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Letting June 13, 2025

Notice to Bidders, Specifications and Proposal



**Contract No. 62N39
DUPAGE-COOK Counties
Section 2020-266-SUR,SW&TS
Route FAP 771/FAU 1453
Project STP-XVU6(771)
District 1 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 12:00 p.m. June 13, 2025 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. 62N39
DUPAGE-COOK Counties
Section 2020-266-SUR,SW&TS
Project STP-XVU6(771)
Route FAP 771/FAU 1453
District 1 Construction Funds**

(9.38-Mile) Changeable Message Signs, Signal Timing/Progression, Signing (New), Surveillance, Traffic Signal Modernization, and ADA Improvements. Located along 22nd St / Cermak Rd from York Rd to IL 50 (Cicero Ave.) in the Village of Oak Brook in DuPage County, and in the Villages of Hillside, Westchester, Broadview North Riverside, Forest Park, the City of Berwyn, and the Town of Cicero, in Cook County.

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 re-advertise the proposed improvement, and to waive technicalities.

By Order of the
Illinois Department of Transportation

Gia Biagi,
Acting Secretary

INDEX
FOR
SUPPLEMENTAL SPECIFICATIONS
AND RECURRING SPECIAL PROVISIONS

Adopted January 1, 2025

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

ERRATA Standard Specifications for Road and Bridge Construction (Adopted 1-1-22) (Revised 1-1-25)

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STATE OF ILLINOIS

SPECIAL PROVISIONS

The following Special Provisions supplement the "Standard Specifications for Road and Bridge Construction," adopted January 1, 2025, 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 FAP Route 771/FAU Route 1453 (22nd Street/Cermak Road), Project STP-XVU6(771), Section 2020-266-SUR, SW & TS, DuPage & Cook County, Contract No. 62N39 and in case of conflict with any part or parts of said Specifications, the said Special Provisions shall take precedence and shall govern.

FAP Route 771/FAU Route 1453 (22nd Street/Cermak Road)
Project STP-XVU6(771)
Section 2020-266-SUR, SW & TS
DuPage & Cook County
Contract No. 62N39

LOCATION OF PROJECT

The project is located along 22nd Street/Cermak Road running in an easterly direction beginning at York Road in the Village of Oak Brook in DuPage County, Illinois, and the Villages of Hillside, Westchester, Broadview, North Riverside, Forest Park, the City of Berwyn, and the Town of Cicero, in Cook County, Illinois.

DESCRIPTION OF PROJECT

The work consists of implementation of several ITS elements to improve local and regional mobility by addressing arterial congestion and improving transit mode share. These ITS elements include: traffic signal interconnect, travel time monitoring, dynamic message signs, closed-circuit television cameras, transit signal priority, emergency vehicle preemption, and pedestrian countdown signals. The work also consists of ADA and bus pad improvements, pavement marking, and other related roadway items required to complete the project as indicated in the contract documents.

MAINTENANCE OF ROADWAYS (D1)

Effective: September 30, 1985

Revised: November 1, 1996

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

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

STATUS OF UTILITIES (D-1)

Effective: June 1, 2016

Revised: April 1, 2025

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

UTILITIES TO BE ADJUSTED

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

Throughout the Duration of the Project

STAGE / LOCATION	TYPE	DESCRIPTION	RESPONSIBLE AGENCY	DURATION OF TIME

UTILITIES TO BE WATCHED AND PROTECTED

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

Throughout the Duration of the Project

STAGE / LOCATION	TYPE	DESCRIPTION	OWNER
Throughout the entire project.	Communication Lines	Underground fiber and manholes	AT & T
Throughout the entire project.	Communication Lines	Underground fiber and manholes	MCI/Verizon
Cermak Road and the Des Plaines River, Cermak Road from 15 th to 23 rd Street, Cermak, Cermak Road and Central Avenue, Cermak Road from Highland and Lombard Avenue, Cermak Road from East Avenue to Cuyler Avenue	Sanitary Sewer	Underground pipe and manholes	Metropolitan Water Reclamation District of Greater Chicago
Throughout the entire project.	Gas	Underground pipe	Nicor
Throughout the entire project.	Electric	Underground and overhead	ComEd

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

Agency/Company Responsible to Resolve Conflict	Name of contact	Phone	E-mail address
AT & T	Tom Laskowski	630.632.3148	tl7895@att.com
Crown Castle	Mike Kyriazakos	630.480.5203	Michael.Kyriazakos@crowncastle.com
MCI/Verizon	Eve Campbell	312.612.5216	ecampbell@telecom-eng.com
Metropolitan Water Reclamation District of Greater Chicago	Paul Sobanski	708.588.4080	SobanskiP@mwr.org

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

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

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

The contractor is responsible for contacting JULIE (or DIGGER within the City of Chicago) prior to any excavation work. Please note that IDOT electrical facilities are not part of the one-call locating services, such as JULIE or DIGGER.

If the contract requires the services of an electrical contractor, it is the contractor's responsibility, at their own expense, to locate existing IDOT electrical facilities before commencing work. For contracts that do not require an electrical contractor, the contractor may request one free locate of IDOT electrical facilities by contacting the Department's Electrical Maintenance Contractor. Additional locate requests will be at the contractor's expense.

The Department's Electrical Maintenance Contractor must be notified at least 72 hours in advance of the work by calling 773-287-7600 or emailing dispatch@meade100.com to arrange for the locating of underground electrical facilities.

Please note, the marking of underground facilities does not absolve the contractor of their responsibility to repair or replace any facilities damaged during construction at their expense.

CONSTRUCTION LAYOUT SPECIAL FOR RESURFACING WITH ADA AND STAND ALONE ADA (D1)

Effective: January 1, 2017
Revised: April 17, 2017

Description. This work shall consist of furnishing and placing construction layout stakes for the construction of ADA Ramps shown in the plans. The Contractor shall furnish and place stakes marking the locations and elevations of points indicated in the plans for ADA Ramp Construction.

The Contractor shall locate all reference points as shown on the plans and listed herein. Any additional control points required will be identified in the field by the Contractor and all field notes will be kept in the office of the Resident Engineer.

The Contractor shall provide field forces, equipment, and material to set all additional stakes for this project, which are needed to establish offset stakes, reference points, and any other horizontal and vertical controls necessary to secure a correct layout for the work.

Layout stakes shall be set to assure conformance to the ADA Ramp design shown on the plans and shall meet the approval of the Engineer.

The Contractor shall be responsible for having the finished work conform to the lines, grades, elevations, and dimensions called for in the plans. Any inspection or checking of the Contractor's layout by the Engineer and the acceptance of all or any part of it shall not relieve the Contractor of his/her responsibility to secure the proper dimensions, grades, and elevations of the work. The Contractor shall exercise care in the preservation of stakes and bench marks and shall have them reset when any are damaged, lost, displaced, removed or otherwise obliterated.

Responsibility of the Department.

The Department will make random checks of the Contractor's staking to determine if the work is in conformance with the plans. When the Contractor's work will tie into work that is being or will be done by others, checks will be made to determine if the work is in conformance with the proposed overall grade and horizontal alignment.

Where the Contractor, in setting construction stakes, discovers discrepancies, the Department will check to determine their nature and make whatever revisions are necessary to the plans. Any additional restaking required by the Engineer will be the responsibility of the Contractor. The additional restaking done by the Contractor will be paid for according to Article 109.04 of the Standard Specifications.

The Department will be responsible for the accuracy of the initial reference points shown in the plans.

It is not the responsibility of the Department, except as provided herein, to check the correctness of the Contractor's stakes. Any apparent errors will be immediately called to the Contractor's attention and the Contractor will be required to make the necessary correction before the stakes are used for construction purposes. The Contractor shall provide the Engineer a copy of any field notes and layout diagrams produced during the course of the project.

Responsibility of the Contractor.

The Contractor shall establish from the given survey points and contract plan information, all the control points or reference points necessary to layout the ADA Ramp elements. The Contractor shall furnish and place the layout stakes. The Contractor shall notify the Engineer when the stakes are complete and available for review and approval by the Engineer at least 3 working days in advance of the actual construction.

Field notes shall be kept in standard survey field notebooks and those books shall become the property of the Department at the completion of the project. All notes shall be neat, orderly, and in accepted form.

Measurement and Payment. This work will be paid for at the contract lump sum price for CONSTRUCTION LAYOUT (SPECIAL).

PUBLIC CONVENIENCE AND SAFETY (D1)

Effective: May 1, 2012

Revised: July 15, 2012

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

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

Add the following sentence after the Holiday Period table in the fourth paragraph of Article 107.09:

"The Length of Holiday Period for Thanksgiving shall be from 5:00 AM the Wednesday prior to 11:59 PM the Sunday After"

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

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

TOLLWAY PERMIT AND BOND (D1)

Effective: January 13, 1989

The Contractor will be required to obtain a permit from the Illinois State Toll Highway Authority (ISTHA) according to Article 107.04 of the Standard Specifications prior to initiating any lane closures on the Tollway or doing any work on the ISTHA right of way. As part of the permit, the Contractor will be required to post a surety bond with the ISTHA.

The Contractor will furnish a copy of the authorized permit to the Engineer.

COMPLETION DATE PLUS WORKING DAYS (D1)

Effective: September 30, 1985

Revised: January 1, 2007

Revise Article 108.05 (b) of the Standard Specifications as follows:

"When a completion date plus working days is specified, the Contractor shall complete all contract items and safely open all roadways to traffic by 11:59 PM on, **October 29, 2027** except as specified herein.

