatter-plot format.

8.1.11.3 The Cycle Length Report shall visually indicate pattern changes throughout the day

8.1.11.4 The Cycle Length Report shall include a moving-average plot of the Cycle lengths throughout the day.

8.1.12

8.1.13 The MOE reports shall include a Flow Rate Report

8.1.13.1 The Flow Rate Report shall be capable of reporting vehicle volumes reported for each cycle over a 24 hour period.

8.1.13.2 The Flow Rate Report shall be capable of displaying data in a scatter-plot or line-plot format.

8.1.13.3 The Flow Rate Report shall visually indicate pattern changes throughout the day

8.1.13.4 The Flow Rate Report shall include a moving-average plot of the Volumes throughout the day.

8.1.14 The MOE reports shall include a Green Times Report

8.1.14.1 The Green Time Report shall be capable of reporting length of green for any phase of a cycle as reported over a 24 hour period.

8.1.14.2 The Green Time Report shall be capable of displaying Green Time data in a scatter-plot or line-plot format.

8.1.14.3 The Green Time Report shall visually indicate pattern changes throughout the day

8.1.14.4 The Green Time Report shall include a moving-average plot of the Green Times throughout the day.

8.1.15 The MOE reports shall include a Percent Ped Calls Report

8.1.15.1 The Ped Calls Report shall be capable of reporting the percent of cycles affected by pedestrian calls for standard pedestrian phases of a cycle as reported over a 24 hour period.

8.1.16

8.1.17 The MOE reports shall include a Volume to Capacity Report

8.1.17.1 The Volume to Capacity report shall be capable of reporting vehicle volume to capacity ratio reported for each cycle over a 24 hour period relative to the capacity of the intersection.

8.1.17.2 The Volume to Capacity report shall be capable of displaying data in a scatter-plot or line-plot format.

8.1.17.3 The Volume to Capacity report shall visually indicate pattern changes throughout the day

8.1.17.4 The Volume to Capacity report shall be capable of including a moving-average plot of the data throughout the day.

8.1.18

8.1.19 The MOE reports shall include a Split Failures Report

8.1.19.1 The Split Failure Report shall be capable of reporting the number split failures that occur as reported over a 24 hour period.

8.1.19.2 The Split Failure Report shall provide graphical display of Split Failures for each phase of the intersection.

8.1.19.3 The Split Failure Report shall display graphs for up to 8 phases.

8.1.19.4 The Split Failure Report shall include a moving-average plot of Split Failures throughout the day.

8.1.19.5 Split Failures shall be defined as occurrences of volume exceeding capacity as defined in the Volume to Capacity Report

Glossary

ATMS – Advanced Transportation Management System
COTS – Commercial Off-the-Shelf
CRC – Cyclical Redundancy Check
DMS – Dynamic Message Sign
GIS – Geographic Information System
ITS – Intelligent Transportation System
LAN – Local Area Network
MOE – Measure of Effectiveness
MULTI – Mark-up Language for Transportation Information
NTCIP – National Transportation Communications for ITS Protocol
PTZ – Pan/Tilt/Zoom
RTMS – Remote Traffic Microwave Sensor
SMS – Short Message Service (text messaging for cellular phones)
TOD/DOW – Time-of-Day/Day-of-Week
TSP – Transit Signal Priority
TWP – Twisted-Wire-Pair copper interconnect
VOS – Volume/Occupancy/Speed
VPN – Virtual Private Network

ATMS SOFTWARE SUPPORT AND WARRANTY

The Contractor shall provide the following:

- The Contractor shall warranty the ATMS software for a two year period. The warranty shall include parts, labor, and materials and shall begin after final acceptance by the Department.

- During the warranty period, the Contractor shall provide corrective maintenance to address and repair any issues that arise with the proposed implementation of the ATMS software. Corrective maintenance does not include upgrades, preventive maintenance, scheduled maintenance, replacement of equipment, enhancements, or consulting support.

- All ATMS software shall be supported through a Next Business Day response time via telephone or email.

Warranty and maintenance requirements:

- One complete set of manuals, in electronic format, shall be supplied on a CD or DVD for all systems and hardware provided as part of the contract.

- All instruction sheets and other documentation required to be furnished by the manufacturer for materials and supplies and for operations shall be delivered to the Engineer prior to the acceptance of the project, with the following warranties and guarantees:

    - The manufacturer's standard written warranty for each piece of equipment furnished under the contract.

    - The Contractor's written guarantee for satisfactory operation of all hardware and software furnished and constructed under the contract for a period of two years (three years for computer workstations and servers) after final acceptance of the project.

    - The Contractor shall furnish a warranty certificate that lists each component and includes the equipment description and details, serial numbers, effective dates, and the details of the warranty regarding materials and labor. The warranty period shall begin on the date of final acceptance and the warranty certificate shall reflect this date.

The Contractor will not be responsible for components that are not provided under this contract.

REMOTE ACCESS CAPABILITIES

The Department will provide remote access capabilities into the Intelligent Transportation System to provide the Contractor with the ability to perform work remotely for the initial deployment and support of the ATMS software and for maintenance purposes.

Payment Schedule: The payment schedule for this pay item is listed below:

- Initial documentation submittal (10%)
- Software is installed and is operating successfully on Department server (25%)
- Software features operate successfully for twenty-five intersections (25%)
- Completion of 60 day burn-in period (25%)
- Resolution of any outstanding Issues (10%)
- System training completion. (5%)

Basis of Payment: This work will be paid for at the contract unit price per Lump Sum for ATMS SOFTWARE (CORE MODULE) which price shall be payment in full for all labor, materials, and equipment required to furnish and install the ATMS software that meets all of the requirements described above with deployment, integration, and testing as specified in this document, complete.

FIBER OPTIC SPLICE-LATERAL

The Contractor shall perform the following items:

The Contractor shall install fiber optic cable from existing traffic signal cabinets to the nearest existing handhole that contains the existing fiber optic backbone cable at the locations shown on the plan sheets. The fiber optic cable will be paid for separately under the pay item for FIBER OPTIC CABLE 48 FIBERS, SINGLE MODE.

The Contractor shall laterally splice twelve multi-mode fibers (six multimode or single mode fibers in each direction) from the proposed fiber optic cable into the existing backbone fiber inside the nearest handhole or double handhole.

The Contractor shall terminate twelve fibers with ST connectors inside the traffic signal cabinet.

The Contractor shall furnish and install a weatherproof splice kit inside the existing handhole, a 24 fiber termination WIC enclosure inside the existing traffic signal cabinet, and all other items required for fiber optic cable splicing and termination.

The Contractor shall submit shop drawings for all items for approval prior to ordering any materials.

The Contractor shall verify all field conditions prior to bidding. There will be no additional compensation for this work.

Method of Measurement: This work will be paid for per each per intersection (includes all splicing and termination as described above).

Basis of Payment: This work will be paid for at the contract unit price per Each for FIBER OPTIC SPLICE-LATERAL and shall be payment in full for all labor, materials, and equipment required to terminate and splice the fiber optic cable described above, complete.

PCC QC/QA ELECTRONIC REPORT SUBMITTAL
Effective April 26, 2013

The Contractor's QC personnel shall be responsible for electronically submitting PRO and IND MI 654 Air, Slump, Quantity and PRO MI 655 PCC Strength Reports to the Department. The format for the electronic submittals will be the PCC QC/QA reporting program, which will be provided by the Department. Microsoft Office 2007 or newer is required for this program which must be provided by the Contractor.

PCC AUTOMATIC BATCHING EQUIPMENT
Effective April 23, 2010 Revised November 8, 2013

Portland cement concrete provided shall be produced from batch plants that conform to the requirements of Article 1103.03 (a) and (b) of the Standard Specifications for Road and Bridge Construction. Semi-automatic batching will not be allowed.

In addition, the batching plant shall be a computerized plant interfaced with a printer and shall print actual batch weights, added water, tempering water, mixing time, and amount of Each additive per batch. At the discretion of the Engineer, archived electronic versions of batch proportions will be acceptable. Truck delivery tickets will still be required as per Article 1020.11 (a)(7).

COMPENSABLE DELAY COSTS (BDE)
Effective: June 2, 2017

Revise Article 107.40(b) of the Standard Specifications to read:

"(b) Compensation. Compensation will not be allowed for delays, inconveniences, or damages sustained by the Contractor from conflicts with facilities not meeting the above definition; or if a conflict with a utility in an unanticipated location does not cause a shutdown of the work or a documentable reduction in the rate of progress exceeding the limits set herein. The provisions of Article 104.03 notwithstanding, compensation for delays caused by a utility in an unanticipated location will be paid according to the provisions of this Article governing minor and major delays or reduced rate of production which are defined as follows.

(1) Minor Delay. A minor delay occurs when the work in conflict with the utility in an unanticipated location is completely stopped for more than two hours, but not to exceed two weeks.

(2) Major Delay. A major delay occurs when the work in conflict with the utility in an unanticipated location is completely stopped for more than two weeks.

(3) Reduced Rate of Production Delay. A reduced rate of production delay occurs when the rate of production on the work in conflict with the utility in an unanticipated location decreases by more than 25 percent and lasts longer than seven calendar days."

Revise Article 107.40(c) of the Standard Specifications to read:

"(c) Payment. Payment for Minor, Major, and Reduced Rate of Production Delays will be made as follows.

(1) Minor Delay. Labor idled which cannot be used on other work will be paid for according to Article 109.04(b)(1) and (2) for the time between start of the delay and the minimum remaining hours in the work shift required by the prevailing practice in the area.

Equipment idled which cannot be used on other work, and which is authorized to standby on the project site by the Engineer, will be paid for according to Article 109.04(b)(4).

(2) Major Delay. Labor will be the same as for a minor delay.

Equipment will be the same as for a minor delay, except Contractor-owned equipment will be limited to two weeks plus the cost of move-out to either the Contractor's yard or another job and the cost to re-mobilize, whichever is less. Rental equipment may be paid for longer than two weeks provided the Contractor presents adequate support to the Department (including lease agreement) to show retaining equipment on the job is the most economical course to follow and in the public interest.

