



# Illinois Department of Transportation

2300 South Dirksen Parkway / Springfield, Illinois / 62764

May 22, 2024

SUBJECT FAP Route 600 and FAI Route 64 (IL 159 and I-64)  
Project CMAQ-HSIP-4U5N(249)  
Section (130,130-1,130-2)TS-3, 82-5TS  
St. Clair County  
Contract No. 76R78

Item No. 192, June 14<sup>th</sup>, 2024 Letting  
Addendum A

## NOTICE TO PROSPECTIVE BIDDERS:

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

1. Revised page i of the Table of Contents of the Special Provisions.
2. Added pages 71A-F of the Special Provisions.
3. Revised sheets 2 of the Plans.

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

Very truly yours,

A handwritten signature in black ink, appearing to read 'Jack A. Elston'.

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

MTS

## TABLE OF CONTENTS

LOCATION OF PROJECT .....	1
DESCRIPTION OF PROJECT .....	1
SUBMITTAL OF EEO/LABOR DOCUMENTATION .....	2
MAINTENANCE OF EXISTING TRAFFIC SIGNAL INSTALLATION .....	4
TRAFFIC CONTROL PLAN .....	5
PEAK HOUR RESTRICTIONS .....	6
SEEDING, MINOR AREAS .....	7
UNDERGROUND CONDUIT, COILABLE NONMETALLIC CONDUIT .....	7
SIDEWALK REMOVAL AND REPLACEMENT .....	8
MODIFY EXISTING CONTROLLER CABINET .....	8
FULL ACTUATED CONTROLLER AND CABINET .....	12
COMMUNICATIONS VAULT, 24"X36" .....	15
COMMUNICATIONS VAULT SPACING .....	16
ROUTING, LAYOUT AND DOCUMENTATION .....	17
FIBER OPTIC CABLE SPLICE .....	17
FIBER OPTIC CABLE IN CONDUIT, SINGLE MODE .....	22
FIBER OPTIC UTILITY MARKER .....	27
RELOCATE EXISTING TRAFFIC SIGNAL EQUIPMENT .....	29
REMOVE EXISTING TRAFFIC SIGNAL EQUIPMENT .....	30
DRILL EXISTING FOUNDATION .....	31
DRILL EXISTING HANDHOLE .....	31
AS-BUILT DOCUMENTATION .....	31
TRAFFIC SIGNAL SYSTEM SHUTDOWN .....	31
VIDEO VEHICLE DETECTION SYSTEM COMPLETE .....	32
PEDESTRIAN PUSH-BUTTON POST .....	38
CABINET, MODEL 334 .....	40
SYSTEM IMPLEMENTATION, EQUIPMENT INTEGRATION AND SUPPORT .....	42
TRUSS MOUNTED LED DYNAMIC MESSAGE SIGN .....	43
EMERGENCY VEHICLE PRIORITY SYSTEM LINE SENSOR CABLE, NO. 20 3/C .....	65
CONCRETE FOUNDATION, PEDESTRIAN POST .....	65
REMOVAL AND DISPOSAL OF REGULATED SUBSTANCES .....	65
STATUS OF UTILITIES TO BE ADJUSTED .....	71
ETHERNET SWITCH .....	721A-C
ETHERNET MANAGE SWITCH .....	71C-E
CLOSED CIRCUIT TELEVESION DOME CAMERA, HD .....	71E-F

FAP ROUTE 600 AND FAI ROUTE 64 (IL 159 AND I-64)  
PROJECT CMAQ-HSIP-4U5N(249)  
SECTION (130,130-1,130-2)TS-3, 82-5TS  
ST. CLAIR COUNTY  
CONTRACT NO. 76R78