The Contractor will be allowed to complete all clean-up work and punch list items within **5** working days after the completion date for opening the roadway to traffic. Under extenuating circumstances the Engineer may direct that certain items of work, not affecting the safe opening of the roadway to traffic, may be completed within the working days allowed for clean up work and punch list items. Temporary lane closures for this work may be allowed at the discretion of the Engineer.

Article 108.09 or the Special Provision for "Failure to Complete the Work on Time", if included in this contract, shall apply to both the completion date and the number of working days.

HOT-MIX ASPHALT BINDER AND SURFACE COURSE (D1)

Effective: November 1, 2019

Revised: January 1, 2025

Revise Article 1004.03(c) to read:

“(c) Gradation. The coarse aggregate gradations shall be as listed in the following table.

Use	Size/Application	Gradation No.
Class A-1, A-2, & A-3	3/8 in. (10 mm) Seal	CA 16 or CA 20
Class A-1	1/2 in. (13 mm) Seal	CA 15
Class A-2 & A-3	Cover Coat	CA 14
HMA High ESAL	IL-19.0; Stabilized Subbase IL-19.0	CA 11 ^{1/}
	SMA 12.5 ^{2/}	CA 13 ^{4/} , CA 14, or CA 16
	SMA 9.5 ^{2/}	CA 13 ^{3/4/} or CA 16 ^{3/}
	IL-9.5	CA 16, CM 13 ^{4/}
	IL-9.5FG	CA 16
HMA Low ESAL	IL-19.0L	CA 11 ^{1/}
	IL-9.5L	CA 16

1/ CA 16 or CA 13 may be blended with the CA 11.

2/ The coarse aggregates used shall be capable of being combined with the fine aggregates and mineral filler to meet the approved mix design and the mix requirements noted herein.

3/ The specified coarse aggregate gradations may be blended.

4/ CA 13 shall be 100 percent passing the 1/2 in. (12.5mm) sieve.”

Revise Article 1004.03(e) of the Standard Specifications to read:

“(e) Absorption. For SMA the coarse aggregate shall also have water absorption
 ≤ 2.0 percent.”

Revise the “High ESAL” portion of the table in Article 1030.01 to read:

“High ESAL	Binder Courses	IL-19.0, IL-9.5, IL-9.5FG, IL-4.75, SMA 12.5, Stabilized Subbase IL-19.0
	Surface Courses	IL-9.5, IL-9.5FG, SMA 12.5, SMA 9.5”

Revise Note 2. and add Note 6 to Article 1030.02 of the Standard Specifications to read:

“Item	Article/Section
(g)Performance Graded Asphalt Binder (Note 6)	1032
(h)Fibers (Note 2)	

Note 2. A stabilizing additive such as cellulose or mineral fiber shall be added to the SMA mixture according to Illinois Modified AASHTO M 325. The stabilizing additive shall meet the Fiber Quality Requirements listed in Illinois Modified AASHTO M 325. Prior to approval and use of fibers, the Contractor shall submit a notarized certification by the producer of these materials stating they meet these requirements. Reclaimed Asphalt Shingles (RAS) may be used in Stone Matrix Asphalt (SMA) mixtures designed with an SBA polymer modifier as a fiber additive if the mix design with RAS included meets AASHTO T305 requirements. The RAS shall be from a certified source that produces either Type I or Type 2. Material shall meet requirements noted herein and the actual dosage rate will be determined by the Engineer.

Note 6. The asphalt binder shall be an SBS PG 76-28 when the SMA is used on a full-depth asphalt pavement and SBS PG 76-22 when used as an overlay, except where modified herein. The asphalt binder shall be a SBS PG 76-22 for IL-4.75, except where modified herein..”

Revise table in Article 1030.05(a) of the Standard Specifications to read:

"MIXTURE COMPOSITION (% PASSING)" ^{1/}												
Sieve Size	IL-19.0 mm		SMA 12.5		SMA 9.5		IL-9.5mm		IL-9.5FG		IL-4.75 mm	
	min	max	min	max	min	max	min	max	min	max	min	max
1 1/2 in (37.5 mm)												
1 in. (25 mm)		100										
3/4 in. (19 mm)	90	100		100								
1/2 in. (12.5 mm)	75	89	80	100		100		100		100		100
3/8 in. (9.5 mm)				65	90	100	90	100	90	100		100
#4 (4.75 mm)	40	60	20	30	36	50	34	69	60	75 ^{6/}	90	100
#8 (2.36 mm)	20	42	16	24 ^{4/}	16	32 ^{4/}	34 ^{5/}	52 ^{2/}	45	60 ^{6/}	70	90
#16 (1.18 mm)	15	30					10	32	25	40	50	65
#30 (600 μm)			12	16	12	18			15	30		
#50 (300 μm)	6	15					4	15	8	15	15	30
#100 (150 μm)	4	9					3	10	6	10	10	18
#200 (75 μm)	3.0	6.0	7.0	9.0 ^{3/}	7.5	9.5 ^{3/}	4.0	6.0	4.0	6.5	7.0	9.0 ^{3/}
#635 (20 μm)			≤ 3.0		≤ 3.0							
Ratio Dust/Asphalt Binder		1.0		1.5		1.5		1.0		1.0		1.0

- 1/ Based on percent of total aggregate weight.
- 2/ The mixture composition shall not exceed 44 percent passing the #8 (2.36 mm) sieve for surface courses with N_{design} = 90.
- 3/ Additional minus No. 200 (0.075 mm) material required by the mix design shall be mineral filler, unless otherwise approved by the Engineer.
- 4/ When establishing the Adjusted Job Mix Formula (AJMF) the percent passing the #8 (2.36 mm) sieve shall not be adjusted above the percentage stated on the table.
- 5/ When establishing the Adjusted Job Mix Formula (AJMF) the percent passing the #8 (2.36 mm) sieve shall not be adjusted below 34 percent.
- 6/ When the mixture is used as a binder, the maximum shall be increased by 0.5 percent passing."

Revise Article 1030.05(b) of the Standard Specifications to read:

- (b) Volumetric Requirements. The target value for the air voids of the HMA shall be 4.0 percent, for IL-4.75 and SMA mixtures it shall be 3.5 percent and for Stabilized Subbase it shall be 3.0 percent at the design number of gyrations. The voids in the mineral aggregate (VMA) and voids filled with asphalt binder (VFA) of the HMA design shall be based on the nominal maximum size of the aggregate in the mix and shall conform to the following requirements.

Mix Design	Voids in the Mineral Aggregate (VMA), % Minimum for Ndesign				
	30	50	70	80	90
IL-19.0		13.5	13.5		13.5
IL-9.5		15.0	15.0		
IL-9.5FG		15.0	15.0		
IL-4.75 ^{1/}		18.5			
SMA-12.5 ^{1/2/5/}				17.0 ^{3/} /16.0 ^{4/}	
SMA-9.5 ^{1/2/5/}				17.0 ^{3/} /16.0 ^{4/}	
IL-19.0L	13.5				
IL-9.5L	15.0				

- 1/ Maximum draindown shall be 0.3 percent according to Illinois Modified AASHTO T 305.
- 2/ The draindown shall be determined at the JMF asphalt binder content at the mixing temperature plus 30°F.
- 3/ Applies when specific gravity of coarse aggregate is ≥ 2.760 .
- 4/ Applies when specific gravity of coarse aggregate is < 2.760 .
- 5/ For surface course, the coarse aggregate can be crushed steel slag, crystalline crushed stone or crushed sandstone. For binder course, coarse aggregate shall be crushed stone (dolomite), crushed gravel, crystalline crushed stone, or crushed sandstone”

Revise the last paragraph of Article 1102.01 (a) (5) of the Standard Specifications to read:

“IL-4.75 and Stone Matrix Asphalt (SMA) mixtures which contain aggregate having absorptions greater than or equal to 2.0 percent, or which contain steel slag sand, shall have minimum surge bin storage plus haul time of 1.5 hours.”

Revise the first and second paragraphs of Articles 1030.06(c)(2) of the Standard Specifications to read:

- “(2) Personnel. The Contractor shall provide a QC Manager who shall have overall responsibility and authority for quality control. This individual shall maintain active certification as a Hot-Mix Asphalt Level II technician.

In addition to the QC Manager, the Contractor shall provide sufficient personnel to perform the required visual inspections, sampling, testing, and documentation in a timely manner. Mix designs shall be developed by personnel with an active certification as a Hot-Mix Asphalt Level III technician. Technicians performing mix design testing and plant sampling/testing shall maintain active certification as a Hot-Mix Asphalt Level I technician. The Contractor may provide a technician trainee who has successfully completed the Department's "Hot-Mix Asphalt Trainee Course" to assist in the activities completed by a Hot-Mix Asphalt Level I technician for a period of one year after the course completion date. The Contractor may also provide a Gradation Technician who has successfully completed the Department's "Gradation Technician Course" to run gradation tests only under the supervision of a Hot-Mix Asphalt Level II Technician. The Contractor shall provide a Hot-Mix Asphalt Density Tester who has successfully completed the Department's "Nuclear Density Testing" course to run all nuclear density tests on the job site.”

Add Article 1030.06(d)(3) to the Standard Specifications to read:

- “(3) The Contractor shall take possession of any Department unused backup or dispute resolution HMA mixture samples or density specimens upon notification by the Engineer. The Contractor shall collect the HMA mixture samples or density specimens from the location designated by the Engineer. The HMA mixture samples or density specimens may be added to RAP stockpiles according to Section 1031.”