(3) Reduced Rate of Production Delay. The Contractor will be compensated for the reduced productivity for labor and equipment time in excess of the 25 percent threshold for that portion of the delay in excess of seven calendar days. Determination of compensation will be in accordance with Article 104.02, except labor and material additives will not be permitted.

Payment for escalated material costs, escalated labor costs, extended project overhead, and extended traffic control will be determined according to Article 109.13."

Revise Article 108.04(b) of the Standard Specifications to read:

"(b) No working day will be charged under the following conditions.

(1) When adverse weather prevents work on the controlling item.

(2) When job conditions due to recent weather prevent work on the controlling item.

(3) When conduct or lack of conduct by the Department or its consultants, representatives, officers, agents, or employees; delay by the Department in making the site available; or delay in furnishing any items required to be furnished to the Contractor by the Department prevents work on the controlling item.

(4) When delays caused by utility or railroad adjustments prevent work on the controlling item.

(5) When strikes, lock-outs, extraordinary delays in transportation, or inability to procure critical materials prevent work on the controlling item, as long as these delays are not due to any fault of the Contractor.

(6) When any condition over which the Contractor has no control prevents work on the controlling item."

Revise Article 109.09(f) of the Standard Specifications to read:

"(f) Basis of Payment. After resolution of a claim in favor of the Contractor, any adjustment in time required for the work will be made according to Section 108. Any adjustment in the costs to be paid will be made for direct labor, direct materials, direct equipment, direct jobsite overhead, direct offsite overhead, and other direct costs allowed by the resolution. Adjustments in costs will not be made for interest charges, loss of anticipated profit, undocumented loss of efficiency, home office overhead and unabsorbed overhead other than as allowed by Article 109.13, lost opportunity, preparation of claim expenses and other consequential indirect costs regardless of method of calculation.

The above Basis of Payment is an essential element of the contract and the claim cost recovery of the Contractor shall be so limited."

Add the following to Section 109 of the Standard Specifications.

"**109.13 Payment for Contract Delay.** Compensation for escalated material costs, escalated labor costs, extended project overhead, and extended traffic control will be allowed when such costs result from a delay meeting the criteria in the following table.

Contract Type	Cause of Delay	Length of Delay
Working Days	Article 108.04(b)(3) or Article 108.04(b)(4)	No working days have been charged for two consecutive weeks.
Completion Date	Article 108.08(b)(1) or Article 108.08(b)(7)	The Contractor has been granted a minimum two week extension of contract time, according to Article 108.08.

Payment for each of the various costs will be according to the following.

(a) Escalated Material and/or Labor Costs. When the delay causes work, which would have otherwise been completed, to be done after material and/or labor costs have increased, such increases will be paid. Payment for escalated material costs will be limited to the increased costs substantiated by documentation furnished by the Contractor. Payment for escalated labor costs will be limited to those items in Article 109.04(b)(1) and (2), except the 35 percent and 10 percent additives will not be permitted.

(b) Extended Project Overhead. For the duration of the delay, payment for extended project overhead will be paid as follows.

(1) Direct Jobsite and Offsite Overhead. Payment for documented direct jobsite overhead and documented direct offsite overhead, including onsite supervisory and administrative personnel, will be allowed according to the following table.

Original Contract Amount	Supervisory and Administrative Personnel
Up to $5,000,000	One Project Superintendent
Over $ 5,000,000 - up to $25,000,000	One Project Manager, One Project Superintendent or Engineer, and One Clerk
Over $25,000,000 - up to $50,000,000	One Project Manager, One Project Superintendent, One Engineer, and One Clerk
Over $50,000,000	One Project Manager, Two Project Superintendents, One Engineer, and One Clerk

(2) Home Office and Unabsorbed Overhead. Payment for home office and unabsorbed overhead will be calculated as 8 percent of the total delay cost.

(c) Extended Traffic Control. Traffic control required for an extended period of time due to the delay will be paid. For working day contracts the payment will be made according to Article 109.04. For completion date contracts, an adjustment will be determined as follows.

Extended Traffic Control occurs between April 1 and November 30:

ETCP Adjustment ($) = TE x (%/100 x CUP / OCT)

Extended Traffic Control occurs between December 1 and March 31:

ETCP Adjustment ($) = TE x 1.5 (%/100 x CUP / OCT)

Where: TE = Duration of approved time extension in calendar days.
% = Percent maintenance for the traffic control, % (see table below).
CUP = Contract unit price for the traffic control pay item in place during the delay.
OCT = Original contract time in calendar days.

Original Contract Amount	Percent Maintenance
Up to $2,000,000	65%
$2,000,000 to $10,000,000	75%
$10,000,000 to $20,000,000	85%
Over $20,000,000	90%

When an ETCP adjustment is paid under this provision, an adjusted unit price as provided for in Article 701.20(a) for increase or decrease in the value of work by more than ten percent will not be paid.

Upon payment for a contract delay under this provision, the Contractor shall assign subrogation rights to the Department for the Department's efforts of recovery from any other party for monies paid by the Department as a result of any claim under this provision. The Contractor shall fully cooperate with the Department in its efforts to recover from another party any money paid to the Contractor for delay damages under this provision."

DISADVANTAGED BUSINESS ENTERPRISE PARTICIPATION (BDE)
Effective: September 1, 2000 Revised: April 2, 2018

FEDERAL OBLIGATION. The Department of Transportation, as a recipient of federal financial assistance, is required to take all necessary and reasonable steps to ensure nondiscrimination in the award and administration of contracts. Consequently, the federal regulatory provisions of 49 CFR Part 26 apply to this contract concerning the utilization of disadvantaged business enterprises. For the purposes of this Special Provision, a disadvantaged business enterprise (DBE) means a business certified by the Department in accordance with the requirements of 49 CFR Part 26 and listed in the Illinois Unified Certification Program (IL UCP) DBE Directory.

STATE OBLIGATION. This Special Provision will also be used by the Department to satisfy the requirements of the Business Enterprise for Minorities, Females, and Persons with Disabilities Act, 30 ILCS 575. When this Special Provision is used to satisfy state law requirements on 100 percent state-funded contracts, the federal government has no involvement in such contracts (not a federal-aid contract) and no responsibility to oversee the implementation of this Special Provision by the Department on those contracts. DBE participation on 100 percent state-funded contracts will not be credited toward fulfilling the Department's annual overall DBE goal required by the US Department of Transportation to comply with the federal DBE program requirements.

CONTRACTOR ASSURANCE. The Contractor makes the following assurance and agrees to include the assurance in each subcontract that the Contractor signs with a subcontractor.

> The Contractor, subrecipient, or subcontractor shall not discriminate on the basis of race, color, national origin, or sex in the performance of this contract. The Contractor shall carry out applicable requirements of 49 CFR Part 26 in the award and administration of contracts funded in whole or in part with federal or state funds. Failure by the Contractor to carry out these requirements is a material breach of this contract, which may result in the termination of this contract or such other remedy as the recipient deems appropriate, which may include, but is not limited to:
>
> (a) Withholding progress payments;
>
> (b) Assessing sanctions;
>
> (c) Liquidated damages; and/or
>
> (d) Disqualifying the Contractor from future bidding as non-responsible.

OVERALL GOAL SET FOR THE DEPARTMENT. As a requirement of compliance with 49 CFR Part 26, the Department has set an overall goal for DBE participation in its federally assisted contracts. That goal applies to all federal-aid funds the Department will expend in its federally assisted contracts for the subject reporting fiscal year. The Department is required to make a good faith effort to achieve the overall goal. The dollar amount paid to all approved DBE companies performing work called for in this contract is eligible to be credited toward fulfillment of the Department's overall goal.

CONTRACT GOAL TO BE ACHIEVED BY THE CONTRACTOR. This contract includes a specific DBE utilization goal established by the Department. The goal has been included because the Department has determined that the work of this contract has subcontracting opportunities that may be suitable for performance by DBE companies. The determination is based on an assessment of the type of work, the location of the work, and the availability of DBE companies to do a part of the work. The assessment indicates that, in the absence of unlawful discrimination, and in an arena of fair and open competition, DBE companies can be expected to perform **0.00%** of the work. This percentage is set as the DBE participation goal for this contract. Consequently, in addition to the other award criteria established for this contract, the Department will only award this contract to a bidder who makes a good faith effort to meet this goal of DBE participation in the performance of the work. A bidder makes a good faith effort for award consideration if either of the following is done in accordance with the procedures set for in this Special Provision:

(a) The bidder documents that enough DBE participation has been obtained to meet the goal or,

(b) The bidder documents that a good faith effort has been made to meet the goal, even though the effort did not succeed in obtaining enough DBE participation to meet the goal.

DBE LOCATOR REFERENCES. Bidders shall consult the IL UCP DBE Directory as a reference source for DBE-certified companies. In addition, the Department maintains a letting and item specific DBE locator information system whereby DBE companies can register their interest in providing quotes on particular bid items advertised for letting. Information concerning DBE companies willing to quote work for particular contracts may be obtained by contacting the Department's Bureau of Small Business Enterprises at telephone number (217) 785-4611, or by visiting the Department's website at:
http://www.idot.illinois.gov/doing-business/certifications/disadvantaged-business-enterprise-certification/il-ucp-directory/index.

BIDDING PROCEDURES. Compliance with this Special Provision is required prior to the award of the contract and the failure of the low bidder to comply will render the bid not responsive.

In order to assure the timely award of the contract, the low bidder shall submit:

(a) The bidder shall submit a DBE Utilization Plan on completed Department forms SBE 2025 and 2026.

(1) The final Utilization Plan must be submitted within five calendar days after the date of the letting in accordance with subsection (a)(2) of Bidding Procedures herein.

(2) To meet the five day requirement, the bidder may send the Utilization Plan electronically by scanning and sending to **DOT.DBE.UP@illinois.gov** or faxing to (217) 785-1524. The subject line must include the bid Item Number and the Letting date. The Utilization Plan should be sent as one .pdf file, rather than multiple files and emails for the same Item Number. It is the responsibility of the bidder to obtain confirmation of email or fax delivery.