ACCESSIBLE PEDESTRIAN SIGNALS (APS) (BDE) ..... 72  
CEMENT, TYPE IL (BDE)..... 73  
COMPENSABLE DELAY COSTS (BDE)..... 74  
CONSTRUCTION AIR QUALITY – DIESEL RETROFIT (BDE)..... 77  
DISADVANTAGED BUSINESS ENTERPRISE PARTICIPATION (BDE) ..... 79  
PORTLAND CEMENT CONCRETE (BDE) ..... 87  
REMOVAL AND DISPOSAL OF REGULATED SUBSTANCES (BDE) ..... 87  
SEEDING (BDE) ..... 89  
SHORT TERM AND TEMPORARY PAVEMENT MARKINGS (BDE)..... 94  
SOURCE OF SUPPLY AND QUALITY REQUIREMENTS (BDE) ..... 97  
SPEED DISPLAY TRAILER (BDE)..... 98  
STEEL COST ADJUSTMENT (BDE)..... 99  
SUBCONTRACTOR AND DBE PAYMENT REPORTING (BDE) ..... 101  
SUBCONTRACTOR MOBILIZATION PAYMENTS (BDE) ..... 102  
SUBMISSION OF PAYROLL RECORDS (BDE)..... 102  
TRAFFIC SPOTTERS (BDE)..... 103  
VEHICLE AND EQUIPMENT WARNING LIGHTS (BDE) ..... 105  
WEEKLY DBE TRUCKING REPORTS (BDE)..... 105  
WORK ZONE TRAFFIC CONTROL DEVICES (BDE) ..... 105  
WORKING DAYS (BDE)..... 107

## ETHERNET SWITCH

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

Materials. The Layer II switch shall be environmentally hardened with a minimum of 2 100Mbps SFP ports and 8 100Mbps copper RJ45 ports. Two SFP ports shall be populated with environmentally hardened optical modules capable of transmitting for 10 Km on single-mode fiber optic cable. An environmentally hardened power supply with input of 120 VAC and sufficient wattage for the switch shall be provided.

The switch shall conform to the following minimum specifications:

- Forwarding Bandwidth 3.8Gbps
- Switching Bandwidth 7.6Gbps
- Forwarding rate: 5.66Mpps with 64-byte packets (Line-rate at all packet sizes)
- Egress buffer: 2 MB
- Unicast MAC addresses: 8000
- Internet Group Management Protocol (IGMP) multicast groups: 255
- Virtual LANs (VLANs): 1005
- IPv4 MAC security ACEs: 384 (default Ternary Content-Addressable Memory [TCAM] template)
- Bidirectional, 128 NAT translation entries
- IPv4 routing: 3500 routes, IPv6 routing: 1750 routes
- Layer 2 switching: IEEE 802.1, 802.3, 802.3at, 802.3af standard (see Table 8), VTPv2, NTP, UDLD, CDP, LLDP, Unicast MAC filter, Resilient Ethernet Protocol (REP), Media Redundancy Protocol (MRP) Ring (IEC 62439-2)
- Security: SCP, SSH, SNMPv3, TACACS+, RADIUS Server/Client, MAC Address Notification, BPDU Guard, SPAN session
- Multicast: IGMPv1, v2, v3 Snooping, IGMP filtering, IGMP Querier

Safety certifications:

- UL/CSA 60950-1
- EN 60950-1
- CB to IEC 60950-1 (with country deviations)
- NOM to NOM-019-SCF1 (through partners and distributors)
- CE Marking

Hazard location:

- ANSI/ISA 12.12.01 (Class1, Div2 A-D)
- EN 60079-0, -15 ATEX Certificate (Class 1, Zone2 A-D)
- EMC emissions and immunity compliance:
- FCC 47 CFR Part 15 Class A
- EN 55022A Class A
- VCCI Class A
- RoHS compliance

- AS/NZS CISPR 22 Class A, AS/NZS CISPR 24
- CISPR11 Class A, CISPR22 Class A
- ICES 003 Class A
- CE Marking
- IEC/EN/EN61000-4-2 (Electro Static Discharge), 15kV air/8kV contact
- IEC/EN 61000-4-3 (Radiated Immunity, 10 and 20 V/m)
- IEC/EN 61000-4-4 (Fast Transients - 4kV power line, 4kV data line)
- IEC/EN 61000-4-5 (Surge 2 kV/1 kV)
- IEC/EN 61000-4-6 (Conducted Immunity, 10 V/emf)
- IEC/EN 61000-4-8 (Power Frequency Magnetic Field Immunity)
- IEC/EN 61000-4-9 (Pulse Magnetic Field Immunity)
- IEC/EN 61000-4-10 (Oscillatory Magnetic Field Immunity)
- IEC/EN 61000-4-11 (AC power Voltage Immunity)
- IEC/EN 61000-4-29 (Voltage Dips Immunity)
- IEC/EN 61000-6-1 (Immunity for Light Industrial Environments)
- IEC/EN 61000-6-2 (Immunity for Industrial Environments)
- IEC/EN 61000-6-4 Class A
- EN 61326