Revise the second paragraph of Articles 1030.07(a)(11) and 1030.08(a)(9) of the Standard Specifications to read:

“When establishing the target density, the HMA maximum theoretical specific gravity (Gmm) will be based on the running average of four available Department test results for that project. If less than four Gmm test results are available, an average of all available Department test results for that project will be used. The initial Gmm will be the last available Department test result from a QMP project. If there is no available Department test result from a QMP project, the Department mix design verification test result will be used as the initial Gmm.”

Revise the following table and notes in Article 1030.09 (c) of the Standard Specifications to read:

CONTROL LIMITS						
Parameter	IL-19.0, IL-9.5, IL-9.5FG, IL-19.0L, IL-9.5L		SMA-12.5, SMA-9.5		IL-4.75	
	Individual Test	Moving Avg. of 4	Individual Test	Moving Avg. of 4	Individual Test	Moving Avg. of 4
% Passing: ^{1/}						
1/2 in. (12.5 mm)	± 6 %	± 4 %	± 6 %	± 4 %		
3/8 in. (9.5mm)			± 4 %	± 3 %		
# 4 (4.75 mm)	± 5 %	± 4 %	± 5 %	± 4 %		
# 8 (2.36 mm)	± 5 %	± 3 %	± 4 %	± 2 %		
# 16 (1.18 mm)			± 4 %	± 2 %	± 4 %	± 3 %
# 30 (600 µm)	± 4 %	± 2.5 %	± 4 %	± 2.5 %		
Total Dust Content # 200 (75 µm)	± 1.5 %	± 1.0 %			± 1.5 %	± 1.0 %
Asphalt Binder Content	± 0.3 %	± 0.2 %	± 0.2 %	± 0.1 %	± 0.3 %	± 0.2 %
Air Voids ^{2/}	± 1.2 %	± 1.0 %	± 1.2 %	± 1.0 %	± 1.2 %	± 1.0 %
Field VMA ^{3/}	-0.7 %	-0.5 %	-0.7 %	-0.5 %	-0.7 %	-0.5 %

1/ Based on washed ignition oven or solvent extraction gradation.

2/ The air voids target shall be a value equal to or between 3.2 % and 4.8 %.

3/ Allowable limit below minimum design VMA requirement.

Revise Article 1030.09(g)(2) of the Standard Specifications to read:

“(2)The Contractor shall complete split verification sample tests listed in the Limits of Precision table in Article 1030.09(h)(1).”

In the Supplemental Specifications, replace the revision for the end of the third paragraph of Article 1030.09(h)(2) with the following:

“When establishing the target density, the HMA maximum theoretical specific gravity (Gmm) will be the Department mix design verification test result.”

Add after third sentence of Article 1030.09(b) to read:

“If the Contractor and Engineer agree the nuclear density test method is not appropriate for the mixture, cores shall be taken at random locations determined according to the QC/QA document "Determination of Random Density Test Site Locations". Core densities shall be determined using the Illinois Modified AASHTO T 166 or T 275 procedure.”

Revise Table 1 and Note 4/ of Table 1 in Article 406.07(a) of the Standard Specifications to read:

	Breakdown/Intermediate Roller (one of the following)	Final Roller (one or more of the following)	Density Requirement
IL-9.5, IL-9.5FG, IL-19.0 ^{1/}	V _D , P, T _B , 3W, O _T , O _B	V _S , T _B , T _F , O _T	As specified in Section 1030
IL-4.75 and SMA ^{3/ 4/}	T _B , 3W, O _T	T _F , 3W	As specified in Section 1030
Mixtures on Bridge Decks ^{2/}	T _B	T _F	As specified in Articles 582.05 and 582.06.

“4/ The Contractor shall provide a minimum of two steel-wheeled tandem rollers (T_B), and/or three-wheel (3W) rollers for breakdown, except one of the (T_B) or (3W) rollers shall be 84 inches (2.14 m) wide and a weight of 315 pound per linear inch (PLI) (5.63 kg/mm) and one of the (T_B) or (3W) rollers can be substituted for an oscillatory roller (O_T). T_F rollers shall be a minimum of 280 lb/in. (50 N/mm). The 3W and T_B rollers shall be operated at a uniform speed not to exceed 3 mph (5 km/h), with the drive roll for T_B rollers nearest the paver and maintain an effective rolling distance of not more than 150 ft (45 m) behind the paver.”

Add the following after the fourth paragraph of Article 406.13 (b):

“The plan quantities of SMA mixtures shall be adjusted using the actual approved binder and surface Mix Design’s G_{mb}.”

Revise first paragraph of Article 1030.10 of the Standard Specifications to read:

“A test strip of 300 ton (275 metric tons), except for SMA mixtures it will be 400 ton (363 metric ton), will be required for each mixture on each contract at the beginning of HMA production for each construction year according to the Manual of Test Procedures for Materials “Hot Mix Asphalt Test Strip Procedures”. At the request of the Producer, the Engineer may waive the test strip if previous construction during the current construction year has demonstrated the constructability of the mix using Department test results.”

Revise fourth paragraph of Article 1030.10 of the Standard Specifications to read:

“When a test strip is constructed, the Contractor shall collect and split the mixture according to the document “Hot-Mix Asphalt Test Strip Procedures”. The Engineer, or a representative, shall deliver split sample to the District Laboratory for verification testing. The Contractor shall complete mixture tests stated in Article 1030.09(a). Mixture sampled shall include enough material for the Department to conduct mixture tests detailed in Article 1030.09(a) and in the document “Hot-Mix Asphalt Mixture Design Verification Procedure” Section 3.3. The mixture test results shall meet the requirements of Articles 1030.05(b) and 1030.05(d), except Hamburg wheel tests will only be conducted on High ESAL mixtures during production.”

ADJUSTMENTS AND RECONSTRUCTIONS (D1)

Effective: March 15, 2011

Revised: October 1, 2021

Revise the first paragraph of Article 602.04 to read:

“602.04 Concrete. Cast-in-place concrete for structures shall be constructed of Class SI concrete according to the applicable portions of Section 503. Cast-in-place concrete for pavement patching around adjustments and reconstructions shall be constructed of Class PP-2 concrete, unless otherwise noted in the plans, according to the applicable portions of Section 1020.”

Revise the third, fourth and fifth sentences of the second paragraph of Article 602.11(c) to read:

“Castings shall be set to the finished pavement elevation so that no subsequent adjustment will be necessary, and the space around the casting shall be filled with Class PP-2 concrete, unless otherwise noted in the plans, to the elevation of the surface of the base course or binder course. HMA surface or binder course material shall not be allowed. The pavement may be opened to traffic according to Article 701.17(e)(3)b.”

Revise Article 603.05 to read:

“603.05 Replacement of Existing Flexible Pavement. After the castings have been adjusted, the surrounding space shall be filled with Class PP-2 concrete, unless otherwise noted in the plans, to the elevation of the surface of the base course or binder course. HMA surface or binder course material shall not be allowed. The pavement may be opened to traffic according to Article 701.17(e)(3)b.”

Revise Article 603.06 to read:

“603.06 Replacement of Existing Rigid Pavement. After the castings have been adjusted, the pavement and HMA that was removed, shall be replaced with Class PP-2 concrete, unless otherwise noted in the plans, not less than 9 in. (225 mm) thick. The pavement may be opened to traffic according to Article 701.17(e)(3)b.

The surface of the Class PP concrete shall be constructed flush with the adjacent surface.”

Revise the first sentence of Article 603.07 to read:

“603.07 Protection Under Traffic. After the casting has been adjusted and the Class PP concrete has been placed, the work shall be protected by a barricade and two lights according to Article 701.17(e)(3)b.”

CURB OR COMBINATION CURB AND GUTTER REMOVAL AND REPLACEMENT (D1)

Effective: November 1, 2020

Revised: September 1, 2022

Description. This work shall consist of the complete removal and replacement of curb or combination curb and gutter. Work shall be according to Sections 440 and 606 of the Standard Specifications, State Standard 606001, District Detail BD-24 and as directed by the Engineer except as modified herein.

Curb or combination curb and gutter removal and replacement shall match the type of the existing curb or combination curb and gutter. Types may be variable and are to meet existing dimensions and field conditions. Locations of removal and replacement shall be determined by the Resident Engineer at the time of construction.

Unsuitable material to be removed, as directed by the Engineer, shall be replaced with subbase granular material, type B or additional thickness of concrete. Suitable backfill material, when required, shall be replaced as directed by the Engineer.

Epoxy coated tie bars, #6 (20) - 24” (610) long at 24” (610) centers, shall be used except when adjacent to flexible pavement. Longitudinal bars, if encountered, are not to be replaced.

Hot-mix asphalt surface removal on the existing gutter flag, if encountered, shall be included in the removal of the curb and gutter.

Saw cuts shall be according to Article 440.03 of the Standard Specifications.

½” (13) preformed expansion joints shall be used at concrete sidewalks, driveways and medians.

Method of Measurement. Concrete curb removal and replacement, or combination concrete curb and gutter removal and replacement will be measured for payment in feet (meters) along the face of concrete curb. A minimum replacement length of 4 feet is required.

Basis of Payment. This item will be paid for at the contract unit price per foot (meter) for CURB REMOVAL AND REPLACEMENT GREATER THAN 10 FEET or COMBINATION CURB AND GUTTER REMOVAL AND REPLACEMENT GREATER THAN 10 FEET for lengths greater than 10 feet.

This item will be paid at the contract unit price per foot (meter) for CURB REMOVAL AND REPLACEMENT LESS THAN OR EQUAL TO 10 FEET or COMBINATION CURB AND GUTTER REMOVAL AND REPLACEMENT LESS THAN OR EQUAL TO 10 FEET for lengths less than or equal to 10 feet.

Where unsuitable material is encountered in the subgrade or subbase and its removal and replacement is required by the Engineer, such removal and replacement will be paid for according to Article 109.04.