Alternatively, the Utilization Plan may be sent by certified mail or delivery service within the five calendar day period. If a question arises concerning the mailing date of a Utilization Plan, the mailing date will be established by the U.S. Postal Service postmark on the certified mail receipt from the U.S. Postal Service or the receipt issued by a delivery service when the Utilization Plan is received by the Department. It is the responsibility of the bidder to ensure the postmark or receipt date is affixed within the five days if the bidder intends to rely upon mailing or delivery to satisfy the submission day requirement. The Utilization Plan is to be submitted to:

Illinois Department of Transportation
Bureau of Small Business Enterprises
Contract Compliance Section
2300 South Dirksen Parkway, Room 319
Springfield, Illinois 62764

The Department will not accept a Utilization Plan if it does not meet the five day submittal requirement and the bid will be declared not responsive. In the event the bid is declared not responsive due to a failure to submit a Utilization Plan or failure to comply with the bidding procedures set forth herein, the Department may elect to cause the forfeiture of the penal sum of the bidder's proposal guaranty, and may deny authorization to bid the project if re-advertised for bids. The Department reserves the right to invite any other bidder to submit a Utilization Plan at any time for award consideration.

(b) The Utilization Plan shall indicate that the bidder either has obtained sufficient DBE participation commitments to meet the contract goal or has not obtained enough DBE participation commitments in spite of a good faith effort to meet the goal. The Utilization Plan shall further provide the name, telephone number, and telefax number of a responsible official of the bidder designated for purposes of notification of Utilization Plan approval or disapproval under the procedures of this Special Provision.

(c) The Utilization Plan shall include a DBE Participation Commitment Statement, Department form SBE 2025, for each DBE proposed for the performance of work to achieve the contract goal. For bidding purposes, submission of the completed SBE 2025 forms, signed by the DBEs and scanned or faxed to the bidder will be acceptable as long as the original is available and provided upon request. All elements of information indicated on the said form shall be provided, including but not limited to the following:

(1) The names and addresses of DBE firms that will participate in the contract;

(2) A description, including pay item numbers, of the work each DBE will perform;

(3) The dollar amount of the participation of each DBE firm participating. The dollar amount of participation for identified work shall specifically state the quantity, unit price, and total subcontract price for the work to be completed by the DBE. If partial pay items are to be performed by the DBE, indicate the portion of each item, a unit price where appropriate and the subcontract price amount;

(4) DBE Participation Commitment Statements, form SBE 2025, signed by the bidder and each participating DBE firm documenting the commitment to use the DBE subcontractors whose participation is submitted to meet the contract goal;

(5) If the bidder is a joint venture comprised of DBE companies and non-DBE companies, the Utilization Plan must also include a clear identification of the portion of the work to be performed by the DBE partner(s); and,

(6) If the contract goal is not met, evidence of good faith efforts; the documentation of good faith efforts must include copies of each DBE and non-DBE subcontractor quote submitted to the bidder when a non-DBE subcontractor is selected over a DBE for work on the contract.

GOOD FAITH EFFORT PROCEDURES. The contract will not be awarded until the Utilization Plan submitted by the apparent successful bidder is approved. All information submitted by the bidder must be complete, accurate and adequately document that enough DBE participation has been obtained or document that good faith efforts of the bidder, in the event enough DBE participation has not been obtained, before the Department will commit to the performance of the contract by the bidder. The Utilization Plan will be approved by the Department if the Utilization Plan documents sufficient commercially useful DBE work to meet the contract goal or the bidder submits sufficient documentation of a good faith effort to meet the contract goal pursuant to 49 CFR Part 26, Appendix A. The Utilization Plan will not be approved by the Department if the Utilization Plan does not document sufficient DBE participation to meet the contract goal unless the apparent successful bidder documented in the Utilization Plan that it made a good faith effort to meet the goal. This means that the bidder must show that all necessary and reasonable steps were taken to achieve the contract goal. Necessary and reasonable steps are those which, by their scope, intensity and appropriateness to the objective, could reasonably be expected to obtain sufficient DBE participation, even if they were not successful. The Department will consider the quality, quantity, and intensity of the kinds of efforts that the bidder has made. Mere *pro forma* efforts, in other words, efforts done as a matter of form, are not good faith efforts; rather, the bidder is expected to have taken genuine efforts that would be reasonably expected of a bidder actively and aggressively trying to obtain DBE participation sufficient to meet the contract goal.

(a) The following is a list of types of action that the Department will consider as part of the evaluation of the bidder's good faith efforts to obtain participation. These listed factors are not intended to be a mandatory checklist and are not intended to be exhaustive. Other factors or efforts brought to the attention of the Department may be relevant in appropriate cases, and will be considered by the Department.

(1) Soliciting through all reasonable and available means (e.g. attendance at pre-bid meetings, advertising and/or written notices) the interest of all certified DBE companies that have the capability to perform the work of the contract. The bidder must solicit this interest within sufficient time to allow the DBE companies to respond to the solicitation. The bidder must determine with certainty if the DBE companies are interested by taking appropriate steps to follow up initial solicitations.

(2) Selecting portions of the work to be performed by DBE companies in order to increase the likelihood that the DBE goals will be achieved. This includes, where appropriate, breaking out contract work items into economically feasible units to facilitate DBE participation, even when the prime Contractor might otherwise prefer to perform these work items with its own forces.

(3) Providing interested DBE companies with adequate information about the plans, specifications, and requirements of the contract in a timely manner to assist them in responding to a solicitation.

(4) a. Negotiating in good faith with interested DBE companies. It is the bidder's responsibility to make a portion of the work available to DBE subcontractors and suppliers and to select those portions of the work or material needs consistent with the available DBE subcontractors and suppliers, so as to facilitate DBE participation. Evidence of such negotiation includes the names, addresses, and telephone numbers of DBE companies that were considered; a description of the information provided regarding the plans and specifications for the work selected for subcontracting; and evidence as to why additional agreements could not be reached for DBE companies to perform the work.

b. A bidder using good business judgment would consider a number of factors in negotiating with subcontractors, including DBE subcontractors, and would take a firm's price and capabilities as well as contract goals into consideration. However, the fact that there may be some additional costs involved in finding and using DBE companies is not in itself sufficient reason for a bidder's failure to meet the contract DBE goal, as long as such costs are reasonable. Also the ability or desire of a bidder to perform the work of a contract with its own organization does not relieve the bidder of the responsibility to make good faith efforts. Bidders are not, however, required to accept higher quotes from DBE companies if the price difference is excessive or unreasonable. In accordance with subsection (c)(6) of the above Bidding Procedures, the documentation of good faith efforts must include copies of each DBE and non-DBE subcontractor quote submitted to the bidder when a non-DBE subcontractor was selected over a DBE for work on the contract.

(5) Not rejecting DBE companies as being unqualified without sound reasons based on a thorough investigation of their capabilities. The bidder's standing within its industry, membership in specific groups, organizations, or associations and political or social affiliations (for example union vs. non-union employee status) are not legitimate causes for the rejection or non-solicitation of bids in the bidder's efforts to meet the project goal.

(6) Making efforts to assist interested DBE companies in obtaining bonding, lines of credit, or insurance as required by the recipient or Contractor.

(7) Making efforts to assist interested DBE companies in obtaining necessary equipment, supplies, materials, or related assistance or services.

(8) Effectively using the services of available minority/women community organizations; minority/women contractors' groups; local, state, and federal minority/women business assistance offices; and other organizations as allowed on a case-by-case basis to provide assistance in the recruitment and placement of DBE companies.

(b) If the Department determines that the apparent successful bidder has made a good faith effort to secure the work commitment of DBE companies to meet the contract goal, the Department will award the contract provided that it is otherwise eligible for award. If the Department determines that the bidder has failed to meet the requirements of this Special Provision or that a good faith effort has not been made, the Department will notify the responsible company official designated in the Utilization Plan that the bid is not responsive. The notification shall include a statement of reasons for the determination. If the Utilization Plan is not approved because it is deficient as a technical matter, unless waived by the Department, the bidder will be notified and will be allowed no more than a five calendar day period in order to cure the deficiency.

(c) The bidder may request administrative reconsideration of a determination adverse to the bidder within the five working days after the receipt of the notification date of the determination by delivering the request to the Department of Transportation, Bureau of Small Business Enterprises, Contract Compliance Section, 2300 South Dirksen Parkway, Room 319, Springfield, Illinois 62764 (Telefax: (217) 785-1524). Deposit of the request in the United States mail on or before the fifth business day shall not be deemed delivery. The determination shall become final if a request is not made and delivered. A request may provide additional written documentation or argument concerning the issues raised in the determination statement of reasons, provided the documentation and arguments address efforts made prior to submitting the bid. The request will be forwarded to the Department's Reconsideration Officer. The Reconsideration Officer will extend an opportunity to the bidder to meet in person in order to consider all issues of documentation and whether the bidder made a good faith effort to meet the goal. After the review by the Reconsideration Officer, the bidder will be sent a written decision within ten working days after receipt of the request for reconsideration, explaining the basis for finding that the bidder did or did not meet the goal or make adequate good faith efforts to do so. A final decision by the Reconsideration Officer that a good faith effort was made shall approve the Utilization Plan submitted by the bidder and shall clear the contract for award. A final decision that a good faith effort was not made shall render the bid not responsive.

CALCULATING DBE PARTICIPATION. The Utilization Plan values represent work anticipated to be performed and paid for upon satisfactory completion. The Department is only able to count toward the achievement of the overall goal and the contract goal the value of payments made for the work actually performed by DBE companies. In addition, a DBE must perform a commercially useful function on the contract to be counted. A commercially useful function is generally performed when the DBE is responsible for the work and is carrying out its responsibilities by actually performing, managing, and supervising the work involved. The Department and Contractor are governed by the provisions of 49 CFR Part 26.55(c) on questions of commercially useful functions as it affects the work. Specific counting guidelines are provided in 49 CFR Part 26.55, the provisions of which govern over the summary contained herein.

(a) DBE as the Contractor: 100 percent goal credit for that portion of the work performed by the DBE's own forces, including the cost of materials and supplies. Work that a DBE subcontracts to a non-DBE does not count toward the DBE goals.

(b) DBE as a joint venture Contractor: 100 percent goal credit for that portion of the total dollar value of the contract equal to the distinct, clearly defined portion of the work performed by the DBE's own forces.