Shock and vibration:

- IEC 60068-2-27 (Operational Shock: 30G 11ms, half sine)
- IEC 60068-2-27 (Non-Operational Shock 55-70G, trapezoidal)
- IEC 60068-2-6, IEC 60068-2-64, EN 61373 (Operational Vibration)
- IEC 60068-2-6, IEC 60068-2-64, EN 61373 (Non-operational Vibration)

Industry standards:

- UL508
- CSA C22.2 No. 142
- EN 61131-2 (EMC/EMI, environmental, mechanical)
- Substation KEMA (IEEE 1613, IEC 61850-3)
- EN50121-3-2 o EN50121-4
- NEMA TS-2 (EMC, environmental, mechanical)
- ABB Industrial IT certification
- IP30
- ODVA Industrial Ethernet/IP support
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Corrosive testing:

- ISO-12944-6
- IEC-60068-2-60

Humidity:

- IEC 60068-2-52 (salt fog mist, test Kb) marine environments
- IEC 60068 -2-3
- IEC 60068-2-30
- Relative humidity: 5% to 95% non-condensing

Operating temperature:

- -40C to +70C (vented enclosure - 40 LFM Air Flow)

- -40C to +60C (sealed enclosure – 0 LFM Air Flow)
- -34C to +75C (fan or blower-equipped enclosure – 200 LFM Air Flow)
- -40C to +85C (IEC 60068-2-2 Environmental Type Testing – 16 hours)

Operational altitude: Up to 15,000 ft

Storage temperature:

- -40 C to +85 C (storage temperature)
- IEC 60068-2-14

Storage altitude: Up to 15,000 ft

Mean time between failure: 374,052 hours (42.7 years)

Warranty: Five-year

The Cisco IE-2000-8TC-B Industrial Ethernet Switch is compliant with this specification. Other manufacturers that comply with this specification are allowed.

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

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

The Layer II switch shall be configured to be compatible with the IDOT D8 field network design. High level guidance (IP Scheme / VLANs / routing protocols, etc.) will be provided by IDOT but the integration, functionality and compatibility with the existing network are the responsibility of the contractor.

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

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

## **ETHERNET MANAGE SWITCH**

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

Revised 5-28-2024

**Materials.** The Layer III switch shall be environmentally hardened with a minimum of 16 1Gbps SFP ports and 12 1Gbps copper RJ45 ports. All SFP ports shown on the plans shall be populated with environmentally hardened optical modules capable of transmitting the appropriate distance as shown on the plans on single-mode fiber optic cable. An environmentally hardened power supply with input of 120 VAC and sufficient wattage for the switch shall be provided.

The switch shall conform to the following minimum specifications:

- Forwarding bandwidth: 28 Gbps (line rate/non-blocking)
- Switching bandwidth: 56 Gbps (Switching bandwidth is full-duplex capacity)
- Forwarding rate: 41.67 mpps with 64 byte packets (line rate for all ports and packet sizes)
- Number of queues: 4 egress
- Unicast MAC addresses: 16,000
- IGMP multicast groups: 1000
- Number of VLANs: 1000
- IPv4 MAC security ACEs: 1000 with default TCAM template
- NAT translation: Bidirectional, 128 unique subnet NAT translation entries, which can expand to tens of thousands of translated entries if designed
- Warranty: Five-year
- Layer 2 switching: IEEE 802.1, 802.3, 802.3at, 802.3af standard, VTPv2, NTP, UDLD, CDP, LLDP, Unicast Mac filter, Flexlink, VTPv3, EtherChannel, Voice VLAN, QinQ tunneling
- Security: SCP, SSH, SNMPv3, TACACS+, RADIUS Server/Client, MAC Address Notification, BPDU Guard, Port-Security, Private VLAN, DHCP Snooping, Dynamic ARP Inspection, IP Source Guard, 802.1x, Guest VLAN, MAC Authentication Bypass, 802.1x Multi-Domain Authentication, Storm Control, Trust Boundary, Cisco TrustSec@security, FIPS 140-2, ACT2, Secure Boot, Full flexible Netflow1
- Layer 2 multicast: IGMPv1, v2, v3 Snooping, IGMP filtering, IGMP Querier
- Quality of Service (QoS): Ingress Policing, Rate-Limit, Egress Queueing/shaping, AutoQoS, Modular QoS CLI (MQC)
- Layer 2 IPv6: IPv6 Host support, HTTP over IPv6, SNMP over IPv6
- Layer 3 routing: IPv4 Static Routing
- Layer 2 switching with 1:1 static Network Address Translation (NAT)
- Utility: IEEE 1588v2 PTP Power Profile, dying gasp, GOOSE messaging, SCADA protocol classification, MODBUS TCP/IP Memory Maps, utility SmartPort macro, BFD, Ethernet OAM, IEEE 802.3ah, CFM (IEEE 802.1ag)
- Redundancy:
  - Redundancy Ethernet Protocol ring (REP)
  - Parallel Redundancy Protocol (PRP)
  - High Availability Seamless Redundancy (HSR), PTP over HSR
- Media Redundancy Protocol (MRP) ring, MRP Auto Manager (MAM)
- IP multicast: PIM Sparse Mode (PIM-SM), PIM Dense Mode (PIM-DM), and PIM sparsedense mode
- IP unicast routing protocols: OSPF, EIGRP, BGPv4, IS-IS, RIPv2, Policy-Based Routing (PBR), HSRP
- IPv6 routing: RIPv6, OSPFv6, and EIGRPv6 support

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- Security: IEEE 802.1AE MACsec (including PSK based MKA support), Cisco TrustSec®, SGT inline tagging and SGACL, Full flexible Netflow

The Cisco IE-4010-16S12P Industrial Ethernet Switch is compliant with this specification. Other manufacturers that comply with this specification are allowed.

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

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

The Layer III switch shall be configured to be compatible with the IDOT D8 field network design. High level guidance (IP Scheme / VLANs / routing protocols, etc.) will be provided by IDOT but the integration, functionality and compatibility with the existing network are the responsibility of the contractor.

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

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

## **CLOSED CIRCUIT TELEVISION DOME CAMERA, HD**

Description. This work shall consist of furnishing and installing an IP based remote controlled video system at a location shown in the plans. The work shall include a color camera, dome assembly, all mounting hardware, connectors, cables, power injectors, and related equipment necessary to complete the installation according to the manufacturer's specifications.

Materials. The PTZ camera shall be one of the following approved models:

- TKH Security Solutions PD1103Z2-E
- AXIS Q6055-E
- Cohu 4220HD

The Contractor shall furnish the required number of power injectors for the camera make and model selected, including operation of the camera heater, as well as all required mounting hardware, connectors, patch cables, and power supplies. The system shall have anonymous FTP



capabilities disabled by the vendor/equipment supplier or provide a feature for the user to disable the functionality through the standard internal menu.

**Installation.** The camera shall be installed as shown on the plans, either on the luminaire arm near the luminaire, or on the combination mast arm assembly pole, angled toward the center of the intersection using a mounting bracket compatible with the camera and procured from one of the approved camera manufacturers. When installed on the pole, the camera shall be mounted to provide a minimum of 12 inches clear space between face of the pole and the camera housing. When installed on the luminaire arm, the camera shall be installed with a 30-degree tilt-adjustable bracket. The camera and any external hardware and housing shall be installed with stainless steel straps.

All holes drilled into signal poles, mast arms, or posts shall require rubber grommets to prevent the chafing of wires.

The Contractor shall contact the Traffic Engineer prior to installing the camera and associated wiring, to receive final approval on the camera location. If the Remote Controlled Video System will be connected to the Gigabit Ethernet network, then a Layer II (Datalink) Switch and/or a Layer III (Network) Switch shall be required. Layer II and Layer III switches shall be installed as shown on the plans. Contractor to coordinate with IDOT Electric Maintenance Contractor and Network engineer for proper set up and IP configuration.

**Basis of Payment.** This work will be paid for at the contract unit price per each for REMOTE CONTROLLED VIDEO SYSTEM, The unit price shall include all associated equipment, hardware, cables, materials and labor required to install the complete system in place and in operation to the satisfaction of the Engineer.