Sidewalk removal, driveway pavement removal and median surface removal will be paid for according to Article 440.08 of the Standard Specifications.

Portland cement concrete sidewalk will be paid for according to Article 424.13 of the Standard Specifications.

Portland cement concrete driveway pavement will be paid for according to Article 423.11 of the Standard Specifications.

Hot-mix asphalt driveway will be paid for according to Article 355.11 and 406.14 of the Standard Specifications.

Concrete median surface will be paid for according to Article 606.15 of the Standard Specifications.

Topsoil will be paid for according to Article 211.08 of the Standard Specifications.

Sodding will be paid for according to Article 252.13 of the Standard Specifications. Fertilizer for the placement of sod is not required.

ENGINEER'S FIELD OFFICE TYPE A (D1)

Effective: January 1, 2022

Revise the first paragraph of Article 670.02 to read:

670.02 Engineer's Field Office Type A (D1). Type A (D1) field offices shall have a ceiling height of not less than 7 feet and a floor space of not less than 1000 square feet with a minimum of two separate offices. The office shall also have a separate storage room capable of being locked for the storage of the nuclear measuring devices. The office shall be provided with sufficient heat, natural and artificial light, and air conditioning. Doors and windows shall be equipped with locks approved by the Engineer.

Add the following to Article 670.07 Basis of Payment.

The building or buildings, fully equipped, will be paid for at the contract unit price per calendar month or fraction thereof for ENGINEER'S FIELD OFFICE, TYPE A (D1).

TRAFFIC CONTROL PLAN (D1)

Effective: September 30, 1985

Revised: January 1, 2007

Traffic Control shall be according to the applicable sections of the Standard Specifications, the Supplemental Specifications, the "Illinois Manual on Uniform Traffic Control Devices for Streets and Highways", any special details and Highway Standards contained in the plans, and the Special Provisions contained herein.

Special attention is called to Article 107.09 of the Standard Specifications and the following Highway Standards, Details, Quality Standard for Work Zone Traffic Control Devices, Recurring Special Provisions and Special Provisions contained herein, relating to traffic control.

The Contractor shall contact the District One Bureau of Traffic at least 72 hours in advance of beginning work.

STANDARDS:

701101	701106	701301	701311	701426	701427
701501	701502	705601	701602	701701	701801
701901					

DETAILS:

Maintenance of Traffic – General Notes and TC-10, TC-13, TC-14, and TC-22

SPECIAL PROVISIONS:

Public Convenience and Safety (D1)
 Completion Date Plus Working Days
 Maintenance of Roadways (D1)
 Short Term and Temporary Pavement Markings (BDE)
 Temporary Information Signing
 Vehicle and Equipment Warning Lights (BDE)
 Work Zone Traffic Control Devices (BDE)

FRICTION AGGREGATE (D1)

Effective: January 1, 2011
 Revised: December 1, 2021

Revise Article 1004.03(a) of the Standard Specifications to read:

“1004.03 Coarse Aggregate for Hot-Mix Asphalt (HMA). The aggregate shall be according to Article 1004.01 and the following.

(a) Description. The coarse aggregate for HMA shall be according to the following table.

Use	Mixture	Aggregates Allowed
Class A	Seal or Cover	<u>Allowed Alone or in Combination</u> ^{5/} : Gravel Crushed Gravel Carbonate Crushed Stone Crystalline Crushed Stone Crushed Sandstone Crushed Slag (ACBF) Crushed Steel Slag Crushed Concrete
HMA Low ESAL	Stabilized Subbase or Shoulders	<u>Allowed Alone or in Combination</u> ^{5/} : Gravel Crushed Gravel Carbonate Crushed Stone Crystalline Crushed Stone Crushed Sandstone Crushed Slag (ACBF) Crushed Steel Slag ^{1/} Crushed Concrete

Use	Mixture	Aggregates Allowed	
HMA High ESAL Low ESAL	Binder IL-19.0 or IL-19.0L SMA Binder	<u>Allowed Alone or in Combination</u> ^{5/ 6/} : Crushed Gravel Carbonate Crushed Stone ^{2/} Crystalline Crushed Stone Crushed Sandstone Crushed Slag (ACBF) Crushed Concrete ^{3/}	
HMA High ESAL Low ESAL	C Surface and Binder IL-9.5 IL-9.5FG or IL-9.5L	<u>Allowed Alone or in Combination</u> ^{5/} : Crushed Gravel Carbonate Crushed Stone ^{2/} Crystalline Crushed Stone Crushed Sandstone Crushed Slag (ACBF) Crushed Steel Slag ^{4/} Crushed Concrete ^{3/}	
HMA High ESAL	D Surface and Binder IL-9.5 or IL-9.5FG	<u>Allowed Alone or in Combination</u> ^{5/} : Crushed Gravel Carbonate Crushed Stone (other than Limestone) ^{2/} Crystalline Crushed Stone Crushed Sandstone Crushed Slag (ACBF) Crushed Steel Slag ^{4/}	
		<u>Other Combinations Allowed:</u>	
		<i>Up to...</i>	<i>With...</i>
		25% Limestone	Dolomite
		50% Limestone	Any Mixture D aggregate other than Dolomite
	75% Limestone	Crushed Slag (ACBF) or Crushed Sandstone	
HMA High ESAL	E Surface IL-9.5 SMA Ndesign 80 Surface	<u>Allowed Alone or in Combination</u> ^{5/ 6/} : Crushed Gravel Crystalline Crushed Stone Crushed Sandstone Crushed Slag (ACBF) Crushed Steel Slag No Limestone.	

Use	Mixture	Aggregates Allowed	
		<u>Other Combinations Allowed:</u>	
		<i>Up to...</i>	<i>With...</i>
		50% Dolomite ^{2/}	Any Mixture E aggregate
		75% Dolomite ^{2/}	Crushed Sandstone, Crushed Slag (ACBF), Crushed Steel Slag, or Crystalline Crushed Stone
		75% Crushed Gravel ^{2/}	Crushed Sandstone, Crystalline Crushed Stone, Crushed Slag (ACBF), or Crushed Steel Slag
HMA High ESAL	F Surface IL-9.5 SMA Ndesign 80 Surface	<u>Allowed Alone or in Combination</u> ^{5/ 6/} :	
		Crystalline Crushed Stone Crushed Sandstone Crushed Slag (ACBF) Crushed Steel Slag No Limestone.	
		<u>Other Combinations Allowed:</u>	
		<i>Up to...</i>	<i>With...</i>
		50% Crushed Gravel ^{2/} or Dolomite ^{2/}	Crushed Sandstone, Crushed Slag (ACBF), Crushed Steel Slag, or Crystalline Crushed Stone

- 1/ Crushed steel slag allowed in shoulder surface only.
- 2/ Carbonate crushed stone (limestone) and/or crushed gravel shall not be used in SMA Ndesign 80.
- 3/ Crushed concrete will not be permitted in SMA mixes.
- 4/ Crushed steel slag shall not be used as binder.
- 5/ When combinations of aggregates are used, the blend percent measurements shall be by volume."
- 6/ Combining different types of aggregate will not be permitted in SMA Ndesign 80."

HOT-MIX ASPHALT – MIXTURE DESIGN VERIFICATION AND PRODUCTION (D1)

Effective: January 1, 2019

Revised: December 1, 2021

Add to Article 1030.05 (d)(3) of the Standard Specifications to read:

“ During mixture design, prepared samples shall be submitted to the District laboratory by the Contractor for verification testing. The required testing, and number and size of prepared samples submitted, shall be according to the following tables.

High ESAL – Required Samples for Verification Testing	
Mixture	Hamburg Wheel and I-FIT Testing ^{1/ 2/}
Binder	total of 3 - 160 mm tall bricks
Surface	total of 4 - 160 mm tall bricks

Low ESAL – Required Samples for Verification Testing	
Mixture	I-FIT Testing ^{1/ 2/}
Binder	1 - 160 mm tall brick
Surface	2 - 160 mm tall bricks

1/ The compacted gyratory bricks for Hamburg wheel and I-FIT testing shall be 7.5 ± 0.5 percent air voids.

2/ If the Contractor does not possess the equipment to prepare the 160 mm tall brick(s), twice as many 115 mm tall compacted gyratory bricks will be acceptable.

Revise the fourth paragraph of Article 1030.10 of the Standard Specifications to read:

“When a test strip is not required, each HMA mixture shall still be sampled on the first day of production: I-FIT and Hamburg wheel testing for High ESAL; I-FIT testing for Low ESAL. Within two working days after sampling the mixture, the Contractor shall deliver gyratory cylinders to the District laboratory for Department verification testing. The High ESAL mixture test results shall meet the requirements of Articles 1030.05(d)(3) and 1030.05(d)(4). The Low ESAL mixture test results shall meet the requirements of Article 1030.05(d)(4). The required number and size of prepared samples submitted for the Hamburg wheel and I-FIT testing shall be according to the “High ESAL - Required Samples for Verification Testing” table in Article 1030.05(d)(3) above.”

Add the following to the end of Article 1030.10 of the Standard Specifications to read:

“Mixture sampled during first day of production shall include approximately 60 lb (27 kg) of additional material for the Department to conduct Hamburg wheel testing and approximately 80 lb (36 kg) of additional material for the Department to conduct I-FIT testing. Within two working days after sampling, the Contractor shall deliver prepared samples to the District laboratory for verification testing. The required number and size of prepared samples submitted for the Hamburg wheel and I-FIT testing shall be according to the “High ESAL - Required Samples for Verification Testing” table in Article 1030.05(d)(3) above.”