(c) DBE as a subcontractor: 100 percent goal credit for the work of the subcontract performed by the DBE's own forces, including the cost of materials and supplies, excluding the purchase of materials and supplies or the lease of equipment by the DBE subcontractor from the prime Contractor or its affiliates. Work that a DBE subcontractor in turn subcontracts to a non-DBE does not count toward the DBE goal.

(d) DBE as a trucker: 100 percent goal credit for trucking participation provided the DBE is responsible for the management and supervision of the entire trucking operation for which it is responsible. At least one truck owned, operated, licensed, and insured by the DBE must be used on the contract. Credit will be given for the following:

(1) The DBE may lease trucks from another DBE firm, including an owner-operator who is certified as a DBE. The DBE who leases trucks from another DBE receives credit for the total value of the transportation services the lessee DBE provides on the contract.

(2) The DBE may also lease trucks from a non-DBE firm, including from an owner-operator. The DBE who leases trucks from a non-DBE is entitled to credit only for the fee or commission is receives as a result of the lease arrangement.

(e) DBE as a material supplier:

(1) 60 percent goal credit for the cost of the materials or supplies purchased from a DBE regular dealer.

(2) 100 percent goal credit for the cost of materials of supplies obtained from a DBE manufacturer.

(3) 100 percent credit for the value of reasonable fees and commissions for the procurement of materials and supplies if not a DBE regular dealer or DBE manufacturer.

CONTRACT COMPLIANCE. Compliance with this Special Provision is an essential part of the contract. The Department is prohibited by federal regulations from crediting the participation of a DBE included in the Utilization Plan toward either the contract goal or the Department's overall goal until the amount to be applied toward the goals has been paid to the DBE. The following administrative procedures and remedies govern the compliance by the Contractor with the contractual obligations established by the Utilization Plan. After approval of the Utilization Plan and award of the contract, the Utilization Plan and individual DBE Participation Statements become part of the contract. If the Contractor did not succeed in obtaining enough DBE participation to achieve the advertised contract goal, and the Utilization Plan was approved and contract awarded based upon a determination of good faith, the total dollar value of DBE work calculated in the approved Utilization Plan as a percentage of the awarded contract value shall become the amended contract goal. All work indicated for performance by an approved DBE shall be performed, managed, and supervised by the DBE executing the DBE Participation Commitment Statement.

(a) NO AMENDMENT. No amendment to the Utilization Plan may be made without prior written approval from the Department's Bureau of Small Business Enterprises. All requests for amendment to the Utilization Plan shall be submitted to the Department of Transportation, Bureau of Small Business Enterprises, Contract Compliance Section, 2300 South Dirksen Parkway, Room 319, Springfield, Illinois 62764. Telephone number (217) 785-4611. Telefax number (217) 785-1524.

(b) CHANGES TO WORK. Any deviation from the DBE condition-of-award or contract plans, specifications, or special provisions must be approved, in writing, by the Department as provided elsewhere in the Contract. The Contractor shall notify affected DBEs in writing of any changes in the scope of work which result in a reduction in the dollar amount condition-of-award to the contract. Where the revision includes work committed to a new DBE subcontractor, not previously involved in the project, then a Request for Approval of Subcontractor, Department form BC 260A or AER 260A, must be signed and submitted. If the commitment of work is in the form of additional tasks assigned to an existing subcontract, than a new Request for Approval of Subcontractor shall not be required. However, the Contractor must document efforts to assure that the existing DBE subcontractor is capable of performing the additional work and has agreed in writing to the change.

(c) SUBCONTRACT. The Contractor must provide DBE subcontracts to IDOT upon request. Subcontractors shall ensure that all lower tier subcontracts or agreements with DBEs to supply labor or materials be performed in accordance with this Special Provision.

(d) ALTERNATIVE WORK METHODS. In addition to the above requirements for reductions in the condition of award, additional requirements apply to the two cases of Contractor-initiated work substitution proposals. Where the contract allows alternate work methods which serve to delete or create underruns in condition of award DBE work, and the Contractor selects that alternate method or, where the Contractor proposes a substitute work method or material that serves to diminish or delete work committed to a DBE and replace it with other work, then the Contractor must demonstrate one of the following:

(1) That the replacement work will be performed by the same DBE (as long as the DBE is certified in the respective item of work) in a modification of the condition of award; or

(2) That the DBE is aware that its work will be deleted or will experience underruns and has agreed in writing to the change. If this occurs, the Contractor shall substitute other work of equivalent value to a certified DBE or provide documentation of good faith efforts to do so; or

(3) That the DBE is not capable of performing the replacement work or has declined to perform the work at a reasonable competitive price. If this occurs, the Contractor shall substitute other work of equivalent value to a certified DBE or provide documentation of good faith efforts to do so.

(e) TERMINATION AND REPLACEMENT PROCEDURES. The Contractor shall not terminate or replace a DBE listed on the approved Utilization Plan, or perform with other forces work designated for a listed DBE except as provided in this Special Provision. The Contractor shall utilize the specific DBEs listed to perform the work and supply the materials for which each is listed unless the Contractor obtains the Department's written consent as provided in subsection (a) of this part. Unless Department consent is provided for termination of a DBE subcontractor, the Contractor shall not be entitled to any payment for work or material unless it is performed or supplied by the DBE in the Utilization Plan.

As stated above, the Contractor shall not terminate or replace a DBE subcontractor listed in the approved Utilization Plan without prior written consent. This includes, but is not limited to, instances in which the Contractor seeks to perform work originally designated for a DBE subcontractor with its own forces or those of an affiliate, a non-DBE firm, or with another DBE firm. Written consent will be granted only if the Bureau of Small Business Enterprises agrees, for reasons stated in its concurrence document, that the Contractor has good cause to terminate or replace the DBE firm. Before transmitting to the Bureau of Small Business Enterprises any request to terminate and/or substitute a DBE subcontractor, the Contractor shall give notice in writing to the DBE subcontractor, with a copy to the Bureau, of its intent to request to terminate and/or substitute, and the reason for the request. The Contractor shall give the DBE five days to respond to the Contractor's notice. The DBE so notified shall advise the Bureau and the Contractor of the reasons, if any, why it objects to the proposed termination of its subcontract and why the Bureau should not approve the Contractor's action. If required in a particular case as a matter of public necessity, the Bureau may provide a response period shorter than five days.

For purposes of this paragraph, good cause includes the following circumstances:

(1) The listed DBE subcontractor fails or refuses to execute a written contract;

(2) The listed DBE subcontractor fails or refuses to perform the work of its subcontract in a way consistent with normal industry standards. Provided, however, that good cause does not exist if the failure or refusal of the DBE subcontractor to perform its work on the subcontract results from the bad faith or discriminatory action of the prime contractor;

(3) The listed DBE subcontractor fails or refuses to meet the prime Contractor's reasonable, nondiscriminatory bond requirements;

(4) The listed DBE subcontractor becomes bankrupt, insolvent, or exhibits credit unworthiness;

(5) The listed DBE subcontractor is ineligible to work on public works projects because of suspension and debarment proceedings pursuant 2 CFR Parts 180, 215 and 1200 or applicable state law.

(6) You have determined that the listed DBE subcontractor is not a responsible contractor;

(7) The listed DBE subcontractor voluntarily withdraws from the projects and provides to you written notice of its withdrawal;

(8) The listed DBE is ineligible to receive DBE credit for the type of work required;

(9) A DBE owner dies or becomes disabled with the result that the listed DBE subcontractor is unable to complete its work on the contract;

(10) Other documented good cause that compels the termination of the DBE subcontractor. Provided, that good cause does not exist if the prime Contractor seeks to terminate a DBE it relied upon to obtain the contract so that the prime Contractor can self-perform the work for which the DBE contractor was engaged or so that the prime Contractor can substitute another DBE or non-DBE contractor after contract award.

When a DBE is terminated, or fails to complete its work on the Contract for any reason the Contractor shall make a good faith effort to find another DBE to substitute for the original DBE to perform at least the same amount of work under the contract as the terminated DBE to the extent needed to meet the established Contract goal. The good faith efforts shall be documented by the Contractor. If the Department requests documentation under this provision, the Contractor shall submit the documentation within seven days, which may be extended for an additional seven days if necessary at the request of the Contractor. The Department shall provide a written determination to the Contractor stating whether or not good faith efforts have been demonstrated.

(f) FINAL PAYMENT. After the performance of the final item of work or delivery of material by a DBE and final payment therefore to the DBE by the Contractor, but not later than thirty calendar days after payment has been made by the Department to the Contractor for such work or material, the Contractor shall submit a DBE Payment Agreement on Department form SBE 2115 to the Resident Engineer. If full and final payment has not been made to the DBE, the DBE Payment Agreement shall indicate whether a disagreement as to the payment required exists between the Contractor and the DBE or if the Contractor believes that the work has not been satisfactorily completed. If the Contractor does not have the full amount of work indicated in the Utilization Plan performed by the DBE companies indicated in the Utilization Plan and after good faith efforts are reviewed, the Department may deduct from contract payments to the Contractor the amount of the goal not achieved as liquidated and ascertained damages. The Contractor may request an administrative reconsideration of any amount deducted as damages pursuant to subsection (h) of this part.

(g) ENFORCEMENT. The Department reserves the right to withhold payment to the Contractor to enforce the provisions of this Special Provision. Final payment shall not be made on the contract until such time as the Contractor submits sufficient documentation demonstrating achievement of the goal in accordance with this Special Provision or after liquidated damages have been determined and collected.

(h) RECONSIDERATION. Notwithstanding any other provision of the contract, including but not limited to Article 109.09 of the Standard Specifications, the Contractor my request administrative reconsideration of a decision to deduct the amount of the goal not achieved as liquidated damages. A request to reconsider shall be delivered to the Contract Compliance Section and shall be handled and considered in the same manner as set forth in paragraph (c) of "Good Faith Effort Procedures" of this Special Provision, except a final decision that a good faith effort was not made during contract performance to achieve the goal agreed to in the Utilization Plan shall be the final administrative decision of the Department. The result of the reconsideration process is not administratively appealable to the U.S. Department of Transportation.