FIRE HYDRANTS TO BE ADJUSTED

This item consists of vertically adjusting of fire hydrants where called for on the plans or as directed by the Engineer. The fire hydrants with the auxiliary valves shall be adjusted vertically to meet the proposed final grade. Any fire hydrant damaged by the Contractor shall be repaired or replaced at his/her own expense. The work shall be performed according to Section 564 of the Standard Specifications and the Standard Specifications for Water and Sewer Construction in Illinois, and in a manner approved, written or orally, by the Engineer and coordinated with the municipality or water district having jurisdiction over the fire hydrant.

Basis of Payment: This work shall be paid for at the contract unit price each for FIRE HYDRANTS TO BE ADJUSTED, which price shall include all labor, materials, and equipment to complete the work in accordance with the plans and the Special Provisions

VALVE BOX FRAMES TO BE ADJUSTED

Description: This work shall consist of adjusting the existing valve box frame to match finished grade as directed by the Engineer, in accordance with Section 603 of the standard specifications.

Method of Measurement: This work will be measured for payment in units of each for VALVE BOX FRAMES TO BE ADJUSTED.

Basis of Payment: This work will be paid for at the contract unit price per each for VALVE BOX FRAMES TO BE ADJUSTED.

REMOVE EXISTING TRAFFIC SIGNAL EQUIPMENT

Effective: May 22, 2002

Revised: March 1, 2024

895.02TS

Add the following to Article 895.05 of the Standard Specifications:

“The traffic signal equipment which is to be removed and is to become the property of the Contractor shall be disposed of outside the right-of-way at the Contractor’s expense.

All equipment to be returned to the State shall be delivered by the Contractor to the State's Traffic Signal Maintenance Contractor's main facility. The Contractor shall contact the State's Electrical Maintenance Contractor to schedule an appointment to deliver the equipment. No equipment will be accepted without a prior appointment. All equipment shall be delivered within thirty (30) days of removing it from the traffic signal installation. The Contractor shall provide one hard copy and one electronic file of a list of equipment that is to remain the property of the State, including model and serial numbers, where applicable. The Contractor shall also provide a copy of the Contract plan or special provision showing the quantities and type of equipment. Controllers and peripheral equipment from the same location shall be boxed together (equipment from different locations may not be mixed) and all boxes and controller cabinets shall be clearly marked or labeled with the location from which they were removed. If equipment is not returned according to these requirements, it will be rejected by the State's Electrical Maintenance Contractor. The Contractor shall be responsible for the condition of the traffic signal equipment from the time Contractor takes maintenance of the signal installation until approval by the Department. A delivery receipt will be signed by the State's Electrical Maintenance Contractor indicating the items have been returned.

The Contractor shall safely store and arrange for pick up or delivery of all equipment to be returned to agencies other than the State. The Contractor shall package the equipment and provide all necessary documentation as stated above.

Traffic signal equipment which is lost, damaged, or not returned to the Department for any reason shall be replaced with new equipment meeting the requirements of these Specifications at no cost to the contract.”

EXPOSED RACEWAYS

Effective: January 1, 2012

Revise the first paragraph of Article 811.03(a) of the Standard Specifications to read:

“General. Rigid metal conduit installation shall be according to Article 810.05(a). Conduits terminating in junction and pull boxes shall be terminated with insulated and gasketed watertight threaded NEMA 4X conduit hubs. The hubs shall be Listed under UL 514B. The insulated throat shall be rated up to 105° C. When PVC coated conduit is utilized, the aforementioned hubs shall also be PVC coated.”

Add the following to Article 811.03(b) of the Standard Specifications:

“Where PVC coated conduit is utilized, all conduit fittings, couplings and clamps shall be PVC coated. All other mounting hardware and appurtenances shall be stainless steel.”

“The personnel installing the PVC coated conduit must be trained and certified by the PVC coated conduit Manufacturer or Manufacturer’s representative to install PVC coated conduit. Documentation demonstrating this requirement must be submitted for review and approval.”

Add the following to Article 1088.01(a) of the Standard Specifications:

All iron and steel products, which are to be incorporated into the work, including conduit and all conduit fittings, shall be domestically manufactured or produced and fabricated as specified in Article 106.”

Revise Article 1088.01(a)(3) of the Standard Specifications to read:

“a. PVC Coated Steel Conduit. The PVC coated rigid metal conduit shall be UL Listed (UL 6). The PVC coating must have been investigated by UL as providing the primary corrosion protection for the rigid metal conduit. Ferrous fittings for general service locations shall be UL Listed with PVC as the primary corrosion protection. Hazardous location fittings, prior to plastic coating shall be UL listed.

- b. The PVC coating shall have the following characteristics:

Hardness:	85+ Shore A Durometer
Dielectric Strength:	400V/mil @ 60 Hz
Aging:	1,000 Hours Atlas Weatherometer
Temperature	The PVC compound shall conform at 0° F. to Federal Specifications PL-406b, Method 2051, Amendment 1 of 25 September 1952 (ASTM D 746)
Elongation:	200%

- c. The exterior and interior galvanized conduit surface shall be chemically treated to enhance PVC coating adhesion and shall also be coated with a primer before the PVC coating to ensure a bond between the zinc substrate and the PVC coating. The bond strength created shall be greater than the tensile strength of the plastic coating.
- d. The nominal thickness of the PVC coating shall be 1 mm (40 mils). The PVC exterior and urethane interior coatings applied to the conduit shall afford sufficient flexibility to permit field bending without cracking or flaking at temperatures above -1°C (30°F).
- e. An interior urethane coating shall be uniformly and consistently applied to the interior of all conduit and fittings. This internal coating shall be a nominal 2 mil thickness. The interior coating shall be applied in a manner so there are no runs, drips, or pinholes at any point. The coating shall not peel, flake, or chip off after a cut is made in the conduit or a scratch is made in the coating.
- f. Conduit bodies shall have a tongue-in-groove gasket for maximum sealing capability. The design shall incorporate a positive placement feature to assure proper installation. Certified test results confirming seal performance at 15 psig (positive) and 25 in. of mercury (vacuum) for 72 hours shall be submitted for review when requested by the Engineer.
- g. The PVC conduit shall pass the following tests:

Exterior PVC Bond test RN1:

Two parallel cuts 13 mm (1/2 inch) apart and 40 mm (1 1/2 inches) in length shall be made with a sharp knife along the longitudinal axis. A third cut shall be made perpendicular to and crossing the longitudinal cuts at one end. The knife shall then be worked under the PVC coating for 13 mm (1/2 inch) to free the coating from the metal.

Using pliers, the freed PVC tab shall be pulled with a force applied vertically and away from the conduit. The PVC tab shall tear rather than cause any additional PVC coating to separate from the substrate.

Boil Test:

Acceptable conduit coating bonds (exterior and interior) shall be confirmed if there is no disbondment after a minimum average of 200 hours in boiling water or exposure to steam vapor at one atmosphere. Certified test results from a national recognized independent testing laboratory shall be submitted for review and approval. The RN1 Bond Test and the Standard Method for Measuring Adhesion by Tape Test shall be utilized.

Exterior Adhesion. In accordance with ASTM D870, a 6" length of conduit test specimen shall be placed in boiling water. The specimen shall be periodically removed, cooled to ambient temperature and immediately tested according to the bond test (RN1). When the PVC coating separates from the substrate, the boil time to failure in hours shall be recorded.

Interior Adhesion. In accordance with ASTM D3359, a 6" conduit test specimen shall be cut in half longitudinally and placed in boiling water or directly above boiling water with the urethane surface facing down. The specimen shall be periodically removed, cooled to ambient temperature and tested in accordance with the Standard Method of Adhesion by Tape Test (ASTM D3359). When the coating disbonds, the time to failure in hours shall be recorded.

Heat/Humidity Test:

Acceptable conduit coating bonds shall be confirmed by a minimum average of 30 days in the Heat and Humidity Test. The RN1 Bond Test and the Standard Method for Measuring Adhesion by Tape Test shall be utilized.

Exterior Adhesion. In accordance with ASTM D1151, D1735, D2247 and D4585, conduit specimens shall be placed in a heat and humidity environment where the temperature is maintained at 150°F (66°C) and 95% relative humidity. The specimens shall be periodically removed and a bond test (RN1) performed. When the PVC coating separates from the substrate, the exposure time to failure in days shall be recorded.

Interior Adhesion. In accordance with ASTM D3359, conduit specimens shall be placed in a heat and humidity environment where the temperature is maintained at 150°F (66°C) and 95% relative humidity. When the coating disbonds, the time to failure in hours shall be recorded.

Add the following to Article 1088.01(a)(4) of the Standard Specifications:

“All liquid tight flexible metal conduit fittings shall have an insulated throat to prevent abrasion of the conductors and shall have a captive sealing O-ring gasket. The fittings shall be Listed under UL 514B. The insulated throat shall be rated up to 105° C.”

Revise the second paragraph of Article 811.04 of the Standard Specifications to read:

“Expansion fittings and LFNC will not be measured for payment.”

Revise Article 811.05 of the Standard Specifications to read:

“811.05 Basis of Payment. This work will be paid for at the contract unit price per meter (foot) for **CONDUIT ATTACHED TO STRUCTURE**, of the diameter specified, **RIGID GALVANIZED STEEL** or **CONDUIT ATTACHED TO STRUCTURE**, of the diameter specified, **RIGID GALVANIZED STEEL, PVC COATED.**”

ROADWAY LUMINAIRE, LED

Effective: April 1, 2024

Description.

This work shall consist of furnishing and installing a roadway LED luminaire as shown on the plans, as specified herein.