DISPOSAL FEES (BDE)
Effective: November 1, 2018

Replace Articles 109.04(b)(5) – 109.04(b)(8) of the Standard Specifications with the following:

"(5) Disposal Fees. When the extra work performed includes paying for disposal fees at a clean construction and demolition debris facility, an uncontaminated soil fill operation or a landfill, the Contractor shall receive, as administrative costs, an amount equal to five percent of the first $10,000 and one percent of any amount over $10,000 of the total approved costs of such fees.

(6) Miscellaneous. No additional allowance will be made for general superintendence, the use of small tools, or other costs for which no specific allowance is herein provided.

(7) Statements. No payment will be made for work performed on a force account basis until the Contractor has furnished the Engineer with itemized statements of the cost of such force account work. Statements shall be accompanied and supported by invoices for all materials used and transportation charges. However, if materials used on the force account work are not specifically purchased for such work but are taken from the Contractor's stock, then in lieu of the invoices, the Contractor shall furnish an affidavit certifying that such materials were taken from his/her stock, that the quantity claimed was actually used, and that the price and transportation claimed represent the actual cost to the Contractor.

Itemized statements at the cost of force account work shall be detailed as follows.

a. Name, classification, date, daily hours, total hours, rate, and extension for each laborer and foreman. Payrolls shall be submitted to substantiate actual wages paid if so requested by the Engineer.

b. Designation, dates, daily hours, total hours, rental rate, and extension for each unit of machinery and equipment.

c. Quantities of materials, prices and extensions.

d. Transportation of materials.

e. Cost of property damage, liability and workmen's compensation insurance premiums, unemployment insurance contributions, and social security tax.

(8) Work Performed by an Approved Subcontractor. When extra work is performed by an approved subcontractor, the Contractor shall receive, as administrative costs, an amount equal to five percent of the total approved costs of such work with the minimum payment being $100.

(9) All statements of the cost of force account work shall be furnished to the Engineer not later than 60 days after receipt of the Central Bureau of Construction form "Extra Work Daily Report". If the statement is not received within the specified time frame, all demands for payment for the extra work are waived and the Department is released from any and all such demands. It is the responsibility of the Contractor to ensure that all statements are received within the specified time regardless of the manner or method of delivery."

EQUIPMENT PARKING AND STORAGE (BDE)
Effective: November 1, 2017

Replace the first paragraph of Article 701.11 of the Standard Specifications with the following.

"**701.11 Equipment Parking and Storage.** During working hours, all vehicles and/or nonoperating equipment which are parked, two hours or less, shall be parked at least 8 ft (2.5 m) from the open traffic lane. For other periods of time during working and for all nonworking hours, all vehicles, materials, and equipment shall be parked or stored as follows.

(a) When the project has adequate right-of-way, vehicles, materials, and equipment shall be located a minimum of 30 ft (9 m) from the pavement.

(b) When adequate right-of-way does not exist, vehicles, materials, and equipment shall be located a minimum of 15 ft (4.5 m) from the edge of any pavement open to traffic.

(c) Behind temporary concrete barrier, vehicles, materials, and equipment shall be located a minimum of 24 in. (600 mm) behind free standing barrier or a minimum of 6 in. (150 mm) behind barrier that is either pinned or restrained according to Article 704.04. The 24 in. or 6 in. measurement shall be from the base of the non-traffic side of the barrier.

(d) Behind other man-made or natural barriers meeting the approval of the Engineer."

LIGHTS ON BARRICADES (BDE)
Effective: January 1, 2018

Revise Article 701.16 of the Standard Specifications to read:

"**701.16 Lights.** Lights shall be used on devices as required in the plans, the traffic control plan, and the following table.

Circumstance	Lights Required
Daylight operations	None
First two warning signs on each approach to the work involving a nighttime lane closure and "ROUGH GROOVED SURFACE" (W8-I107) signs	Flashing mono-directional lights
Devices delineating isolated obstacles, excavations, or hazards at night (Does not apply to patching)	Flashing bi-directional lights
Devices delineating obstacles, excavations, or hazards exceeding 100 ft (30 m) in length at night (Does not apply to widening)	Steady burn bi-directional lights
Channelizing devices for nighttime lane closures on two-lane roads	None
Channelizing devices for nighttime lane closures on multi-lane roads	None
Channelizing devices for nighttime lane closures on multi-lane roads separating opposing directions of traffic	None
Channelizing devices for nighttime along lane shifts on multilane roads	Steady burn mono-directional lights
Channelizing devices for night time along lane shifts on two lane roads	Steady burn bi-directional lights
Devices in nighttime lane closure tapers on Standards 701316 and 701321	Steady burn bi-directional lights
Devices in nighttime lane closure tapers	Steady burn mono-directional lights
Devices delineating a widening trench	None
Devices delineating patches at night on roadways with an ADT less than 25,000	None
Devices delineating patches at night on roadways with an ADT of 25,000 or more	None

Batteries for the lights shall be replaced on a group basis at such times as may be specified by the Engineer."

Delete the fourth sentence of the first paragraph of Article 701.17(c)(2) of the Standard Specifications.

Revise the first paragraph of Article 603.07 of the Standard Specifications to read:

"**603.07 Protection Under Traffic.** After the casting has been adjusted and Class SI concrete has been placed, the work shall be protected by a barricade for at least 72 hours."

PAYMENTS TO SUBCONTRACTORS (BDE)
Effective: November 2, 2017

Add the following to the end of the fourth paragraph of Article 109.11 of the Standard Specifications:

"If reasonable cause is asserted, written notice shall be provided to the applicable subcontractor and/or material supplier and the Engineer within five days of the Contractor receiving payment. The written notice shall identify the contract number, the subcontract or material purchase agreement, a detailed reason for refusal, the value of payment being withheld, and the specific remedial actions required of the subcontractor and/or material supplier so that payment can be made."

PORTLAND CEMENT CONCRETE (BDE)
Effective: November 1, 2017

Revise the Air Content % of Class PP Concrete in Table 1 Classes of Concrete and Mix Design Criteria in Article 1020.04 of the Standard Specifications to read:

"TABLE 1. CLASSES OF CONCRETE AND MIX DESIGN CRITERIA

Class of Conc.	Use	Air Content %
PP	Pavement Patching Bridge Deck Patching (10)	
	PP-1	4.0 - 8.0"
	PP-2	
	PP-3	
	PP-4	
	PP-5	

Revise Note (4) at the end of Table 1 Classes of Concrete and Mix Design Criteria in Article 1020.04 of the Standard Specifications to read:

"(4) For all classes of concrete, the maximum slump may be increased to 7 in (175 mm) when a high range water-reducing admixture is used. For Class SC, the maximum slump may be increased to 8 in. (200 mm). For Class PS, the maximum slump may be increased to 8 1/2 in. (215 mm) if the high range water-reducing admixture is the polycarboxylate type."

PROGRESS PAYMENTS (BDE)
Effective: November 2, 2013

Revise Article 109.07(a) of the Standard Specifications to read:

"(a) Progress Payments. At least once each month, the Engineer will make a written estimate of the quantity of work performed in accordance with the contract, and the value thereof at the contract unit prices. The amount of the estimate approved as due for payment will be vouchered by the Department and presented to the State Comptroller for payment. No amount less than $1000.00 will be approved for payment other than the final payment.

Progress payments may be reduced by liens filed pursuant to Section 23(c) of the Mechanics' Lien Act, 770 ILCS 60/23(c).

If a Contractor or subcontractor has defaulted on a loan issued under the Department's Disadvantaged Business Revolving Loan Program (20 ILCS 2705/2705-610), progress payments may be reduced pursuant to the terms of that loan agreement. In such cases, the amount of the estimate related to the work performed by the Contractor or subcontractor, in default of the loan agreement, will be offset, in whole or in part, and vouchered by the Department to the Working Capital Revolving Fund or designated escrow account. Payment for the work shall be considered as issued and received by the Contractor or subcontractor on the date of the offset voucher. Further, the amount of the offset voucher shall be a credit against the Department's obligation to pay the Contractor, the Contractor's obligation to pay the subcontractor, and the Contractor's or subcontractor's total loan indebtedness to the Department. The offset shall continue until such time as the entire loan indebtedness is satisfied. The Department will notify the Contractor and Fund Control Agent in a timely manner of such offset. The Contractor or subcontractor shall not be entitled to additional payment in consideration of the offset.

The failure to perform any requirement, obligation, or term of the contract by the Contractor shall be reason for withholding any progress payments until the Department determines that compliance has been achieved."

REMOVAL AND DISPOSAL OF REGULATED SUBSTANCES (BDE)
Effective: January 1, 2019

Revise Section 669 of the Standard Specifications to read:

"**SECTION 669. REMOVAL AND DISPOSAL OF REGULATED SUBSTANCES**

669.01 Description. This work shall consist of the transportation and proper disposal of contaminated soil and groundwater. This work shall also consist of the removal, transportation, and proper disposal of underground storage tanks (UST), their content and associated underground piping to the point where the piping is above the ground, including determining the content types and estimated quantities.

669.02 Equipment. The Contractor shall notify the Engineer of the delivery of all excavation, storage, and transportation equipment to a work area location. The equipment shall comply with OSHA and American Petroleum Institute (API) guidelines and shall be furnished in a clean condition. Clean condition means the equipment does not contain any residual material classified as a non-special waste, non-hazardous special waste, or hazardous waste. Residual materials include, but are not limited to, petroleum products, chemical products, sludges, or any other material present in or on equipment.

Before beginning any associated soil or groundwater management activity, the Contractor shall provide the Engineer with the opportunity to visually inspect and approve the equipment. If the equipment contains any contaminated residual material, decontamination shall be performed on the equipment as appropriate to the regulated substance and degree of contamination present according to OSHA and API guidelines. All cleaning fluids used shall be treated as the contaminant unless laboratory testing proves otherwise.

669.03 Pre-construction Submittals. Prior to beginning this work, or working in areas with regulated substances, the Contractor shall submit a Regulated Substance Pre-Construction Plan (RSPCP) to the Engineer for review and approval using form BDE 2730. The form shall be signed by an Illinois licensed Professional Engineer or Professional Geologist.