General.

The luminaire including the housing, driver and optical assembly shall be assembled in the U.S.A. The luminaire shall be assembled by and manufactured by the same manufacturer. The luminaire shall be mechanically strong and easy to maintain. The size, weight, and shape of the luminaire shall be designed so as not to incite detrimental vibrations in its respective pole and it shall be compatible with the pole and arm. All electrical and electronic components of the luminaire shall comply with the requirements of Restriction of Hazardous Materials (RoHS) regulations. The luminaire shall be listed for wet locations by an NRTL and shall meet the requirements of UL 1598 and UL 8750

Submittal Requirements.

The Contractor shall also submit the following manufacturer's product data for each type of luminaire:

1. Descriptive literature and catalogue cuts for luminaire, LED driver, and surge protection device. Completed manufacturer's luminaire ordering form with the full catalog number provided
2. LED drive current, total luminaire input wattage and total luminaire current at the system operating voltage or voltage range and ambient temperature of 25 C.
3. LED efficacy per luminaire expressed in lumens per watt (l/w).
4. Initial delivered lumens at the specified color temperature, drive current, and ambient temperature.
5. IES file associated with each submitted luminaire in the IES LM-63 format.
6. Computer photometric calculation reports as specified and in the luminaire performance table.
7. TM-15 BUG rating report.
8. Isofootcandle chart with max candela point and half candela trace indicated.
9. Documentation of manufacturers experience and verification that luminaires were assembled in the U.S.A. as specified.
10. Written warranty.

Upon request by the Engineer, the submittals shall also include any or all the following:

- a. TM-21 calculator spreadsheet (XLSX or PDF format) and if available, TM-28 report for the specified luminaire or luminaire family. Both reports shall be for 50,000 hours at an ambient temperature of 77 °F (25 °C).
- b. LM-79 report with National Voluntary Laboratory Accreditation Program (NVLAP) current at the time of testing in PDF format inclusive of the following: isofootcandle diagram with half candela contour and maximum candela point; polar plots through maximum plane and maximum cone; coefficient of utilization graph; candela table; and spectral distribution graph and chromaticity diagram.
- c. LM-80 report for the specified LED package in PDF format and if available, LM-84 report for the specified luminaire or luminaire family in PDF format. Both reports shall be conducted by a laboratory with NVLAP certification current at the time of testing.

- d. AGi32 calculation file matching the submittal package.
- e. In Situ Temperature Measurement Test (ISTMT) report for the specified luminaire or luminaire family in PDF format.
- f. Vibration test report in accordance with ANSI C136.31 in PDF format.
- g. ASTM B117/ASTM D1654 (neutral salt spray) test and sample evaluation report in PDF format.
- h. ASTM G154 (ASTM D523) gloss test report in PDF format.
- i. LED drive current, total luminaire input wattage, and current over the operating voltage range at an ambient temperature of 77 °F (25 °C).
- j. Power factor (pf) and total harmonic distortion (THD) at maximum and minimum supply and at nominal voltage for the dimmed states of 70%, 50%, and 30% full power.
- k. Ingress protection (IP) test reports, conducted according to ANSI C136.25 requirements, for the driver and optical assembly in PDF format.
- l. Installation, maintenance, and cleaning instructions in PDF format, including recommendations on periodic cleaning methods.
- m. Documentation in PDF format that the reporting laboratory is certified to perform the required tests.

A sample luminaire shall also be provided upon request of the Engineer. The sample shall be as proposed for the contract and shall be delivered by the Contractor to the District Headquarters. After review, the Contractor shall retrieve the luminaire.

Manufacturer Experience.

The luminaire shall be designed to be incorporated into a lighting system with an expected 20 year lifetime. The luminaire manufacturer shall have a minimum of 15 years' experience manufacturing LED roadway luminaires; parking lot, architectural, or residential luminaires are not applicable to this requirement. The manufacturer shall have a minimum of 100,000 total LED roadway luminaires installed on a minimum of 100 separate installations, all within the U.S.A.

Housing.

Material. The luminaire shall be a single device not requiring on-site assembly for installation. The driver for the luminaire shall be integral to the unit.

Finish. The luminaire shall have a baked acrylic enamel finish. The color of the finish shall be gray, unless otherwise indicated.

The finish shall have a rating of six or greater according to ASTM D1654, Section 8.0 Procedure A – Evaluation of Rust Creepage for Scribed Samples after exposure to 1000 hours of testing according to ASTM B117 for painted or finished surfaces under environmental exposure.

The luminaire finish shall have less than or equal to 30% reduction of gloss according to ASTM D523 after exposure of 500 hours to ASTM G154 Cycle 6 QUV® accelerated weathering testing.

The luminaire shall slip-fit on a mounting arm with a 2" diameter tenon (2.375" outer diameter), and shall have a barrier to limit the amount of insertion. The slip fitter clamp shall utilize four (4) bolts to clamp to the tenon arm. The luminaire shall be provided with a leveling surface and shall be capable of being tilted ± 5 degrees from the axis of attachment in 2.5 degree increments and rotated to any degree with respect to the supporting arm.

All external surfaces shall be cleaned in accordance with the manufacturer's recommendations and be constructed in such a way as to discourage the accumulation of water, ice, and debris.

The effective projected area of the luminaire shall not exceed 1.6 sq. ft.

The total weight including accessories, shall not exceed 40 lb (18.14 kg).

A passive cooling method with no moving, rotating parts, or liquids shall be employed for heat management.

The luminaire shall include a fully prewired, 7-pin twist lock ANSI C136.41-compliant receptacle. Unused pins shall be connected as directed by the Manufacturer and as approved by the Engineer. A shorting cap shall be provided with the luminaire that is compliant with ANSI C136.10.

Vibration Testing. All luminaires shall be subjected to and pass vibration testing requirements at "3G" minimum zero to peak acceleration in accordance with ANSI C136.31 requirements using the same luminaire. To be accepted, the luminaire housing, hardware, and each individual component shall pass this test with no noticeable damage and the luminaire must remain fully operational after testing.

Labels. An internal label shall be provided indicating the luminaire is suitable for wet locations and indicating the luminaire is an NRTL listed product to UL1598 and UL8750. The internal label shall also comply with the requirements of ANSI C136.22.

An external label consisting of two black characters on a white background with the dimensions of the label and the characters as specified in ANSI C136.15 for HPS luminaires. The first character shall be the alphabetical character representing the initial lumen output as specified in Table 1 of Article 1067.06(c). The second character shall be the numerical character representing the transverse light distribution type as specified in IES RP-8 (i.e. Types 1, 2, 3, 4, or 5).

Hardware. All hardware shall be stainless steel or of other corrosion resistant material approved by the Engineer.

Luminaires shall be designed to be easily serviced, having fasteners such as quarter-turn clips of the heavy spring-loaded type with large, deep straight slot heads, complete with a receptacle and shall be according to military specification MIL-f-5591.

All hardware shall be captive and not susceptible to falling from the luminaire during maintenance operations. This shall include lens/lens frame fasteners as well hardware holding the removable driver and electronic components in place.

Provisions for any future house-side external or internal shielding should be indicated along with means of attachment.

Circuiting shall be designed to minimize the impact of individual LED failures on the operation of the other LED's.

Wiring. Wiring within the electrical enclosure shall be rated at 600v, 105°C or higher.

Driver.

The driver shall be integral to the luminaire shall be capable of receiving an indefinite open and short circuit output conditions without damage.

The driver shall incorporate the use of thermal foldback circuitry to reduce output current under abnormal driver case temperature conditions and shall be rated for a lifetime of 100,000 hours at an ambient temperature exposure of 77 °F (25 °C) to the luminaire. If the driver has a thermal shut down feature, it shall not turn off the LEDs when operated at 104 °F (40 °C) or less.

The driver shall have an input voltage range of 120 to 277 volts ($\pm 10\%$) or 347 to 480 volts ($\pm 10\%$) according to the contract documents. When the driver is operating within the rated input voltage range and in an un-dimmed state, the power factor measurement shall be not less than 0.9 and the THD measurement shall be no greater than 20%.

The driver shall meet the requirements of the FCC Rules and Regulations, Title 47, Part 15 for Class A devices with regard to electromagnetic compatibility. This shall be confirmed through the testing methods in accordance with ANSI C63.4 for electromagnetic interference.

The driver shall be dimmable using the protocol listed in the Luminaire Performance Table shown in the contract.

Surge Protection. The luminaire shall comply the requirements of ANSI C136.2 for electrical transient immunity at the "Extreme" level (20KV/10KA) and shall be equipped with a surge protective device (SPD) that is UL1449 compliant with indicator light. An SPD failure shall open the circuit to protect the driver.

LED Optical Assembly

The optical assembly shall have an IP 65 or higher rating in accordance with ANSI C136.25. The circuiting of the LED array shall be designed to minimize the effect of individual LED failures on the operation of other LEDs. All optical components shall be made of glass or a UV stabilized, non-yellowing material.

The optical assembly shall utilize high brightness, long life, minimum 70 CRI, 4,000K color temperature (+/-300K) LEDs binned in accordance with ANSI C78.377. Lenses shall be UV-stabilized acrylic or glass.

Lumen depreciation at 50,000 hours of operation shall not exceed 15% of initial lumen output at the specified LED drive current and an ambient temperature of 25° C.

The luminaire may or may not have a glass lens over the LED modules. If a glass lens is used, it must be a flat lens. Material other than glass will not be acceptable. If a glass lens is not used, the LED modules may not protrude lower than the luminaire housing.

The assembly shall have individual serial numbers or other means for manufacturer tracking.

Photometric Performance.