As part of the RSPCP, the qualifications of Contractor(s) or firm(s) performing the following work shall be listed.

(a) On-Site Monitoring. Qualification for on-site monitoring of regulated substance work and on-site monitoring of UST removal requires either pre-qualification in Hazardous Waste by the Department or demonstration of acceptable project experience in remediation and special waste operations for contaminated sites in accordance with applicable Federal, State, or local regulatory requirements.

Qualification for each individual performing on-site monitoring requires a minimum of one-year of experience in similar activities as those required for the project.

(b) Underground Storage Tank. Qualification for underground storage tank (UST) work requires licensing and certification with the Office of the State Fire Marshall (OSFM) and possession of all permits required to perform the work. A copy of the permit shall be provided to the Engineer prior to tank removal.

The qualified Contractor(s) or firm(s) shall also document it does not have any current or former ties with any of the properties contained within, adjoining, or potentially affecting the work.

The Engineer will require up to 30 calendar days for review of the RSPCP. The review may involve rejection or revision and resubmittal; in which case, an additional 30 days will be required for each subsequent review. Work shall not commence until the RSPCP has been approved by the Engineer. After approval, the RSPCP shall be revised as necessary to reflect changed conditions in the field.

CONSTRUCTION REQUIREMENTS

669.04 Contaminated Soil and/or Groundwater Monitoring. Prior to beginning excavation, the Contractor shall mark the limits of removal for approval by the Engineer. Once excavation begins, the work and work area involving regulated substances shall be monitored by qualified personnel. The qualified personnel shall be on-site continuously during excavation and loading of material containing regulated substances. The qualified personnel shall be equipped with either a photoionization detector (PID) (minimum 10.6eV lamp), or a flame ionization detector (FID), and other equipment, as appropriate, to monitor for potential contaminants associated with volatile organic compounds (VOCs) or semi-volatile organic compounds (SVOCs). The PID or FID meter shall be calibrated on-site and background level readings taken and recorded daily, and as field and weather conditions change. Any field screen reading on the PID or FID in excess of background levels indicates the potential presence of contaminated material requiring handling as a non-special waste, special waste, or hazardous waste. PID or FID readings may be used as the basis of increasing the limits of removal with the approval of the Engineer but shall in no case be used to decrease the limits.

The qualified personnel shall document field activities using form BDE 2732 (Regulated Substances Monitoring Daily Record) including the name(s) of personnel conducting the monitoring, weather conditions, PID or FID calibration records, a list of equipment used on-site, a narrative of activities completed, photo log sheets, manifests and landfill tickets, monitoring results, how regulated substances were managed and other pertinent information.

Samples will be collected in accordance with the RSPCP. Samples shall be analyzed for the contaminants of concern (COCs), including pH, based on the property's land use history, the encountered abnormality and/or the parameters listed in the maximum allowable concentration (MAC) for chemical constituents in uncontaminated soil established pursuant to Subpart F of 35 Ill. Adm. Code 1100.605. The analytical results shall serve to document the level of contamination.

Samples shall be grab samples (not combined with other locations). The samples shall be taken with decontaminated or disposable instruments. The samples shall be placed in sealed containers and transported in an insulated container to the laboratory. The container shall maintain a temperature of 39 °F (4 °C). All samples shall be clearly labeled. The labels shall indicate the sample number, date sampled, collection location and depth, and any other relevant observations.

The laboratory shall use analytical methods which are able to meet the lowest appropriate practical quantitation limits (PQL) or estimated quantitation limit (EQL) specified in "Test Methods for Evaluating Solid Wastes, Physical/Chemical Methods", EPA Publication No. SW-846; "Methods for the Determination of Organic Compounds in Drinking Water", EPA, EMSL, EPA-600/4-88/039; and “Methods for the Determination of Organic Compounds in Drinking Water, Supplement III”, EPA 600/R-95/131, August 1995. For parameters where the specified cleanup objective is below the acceptable detection limit (ADL), the ADL shall serve as the cleanup objective. For other parameters the ADL shall be equal to or below the specified cleanup objective.

669.05 Contaminated Soil and/or Groundwater Management and Disposal. The management and disposal of contaminated soil and/or groundwater shall be according to the following:

(a) Soil Analytical Results Exceed Most Stringent MAC. When the soil analytical results indicate that detected levels exceed the most stringent maximum allowable concentration (MAC) for chemical constituents in uncontaminated soil established pursuant to Subpart F of 35 Illinois Administrative Code 1100.605, the soil shall be managed as follows:

(1) When analytical results indicate inorganic chemical constituents exceed the most stringent MAC but they are still considered within area background levels by the Engineer, the excavated soil can be utilized within the construction limits as fill, when suitable. If the soils cannot be utilized within the construction limits, they shall be managed and disposed of off-site as a non-special waste, special waste, or hazardous waste as applicable.

(2) When analytical results indicate chemical constituents exceed the most stringent MAC but do not exceed the MAC for a Metropolitan Statistical Area (MSA) County, the excavated soil can be utilized within the construction limits as fill, when suitable, or managed and disposed of off-site as “uncontaminated soil” at a clean construction and demolition debris (CCDD) facility or an uncontaminated soil fill operation (USFO) within an MSA County provided the pH of the soil is within the range of 6.25 - 9.0, inclusive.

(3) When analytical results indicate chemical constituents exceed the most stringent MAC but do not exceed the MAC for an MSA County excluding Chicago, or the MAC within the Chicago corporate limits, the excavated soil can be utilized within the construction limits as fill, when suitable, or managed and disposed of off-site as “uncontaminated soil” at a CCDD facility or an USFO within an MSA County excluding Chicago or within the Chicago corporate limits provided the pH of the soil is within the range of 6.25 - 9.0, inclusive.

(4) When analytical results indicate chemical constituents exceed the most stringent MAC but do not exceed the MAC for an MSA County excluding Chicago, the excavated soil can be utilized within the construction limits as fill, when suitable, or managed and disposed of off-site as "uncontaminated soil" at a CCDD facility or an USFO within an MSA County excluding Chicago provided the pH of the soil is within the range of 6.25 - 9.0, inclusive.

(5) When the Engineer determines soil cannot be managed according to Articles 669.05(a)(1) through (a)(4) above, the soil shall be managed and disposed of off-site as a non-special waste, special waste, or hazardous waste as applicable.

(b) Soil Analytical Results Do Not Exceed Most Stringent MAC. When the soil analytical results indicate that detected levels do not exceed the most stringent MAC, the excavated soil can be utilized within the construction limits or managed and disposed off-site as "uncontaminated soil" according to Article 202.03. However, the excavated soil cannot be taken to a CCDD facility or an USFO for any of the following reasons.

(1) The pH of the soil is less than 6.25 or greater than 9.0.

(2) The soil exhibited PID or FID readings in excess of background levels.

(c) Soil Analytical Results Exceed Most Stringent MAC but Do Not Exceed Tiered Approach to Corrective Action Objectives (TACO) Residential. When the soil analytical results indicate that detected levels exceed the most stringent MAC but do not exceed TACO Tier 1 Soil Remediation Objectives for Residential Properties pursuant to 35 IAC 742 Appendix B Table A, the excavated soil can be utilized within the right-of-way or managed and disposed off-site as "uncontaminated soil" according to Article 202.03. However, the excavated soil cannot be taken to a CCDD facility or an USFO.

(d) Groundwater. When groundwater analytical results indicate the detected levels are above Appendix B, Table E of 35 Illinois Administrative Code 742, the most stringent Tier 1 Groundwater Remediation Objectives for Groundwater Component of the Groundwater Ingestion Route for Class 1 groundwater, the groundwater shall be managed off-site as a special waste. The groundwater shall be containerized and trucked to an off-site treatment facility or may be discharged to a sanitary sewer or combined sewer when permitted by the local sewer authority. Groundwater discharged to a sewer shall be pre-treated to remove particulates and measured with a calibrated flow meter to comply with applicable discharge limits. A copy of the permit shall be provided to the Engineer prior to discharging groundwater to the sewer.

All groundwater encountered within trenches may be managed within the trench and allowed to infiltrate back into the ground. If the groundwater cannot be managed within the trench it must be removed as a special or hazardous waste. The Contractor is prohibited from managing groundwater within the trench by discharging it through any existing or new storm sewer. The Contractor shall install backfill plugs within the area of groundwater contamination.

One backfill plug shall be placed down gradient to the area of groundwater contamination. Backfill plugs shall be installed at intervals not to exceed 50 ft (15 m). Backfill plugs are to be 4 ft (1.2 m) long, measured parallel to the trench, full trench width and depth. Backfill plugs shall not have any fine aggregate bedding or backfill, but shall be entirely cohesive soil or any class of concrete. The Contractor shall provide test data that the material has a permeability of less than 10^{-7} cm/sec according to ASTM D 5084, Method A or per another test method approved by the Engineer.

The Contractor shall use due care when transferring contaminated material from the area of origin to the transporter. Should releases of contaminated material to the environment occur (i.e., spillage onto the ground, etc.), the Contractor shall clean-up spilled material and place in the appropriate storage containers as previously specified. Clean-up shall include, but not be limited to, sampling beneath the material staging area to determine complete removal of the spilled material.

The Contractor shall be responsible for transporting and disposing all material classified as a non-special waste, special waste, or hazardous waste from the job site to an appropriately permitted landfill facility. The transporter and the vehicles used for transportation shall comply with all federal, state, and local rules and regulations governing the transportation of non-special waste, special waste, or hazardous waste.

All equipment used by the Contractor to haul contaminated material to the landfill facility shall be lined with a 6 mil (150 micron) polyethylene liner and securely covered during transportation. The Contractor shall obtain all documentation including any permits and/or licenses required to transport the contaminated material to the disposal facility.

The Contractor shall provide engineered barriers, when required, and shall include materials sufficient to completely line excavation surfaces, including sloped surfaces, bottoms, and sidewall faces, within the areas designated for protection.

The Engineer shall coordinate with the Contractor on the completion of all documentation. The Contractor shall make all arrangements for collection and analysis of landfill acceptance testing. The Contractor shall coordinate for waste disposal approval with the disposal facility. After the Contractor completes these activities and upon receipt of authorization from the Engineer, the Contractor shall initiate the disposal process.