Luminaires shall be tested according to IESNA LM-79. This testing shall be performed by a test laboratory holding accreditation from the National Institute of Standards and Technology (NIST) National Voluntary Laboratory Accreditation Program (NVLAP) for the IESNA LM-79 test procedure.

Data reports as a minimum shall yield an isofootcandle chart, with max candela point and half candela trace indicated, maximum plane and maximum cone plots of candela, a candlepower table (house and street side), a coefficient of utilization chart, a luminous flux distribution table, spectral distribution plots, chromaticity plots, and other standard report outputs of the above mentioned tests.

The luminaire shall have a BUG rating of Back Light B3 or less, Up Light rating of U0, and a Glare rating of G3 or less unless otherwise indicated in the luminaire performance table.

Photometric Calculations.

Calculations. Submitted report shall include a luminaire classification system graph with both the recorded lumen value and percent lumens by zone along with the BUG rating according to IESNA TM-15.

Complete point-by-point luminance and veiling luminance calculations as well as listings of all indicated averages and ratios as applicable shall be provided in accordance with IESNA RP-8 recommendations. Lighting calculations shall be performed using AGi32 software with all luminance calculations performed to one decimal place (i.e. x.x cd/m²). Uniformity ratios shall also be calculated to one decimal place (i.e. x.x:1). Calculation results shall demonstrate that the submitted luminaire meets the lighting metrics specified in the project Luminaire Performance Table(s). Values shall be rounded to the number of significant digits indicated in the luminaire performance table(s).

All photometry must be **photopic**. Scotopic or mesopic factors will not be allowed. The AGi32 file shall be submitted at the request of the Engineer.

IDOT DISTRICT 1 LUMINAIRE PERFORMANCE TABLE ROADWAY LIGHTING

GIVEN CONDITIONS

Roadway Data	Pavement Width	_____	Ft
	Number of Lanes Left of Median	_____	
	Number of Lanes Right of Median	_____	
	Lane Width	_____	Ft
	Median Width	_____	Ft
	IES Surface Classification	_____ R3	
	Q-Zero Value	_____ 0.07	
Mounting Data	Mounting Height	_____	Ft
	Mast Arm Length	_____	Ft
	Pole Set-Back from Edge of Pavement	_____	Ft
Luminaire Data	Source	_____ LED	
	Color Temperature	_____ 4000	°K
	Lumens	_____	Min
	Pay Item Lumen Designation	_____ Choose an item.	
	BUG Rating	_____	
	IES Vertical Distribution	_____	
	IES Control of Distribution	_____	
	IES Lateral Distribution	_____	
Pole Layout Data	Total Light Loss Factor	_____ 0.75	
	Spacing	_____	Ft
	Configuration	_____ Choose an item.	
	Luminaire Overhang over E.O.P.	_____	Ft

NOTE: Variations from the above specified I.E.S. distribution pattern may be requested, and acceptance of variations will be subject to review by the Engineer based on how well the performance requirements are met.

PERFORMANCE REQUIREMENTS

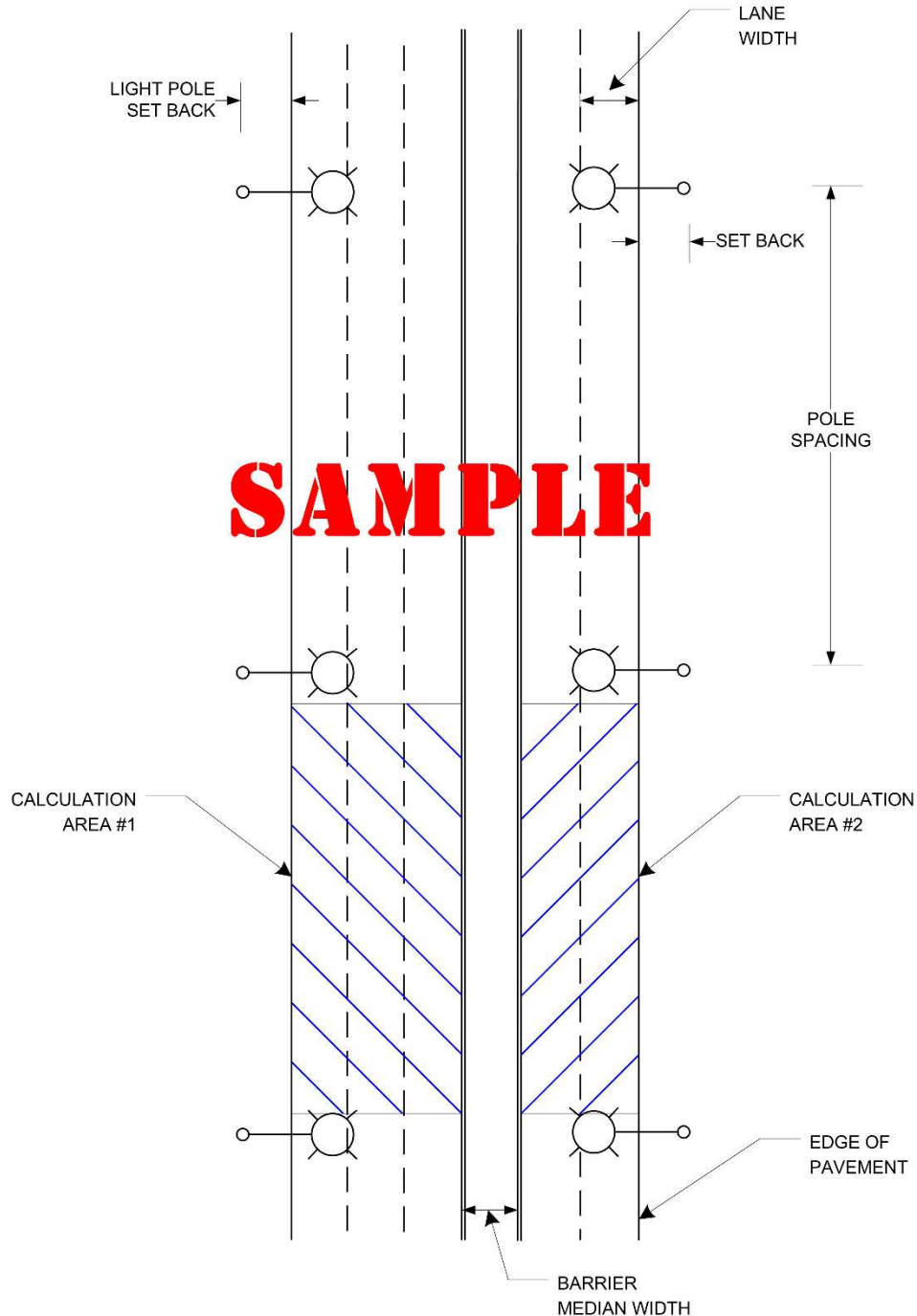
NOTE: These performance requirements shall be the minimum acceptable standards of photometric performance for the luminaire, based on the given conditions listed above.

Roadway Luminance	Average Luminance, L_{AVE} (Max)	_____	Cd/m ²
	Average Luminance, L_{AVE} (Min)	_____	Cd/m ²
	Uniformity Ratio, L_{AVE}/L_{MIN}	_____	Max
	Uniformity Ratio, L_{MAX}/L_{MIN}	_____	Max
	Veiling Luminance Ratio, L_v/L_{AVE}	_____	Max

INSERT DRAWING OF POLE LAYOUT. THIS IS A SAMPLE DIAGRAM.

ALL DIAGRAMS MUST BE PROJECT SPECIFIC COORDINATED WITH THE LUMINAIRE PERFORMANCE TABLES.

INTERSECTIONS OR CURVES CANNOT BE USED.



Independent Testing

When a contract has 50 or more luminaires of the same type (distribution type and lumen output/wattage), that luminaire type shall be independently tested, unless otherwise noted. The quantity of luminaires to be tested shall be as specified in the following table.

Contract Quantity	Luminaires to be Tested
1-49	0 (unless otherwise noted)
50-100	2
101-150	3
151-200	4
201-250	5
251-300	6
301-350	7

The Contractor shall coordinate the testing with the contract schedule considering submittal, manufacturing, testing, and installation lead-times and deadlines.

The Electrical Engineer shall select from all the project luminaires at the Contractor's or distributor's storage facility, within District 1, the luminaires for testing. In all cases, the selection of luminaires shall be a random selection from the entire completed lot of luminaires required for the contract. Selections from partial lots will not be allowed. An additional luminaire shall also be selected for physical inspection by the Engineer at the District Headquarters. This luminaire will be available for the Contractor to pick up at a later date to be installed under this contract. This luminaire is in addition to the luminaire required as a part of the submittal process specified elsewhere.

Alternative selection process. With the Engineer's prior approval, the Contractor shall provide a list of luminaire serial numbers for all the luminaires. The Engineer shall make a random selection of the required number of luminaires for testing from the serial numbers. That luminaire must then be photographed clearly showing the serial number prior to shipment to the selected and approved testing laboratory. The testing laboratory shall include a photograph of the luminaire along with the test results directly to the Engineer.

Luminaires shall be tested at a National Voluntary Laboratory Accreditation Program (NVLAP) accredited laboratory approved for each of the required tests. The testing facility shall not be associated in any way, subsidiary or otherwise, with the luminaire manufacturer. All costs associated with luminaire testing shall be included in the bid price of the luminaire.

The selection of the proposed independent laboratory shall be presented with the information submitted for review and approval.

The testing performed shall include photometric and electrical testing.

All tests shall be conducted at the luminaire system operating voltage of 240 volts unless specified differently in the contract plans.