The Contractor shall provide the Engineer with all transport-related documentation within two days of transport or receipt of said document(s). The Engineer shall maintain the file for all such documentation. For management of special or hazardous waste, the Contractor shall provide the Engineer with documentation the Contractor (or subcontractor, if a subcontractor is used for transportation) is operating with a valid Illinois special waste transporter permit at least two weeks before transporting the first load of contaminated material.

The Contractor shall schedule and arrange the transport and disposal of each load of contaminated material produced. The Contractor shall make all transport and disposal arrangements so no contaminated material remains within the project area at the close of business each day. Exceptions to this specification require prior approval from the Engineer within 24 hours of close of business. The Contractor shall be responsible for all other pre-disposal/transport preparations necessary daily to accomplish management activities.

Any waste generated as a special or hazardous waste from a non-fixed facility shall be manifested off-site using the Department's county generator number. An authorized representative of the Department shall sign all manifests for the disposal of the contaminated material and confirm the Contractor's transported volume. Any waste generated as a non-special waste may be managed off-site without a manifest, a special waste transporter, or a generator number.

The Contractor shall select a landfill mandated by definition of the contaminant within the State of Illinois. The Department will review and approve or reject the facility proposed by the Contractor to use as a landfill. The Contractor shall verify whether the selected disposal facility is compliant with those applicable standards as mandated by definition of the contaminant and whether the disposal facility is presently, has previously been, or has never been, on the United States Environmental Protection Agency (U.S. EPA) National Priorities List or the Resource Conservation and Recovery Act (RCRA) List of Violating Facilities. The Contractor shall be responsible for coordinating permits with the IEPA. The use of a Contractor selected landfill shall in no manner delay the construction schedule or alter the Contractor's responsibilities as set forth.

669.06 Non-Special Waste Certification. An authorized representative of the Department shall sign and date all non-special waste certifications. The Contractor shall be responsible for providing the Engineer with the required information that will allow the Engineer to certify the waste is not a special waste.

(a) Definition. A waste is considered a non-special waste as long as it is not:

(1) a potentially infectious medical waste;

(2) a hazardous waste as defined in 35 IAC 721;

(3) an industrial process waste or pollution control waste that contains liquids, as determined using the paint filter test set forth in subdivision (3)(A) of subsection (m) of 35 IAC 811.107;

(4) a regulated asbestos-containing waste material, as defined under the National Emission Standards for Hazardous Air Pollutants in 40 CFR 61.141;

(5) a material containing polychlorinated biphenyls (PCB's) regulated pursuant to 40 CFR Part 761;

(6) a material subject to the waste analysis and recordkeeping requirements of 35 IAC 728.107 under land disposal restrictions of 35 IAC 728;

(7) a waste material generated by processing recyclable metals by shredding and required to be managed as a special waste under Section 22.29 of the Environmental Protection Act; or

(8) an empty portable device or container in which a special or hazardous waste has been stored, transported, treated, disposed of, or otherwise handled.

(b) Certification Information. All information used to determine the waste is not a special waste shall be attached to the certification. The information shall include but not be limited to:

(1) the means by which the generator has determined the waste is not a hazardous waste;

(2) the means by which the generator has determined the waste is not a liquid;

(3) if the waste undergoes testing, the analytic results obtained from testing, signed and dated by the person responsible for completing the analysis;

(4) if the waste does not undergo testing, an explanation as to why no testing is needed;

(5) a description of the process generating the waste; and

(6) relevant material safety data sheets.

669.07 Temporary Staging. The Contractor shall excavate and dispose of all waste material as mandated by the contaminants without temporary staging. If circumstances require temporary staging, he/she shall request in writing, approval from the Engineer.

When approved, the Contractor shall prepare a secure location within the project area capable of housing containerized waste materials. The Contractor shall contain all waste material in leak-proof storage containers such as lined roll-off boxes or 55 gal (208 L) drums, or stored in bulk fashion on storage pads. The design and construction of such storage pad(s) for bulk materials shall be subject to approval by the Engineer. The Contractor shall place the staged storage containers on an all-weather gravel-packed, asphalt, or concrete surface. The Contractor shall maintain a clearance both above and beside the storage units to provide maneuverability during loading and unloading. The Contractor shall provide any assistance or equipment requested by the Engineer for authorized personnel to inspect and/or sample contents of each storage container. All containers and their contents shall remain intact and undisturbed by unauthorized persons until the manner of disposal is determined. The Contractor shall keep the storage containers covered, except when access is requested by authorized personnel of the Department. The Engineer shall authorize any additional material added to the contents of any storage container before being filled.

The Contractor shall ensure the staging area is enclosed (by a fence or other structure) to ensure direct access to the area is restricted, and he/she shall procure and place all required regulatory identification signs applicable to an area containing the waste material. The Contractor shall be responsible for all activities associated with the storage containers including, but not limited to, the procurement, transport, and labeling of the containers. The Contractor shall clearly mark all containers in permanent marker or paint with the date of waste generation, location and/or area of waste generation, and type of waste (e.g., decontamination water, contaminated clothing, etc.). The Contractor shall place these identifying markings on an exterior side surface of the container. The Contractor shall separately containerize each contaminated medium, i.e. contaminated clothing is placed in a separate container from decontamination water. Containers used to store liquids shall not be filled in excess of 80 percent of the rated capacity. The Contractor shall not use a storage container if visual inspection of the container reveals the presence of free liquids or other substances that could classify the material as a hazardous waste in the container.

The Department will not be responsible for any additional costs incurred, if mismanagement of the staging area, storage containers, or their contents by the Contractor results in excess cost expenditure for disposal or other material management requirements.

669.08 Underground Storage Tank Removal. For the purposes of this section, an underground storage tank (UST) includes the underground storage tank, piping, electrical controls, pump island, vent pipes and appurtenances.

Prior to removing an UST, the Engineer shall determine whether the Department is considered an "owner" or "operator" of the UST as defined by the UST regulations (41 Ill. Adm. Code Part 176). Ownership of the UST refers to the Department's owning title to the UST during storage, use or dispensing of regulated substances. The Department may be considered an "operator" of the UST if it has control of, or has responsibility for, the daily operation of the UST. The Department may however voluntarily undertake actions to remove an UST from the ground without being deemed an "operator" of the UST.

In the event the Department is deemed not to be the "owner" or "operator" of the UST, the OSFM removal permit shall reflect who was the past "owner" or "operator" of the UST. If the "owner" or "operator" cannot be determined from past UST registration documents from OSFM, then the OSFM removal permit will state the "owner" or "operator" of the UST is the Department. The Department’s Office of Chief Counsel (OCC) will review all UST removal permits prior to submitting any removal permit to the OSFM. If the Department is not the “owner” or “operator” of the UST then it will not register the UST or pay any registration fee.

The Contractor shall be responsible for obtaining all permits required for removing the UST, notification to the OSFM, using an OSFM certified tank contractor, removal and disposal of the UST and its contents, and preparation and submittal of the OSFM Site Assessment Report in accordance with 41 Ill. Adm. Code Part 176.330.

The Contractor shall contact the Engineer and the OSFM's office at least 72 hours prior to removal to confirm the OSFM inspector's presence during the UST removal. Removal, transport, and disposal of the UST shall be according to the applicable portions of the latest revision of the "American Petroleum Institute (API) Recommended Practice 1604".

The Contractor shall collect and analyze tank content (sludge) for disposal purposes. The Contractor shall remove as much of the regulated substance from the UST system as necessary to prevent further release into the environment. All contents within the tank shall be removed, transported and disposed of, or recycled. The tank shall be removed and rendered empty according to IEPA definition.

The Contractor shall collect soil samples from the bottom and sidewalls of the excavated area in accordance with 35 Ill. Adm. Code Part 734.210(h) after the required backfill has been removed during the initial response action, to determine the level of contamination remaining in the ground, regardless if a release is confirmed or not by the OSFM on-site inspector.

In the event the UST is designated a leaking underground storage tank (LUST) by the OSFM's inspector, or confirmation by analytical results, the Contractor shall notify the Engineer and the DESU. Upon confirmation of a release of contaminants from the UST and notifications to the Engineer and DESU, the Contractor shall report the release to the Illinois Emergency Management Agency (IEMA) (e.g., by telephone or electronic mail) and provide them with whatever information is available ("owner" or "operator" shall be stated as the past registered "owner" or "operator", or the IDOT District in which the UST is located and the DESU Manager);

The Contractor shall perform the following initial response actions if a release is indicated by the OSFM inspector:

(a) Take immediate action to prevent any further release of the regulated substance to the environment, which may include removing, at the Engineer's discretion, and disposing of up to 4 ft (1.2 m) of the contaminated material, as measured from the outside dimension of the tank

(b) Identify and mitigate fire, explosion and vapor hazards;

(c) Visually inspect any above ground releases or exposed below ground releases and prevent further migration of the released substance into surrounding soils and groundwater; and

(d) Continue to monitor and mitigate any additional fire and safety hazards posed by vapors and free product that have migrated from the UST excavation zone and entered into subsurface structures (such as sewers or basements).

The UST excavation shall be backfilled according to applicable portions of Sections 205, 208, and 550 with a material that will compact and develop stability. The material shall be approved prior to placement. All uncontaminated concrete and soil removed during tank extraction may be used to backfill the excavation, at the discretion of the Engineer.

After backfilling the excavation, the site shall be graded and cleaned.

669.09 Regulated Substance Final Construction Report. Not later than 90 days after completing this work, the Contractor shall submit a Regulated Substance Final Construction Report (RSFCR) to the Engineer using form BDE 2733 and required attachments. The form shall be signed by an Illinois licensed Professional Engineer or Professional Geologist.

669.10 Method of Measurement. Non-special waste, special waste, and hazardous waste soil will be measured for payment according to Article 202.07(b) when performing earth excavation, Article 502.12(b) when excavating for structures, or by computing the volume of the trench using the maximum trench width permitted and the actual depth of the trench.

Groundwater containerized and transported off-site for management, storage, and disposal will be measured for payment in gallons (liters).

Backfill plugs will be measured in cubic yards (cubic meters) in place, except the quantity for which payment will be made shall not exceed the volume of the trench, as computed by using the maximum width of trench permitted by the Specifications and the actual depth of the trench, with a deduction for the volume of the pipe.

Engineered Barriers will be measured for payment in square yards (square meters).

669.11 Basis of Payment. The work of preparing, submitting and administering a Regulated Substances Pre-Construction Plan will be paid for at the contract lump sum price for REGULATED SUBSTANCES PRE-CONSTRUCTION PLAN.

On-site monitoring of regulated substances, including completion of form BDE 2732 for each day of work, will be paid for at the contract unit price per calendar day, or faction thereof, for ON-SITE MONITORING OF REGULATED SUBSTANCES.

The installation of engineered barriers will be paid for at the contract unit price per square yard (square meter) for ENGINEERED BARRIER.

The work of removing a UST, soil excavation, soil and content sampling, and the excavated soil, UST content, and UST disposal will be paid for at the contract unit price per each for UNDERGROUND STORAGE TANK REMOVAL.

The transportation and disposal of soil and other materials from an excavation determined to be contaminated will be paid for at the contract unit price per cubic yard (cubic meter) for NON-SPECIAL WASTE DISPOSAL, SPECIAL WASTE DISPOSAL, or HAZARDOUS WASTE DISPOSAL.

The transportation and disposal of groundwater from an excavation determined to be contaminated will be paid for at the contract unit price per gallon (liter) for SPECIAL WASTE GROUNDWATER DISPOSAL or HAZARDOUS WASTE GROUNDWATER DISPOSAL. When groundwater is discharged to a sanitary or combined sewer by permit, the cost will be paid for according to Article 109.05.

Backfill plugs will be paid for at the contract unit price per cubic yard (cubic meter) for BACKFILL PLUGS.

Payment for temporary staging, if required, will be paid for according to Article 109.04.

Payment for accumulated stormwater removal and disposal will be according to Article 109.04. Payment will only be allowed if appropriate stormwater and erosion control methods were used.

Payment for decontamination, labor, material, and equipment for monitoring areas beyond the specified areas, with the Engineer's prior written approval, will be according to Article 109.04.

The sampling and testing associated with this work will be paid for as follows.

(a) BETX Soil/Groundwater Analysis. When the contaminants of concern are gasoline only, soil or groundwater samples shall be analyzed for benzene, ethylbenzene, toluene, and xylenes (BETX). The analysis will be paid for at the contract unit price per each for BETX SOIL ANALYSIS and/or BETX GROUNDWATER ANALYSIS using EPA Method 8021B.

(b) BETX-PNAS Soil/Groundwater Analysis. When the contaminants of concern are middle distillate and heavy ends, soil or groundwater samples shall be analyzed for BETX and polynuclear aromatics (PNAS). The analysis will be paid for at the contract unit price per each for BETX-PNAS SOIL ANALYSIS and/or BETX-PNAS GROUNDWATER ANALYSIS using EPA Method 8021B for BETX and EPA Method 8310 for PNAs.

(c) Priority Pollutants Soil Analysis. When the contaminants of concern are used oils, soil samples shall be analyzed for priority pollutant VOCs, priority pollutants SVOCs, and priority pollutants metals. The analysis will be paid for at the contract unit price per each for PRIORITY POLLUTANTS SOIL ANALYSIS using EPA Method 8260B for VOCs, EPA Method 8270C for SVOCs, and using an ICP instrument and EPA Methods 6010B and 7471A for metals.

(d) Priority Pollutant Groundwater Analysis. When the contaminants of concern are used oils, non-petroleum material, or unknowns, groundwater samples shall be analyzed for priority pollutant VOCs, priority pollutants SVOCs, and priority pollutants metals. The analysis will be paid for at the contract unit price per each for PRIORITY POLLUTANTS GROUNDWATER ANALYSIS using EPA Method 8260B for VOCs, EPA Method 8270C for SVOCs, and EPA Methods 6010B and 7470A for metals.

(e) Target Compound List (TCL) Soil Analysis. When the contaminants of concern are unknowns or non-petroleum material, soil samples shall be analyzed for priority pollutant VOCs, priority pollutants SVOCS, priority pollutants metals, pesticides, and Resource Conservation and Recovery Act (RCRA) metals by the toxicity characteristic leaching procedure (TCLP). The analysis will be paid for at the contract unit price per each for TCL SOIL ANALYSIS using EPA Method 8260B for VOCs, EPA Method 8270C for SVOCs, EPA Method 8081 for pesticides, and ICP instrument and EPA Methods 6010B, 7471A, 1311 (extraction), 6010B, and 7470A for metals.

(f) Soil Disposal Analysis. When the waste material for disposal requires sampling for disposal acceptance, the samples shall be analyzed for TCLP VOCs, SVOCs, RCRA metals, pH, ignitability, and paint filter test. The analysis will be paid for at the contract unit price per each for SOIL DISPOSAL ANALYSIS using EPA Methods 1311 (extraction), 8260B for VOCs, 8270C for SVOCs, 6010B and 7470A for RCRA metals, 9045C for pH, 1030 for ignitability, and 9095A for paint filter.

The work of preparing, submitting and administering a Regulated Substances Final Construction Report will be paid for at the contract lump sum price REGULATED SUBSTANCES FINAL CONSTRUCTION REPORT."

SUBCONTRACTOR AND DBE PAYMENT REPORTING (BDE)
Effective: April 2, 2018

Add the following to Section 109 of the Standard Specifications.

"**109.14 Subcontractor and Disadvantaged Business Enterprise Payment Reporting.** The Contractor shall report all payments made to the following parties:

(a) first tier subcontractors;

(b) lower tier subcontractors affecting disadvantaged business enterprise (DBE) goal credit;

(c) material suppliers or trucking firms that are part of the Contractor's submitted DBE utilization plan.

The report shall be made through the Department's on-line subcontractor payment reporting system within 21 days of making the payment."

SUBCONTRACTOR MOBILIZATION PAYMENTS (BDE)
Effective: November 2, 2017

Replace the second paragraph of Article 109.12 of the Standard Specifications with the following:

"This mobilization payment shall be made at least 14 days prior to the subcontractor starting work. The amount paid shall be at the following percentage of the amount of the subcontract reported on form BC 260A submitted for the approval of the subcontractor's work.

Value of Subcontract Reported on Form BC 260A	Mobilization Percentage
Less than $10,000	25%
$10,000 to less than $20,000	20%
$20,000 to less than $40,000	18%
$40,000 to less than $60,000	16%
$60,000 to less than $80,000	14%
$80,000 to less than $100,000	12%
$100,000 to less than $250,000	10%
$250,000 to less than $500,000	9%
$500,000 to $750,000	8%
Over $750,000	7%"

TRAFFIC CONTROL DEVICES - CONES (BDE)
Effective: January 1, 2019

Revise Article 701.15(a) of the Standard Specifications to read:

"(a) Cones. Cones are used to channelize traffic. Cones used to channelize traffic at night shall be reflectorized; however, cones shall not be used in nighttime lane closure tapers or nighttime lane shifts."

Revise Article 1106.02(b) of the Standard Specifications to read:

"(b) Cones. Cones shall be predominantly orange. Cones used at night that are 28 to 36 in. (700 to 900 mm) in height shall have two white circumferential stripes. If non-reflective spaces are left between the stripes, the spaces shall be no more than 2 in. (50mm) in width. Cones used at night that are taller than 36 in. (900 mm) shall have a minimum of two white and two fluorescent orange alternating, circumferential stripes with the top stripe being fluorescent orange. If non-reflective spaces are left between the stripes, the spaces shall be no more than 3 in. (75 mm) in width.

The minimum weights for the various cone heights shall be 4 lb for 18 in. (2 kg for 450 mm), 7 lb for 28 in. (3 kg for 700 mm), and 10 lb for 36 in. (5 kg for 900 mm) with a minimum of 60 percent of the total weight in the base. Cones taller than 36 in. shall be weighted per the manufacturer's specifications such that they are not moved by wind or passing traffic."

WEEKLY DBE TRUCKING REPORTS (BDE)
Effective: June 2, 2012 Revised: April 2, 2015

The Contractor shall submit a weekly report of Disadvantaged Business Enterprise (DBE) trucks hired by the Contractor or subcontractors (i.e. not owned by the Contractor or subcontractors) that are used for DBE goal credit.

The report shall be submitted to the Engineer on Department form "SBE 723" within ten business days following the reporting period. The reporting period shall be Monday through Sunday for each week reportable trucking activities occur.

Any costs associated with providing weekly DBE trucking reports shall be considered as included in the contract unit prices bid for the various items of work involved and no additional compensation will be allowed.

WORKING DAYS (BDE)
Effective: January 1, 2002

The Contractor shall complete the work within **75** working days.

REVISIONS TO THE ILLINOIS PREVAILING WAGE RATES

The Prevailing rates of wages are included in the Contract proposals which are subject to Check Sheet #5 of the Supplemental Specifications and Recurring Special Provisions. The rates have been ascertained and certified by the Illinois Department of Labor for the locality in which the work is to be performed and for each craft or type of work or mechanic needed to execute the work of the Contract. As required by Prevailing Wage Act (820 ILCS 130/0.01, et seq.) and Check Sheet #5 of the Contract, not less than the rates of wages ascertained by the Illinois Department of Labor and as revised during the performance of a Contract shall be paid to all laborers, workers and mechanics performing work under the Contract. Post the scale of wages in a prominent and easily accessible place at the site of work.

If the Illinois Department of Labor revises the prevailing rates of wages to be paid as listed in the specification of rates, the contractor shall post the revised rates of wages and shall pay not less than the revised rates of wages. Current wage rate information shall be obtained by visiting the Illinois Department of Labor web site at http://www.state.il.us/agency/idol/ or by calling 312-793-2814. It is the responsibility of the contractor to review the rates applicable to the work of the contract at regular intervals in order to insure the timely payment of current rates. Provision of this information to the contractor by means of the Illinois Department of Labor web site satisfies the notification of revisions by the Department to the contractor pursuant to the Act, and the contractor agrees that no additional notice is required. The contractor shall notify each of its subcontractors of the revised rates of wages.