Photometric testing shall be according to IES recommendations, performed with a goniophotometer and as a minimum, shall yield an isofootcandle chart, with max candela point and half candela trace indicated, an isocandela diagram, maximum planned and maximum cone plots of candela, a candlepower table (House and street side), a coefficient of utilization chart, a luminous flux distribution table, BUG rating report, and complete calculations based on specified requirements and test results.

Electrical testing shall conform to NEMA and ANSI standards and, as a minimum shall include a complete check of wiring connections and a table of characteristics showing input amperes, watts, power factor, total harmonic distortion and LED drive current.

The summary report and the test results including IES photometric files shall be sent directly to the Resident Engineer, the Electrical Engineer, and the Contractor via email or other mutually agreeable means.

Photometric performance shall meet or exceed that of the specified values. If the luminaire does not meet the specified photometric values, the luminaire has failed regardless of whether the test results meet the submitted factory data.

Should any of the tested luminaires of a given type, and distribution fail to satisfy the specifications and perform according to approved submittal information, the luminaire type of that distribution type and wattage shall be unacceptable and be replaced by alternate equipment meeting the specifications with the submittal and testing process repeated in their entirety; or corrections made to achieve required performance.

In the case of corrections, the Contractor shall advise the Engineer of the proposed corrections and shall request a repeat of the specified testing and, if the corrections are deemed reasonable by the Engineer, the testing process shall be repeated in its entirety.

The number of luminaires to be tested shall be the same quantity as originally tested as required in the above table.

Retesting, should it become necessary, shall not be grounds for additional compensation or extension of time.

Submittal information shall include a statement of intent to provide the testing as well as a request for approval of the chosen laboratory.

Installation.

Each luminaire shall be installed according to the luminaire manufacturer's recommendations.

Luminaires which are pole mounted shall be mounted on site such that poles and arms are not left unloaded. Pole mounted luminaires shall be leveled/adjusted after poles are set and vertically aligned before being energized. When mounted on a tenon, care shall be exercised to assure maximum insertion of the mounting tenon. Each luminaire shall be checked to assure compatibility with the project power system. When the night-time check of the lighting system by the Engineer indicates that any luminaires are mis-aligned, the mis-aligned luminaires shall be corrected at no additional cost.

No luminaire shall be installed prior to approval. Where independent testing is required, full approval will not be given until complete test results, demonstrating compliance with the specifications, have been reviewed and accepted by the Engineer.

Pole wiring shall be provided with the luminaire. Pole wire shall run from handhole to luminaire. Pole wire shall be sized No. 10, rated 600 V, RHW/USE-2, and have copper conductors, stranded in conformance with ASTM B 8. Pole wire shall be insulated with cross-linked polyethylene (XLP) insulation. Pole wire shall include a phase, neutral, and green ground wire. Wire shall be trained within the pole or sign structure so as to avoid abrasion or damage to the insulation.

Pole wire shall be extended through the pole, pole grommet, luminaire ring, and any associated arm and tenon. The pole wire shall be terminated in a manner that avoids sharp kinks, pinching, pressure on the insulation, or any other arrangement prone to damaging insulation value and producing poor megger test results. Wires shall be trained away from heat sources within the luminaire. Wires shall be terminated so all strands are extended to the full depth of the terminal lug with the insulation removed far enough so it abuts against the shoulder of the lug, but is not compressed as the lug is tightened.

Included with the pole wiring shall be fusing located in the handhole. Fusing shall be according to Article 1065.01 with the exception that fuses shall be 6 amperes.

Each luminaire and optical assembly shall be free of all dirt, smudges, etc. Should the optical assembly require cleaning, a luminaire manufacturer approved cleaning procedure shall be used.

Horizontal mount luminaires shall be installed in a level, horizontal plane, with adjustments as needed to insure the optics are set perpendicular to the traveled roadway.

When the pole is bridge mounted, a minimum size stainless steel 1/4-20NC set screw shall be provided to secure the luminaire to the mast arm tenon. A hole shall be drilled and tapped through the tenon and luminaire mounting bracket and then fitted with the screw.

Warranty.

The entire luminaire and all of its component parts shall be covered by a 10-year warranty. Failure is when one or more of the following occur:

- 1) Negligible light output from more than 10 percent of the discrete LEDs.
- 2) Significant moisture that deteriorates performance of the luminaire.
- 3) Driver that continues to operate at a reduced output due to overheating.

The warranty period shall begin on the date of luminaire delivery. The Contractor shall verify that the Resident Engineer has noted the delivery date in the daily diary. Copy of the shipment and delivery documentation shall be submitted with the final documentation.

The replacement luminaire shall be of the same manufacturer, model, and photometric distribution as the original.

Method of Measurement.

The rated initial minimum luminous flux (lumen output) of the light source, as installed in the luminaire, shall be according to the following table for each specified output designation.

Designation Type	Minimum Initial Luminous Flux	Designation Type	Minimum Initial Luminous Flux
A	2,200	F	12,500
B	3,150	G	15,500
C	4,400	H	25,200
D	6,300	I	33,000
E	9,450		

Where delivered lumens is defined as the minimum initial delivered lumens at the specified color temperature. Luminaires with an initial luminous flux less than the values listed in the above table will not be acceptable even if they meet the requirements given in the Luminaire Performance table shown in the contract.

Basis of Payment.

This work will be paid for at the contract unit price per each for **LUMINAIRE, LED, ROADWAY**, of the output designation specified.

TEMPORARY INFORMATION SIGNING

Effective: November 13, 1996

Revised: January 29, 2020

Description.

This work shall consist of furnishing, installing, maintaining, relocating for various states of construction and eventually removing temporary informational signs. Included in this item may be ground mount signs, skid mount signs, truss mount signs, bridge mount signs, and overlay sign panels which cover portions of existing signs.

Materials.

Materials shall be according to the following Articles of Section 1000 - Materials:

	<u>Item</u>	<u>Article/Section</u>
a.)	Sign Base (Note 1)	1090
b.)	Sign Face (Note 2)	1091
c.)	Sign Legends	1091
d.)	Sign Supports	1093
e.)	Overlay Panels (Note 3)	1090.02

Note 1. The Contractor may use 5/8 inch (16 mm) instead of 3/4 inch (19 mm) thick plywood.

Note 2. The sign face material shall be in accordance with the Department's Fabrication of Highway Signs Policy.

Note 3. The overlay panels shall be 0.08 inch (2 mm) thick.

GENERAL CONSTRUCTION REQUIREMENTS

Installation.

The sign sizes and legend sizes shall be verified by the Contractor prior to fabrication.

Signs which are placed along the roadway and/or within the construction zone shall be installed according to the requirements of Article 701.14 and Article 720.04. The signs shall be 7 ft (2.1 m) above the near edge of the pavement and shall be a minimum of 2 ft (600 mm) beyond the edge of the paved shoulder. A minimum of two (2) posts shall be used.

The attachment of temporary signs to existing bridges, sign structures or sign panels shall be approved by the Engineer. Any damage to the existing signs and/or structures due to the Contractor's operations shall be repaired or signs replaced, as determined by the Engineer, at the Contractor's expense.

Method of Measurement.

This work shall be measured for payment in square feet (square meters) edge to edge (horizontally and vertically).

All hardware, posts or skids, supports, bases for ground mounted signs, connections, which are required for mounting these signs will be included as part of this pay item.

Basis Of Payment.

This work shall be paid for at the contract unit price per square foot (square meter) for TEMPORARY INFORMATION SIGNING.

MAST ARM SIGN PANELS

Effective: May 22, 2002

Revised: July 1, 2015

720.01TS

Add the following to Article 720.02 of the Standard Specifications:

Sign stiffening channel systems shall be aluminum and meet the requirements of ASTM 6261-T5. Sign mounting banding, buckles and buckle straps shall be manufactured from AISI 201 stainless steel.

SIGN SHOP DRAWING SUBMITTAL

Effective: January 22, 2013

Revised: July 1, 2015

720.02TS

Add the following paragraph to Article 720.03 of the Standard Specifications:

Shop drawings will be required, according to Article 105.04, for all Arterials/Expressways signs except standard highway signs covered in the MUTCD. Shop drawings shall be submitted to the Engineer for review and approval prior to fabrication. The shop drawings shall include dimensions, letter sizing, font type, colors and materials.

TRAFFIC SIGNAL GENERAL REQUIREMENTS

Effective: May 22, 2002

Revised: March 1, 2024

800.01TS

These Traffic Signal Special Provisions and the "District One Standard Traffic Signal Design Details" supplement the requirements of the State of Illinois "Standard Specifications for Road and Bridge Construction." The intent of these Special Provisions is to prescribe the materials and construction methods commonly used for traffic signal installations.

All material furnished shall be new unless otherwise noted herein. Traffic signal construction and maintenance work shall be performed by personnel holding current International Municipal Signal Association (IMSA)/Illinois Public Service Institute (IPSI) Traffic Signal Technician Level II certification. A copy of the certification shall be immediately available upon request of the Engineer. The work to be done under the Contract consists of furnishing, installing, and maintaining all traffic signal work and items as specified in the plans and as specified herein in a manner acceptable and approved by the Engineer.

Definitions of Terms.

Add the following to Section 101 of the Standard Specifications:

101.56 Manufacturer. Company that sells a particular type of product directly to the Contractor or the Vendor.

101.57 Vendor. Company that supplies, represents, and provides technical support for IDOT District One approved traffic signal controllers and other related equipment. The Vendor shall be located within IDOT District One and shall:

- (1) Be full service with on-site facilities to assemble, test and troubleshoot traffic signal controllers and cabinet assemblies.
- (2) Maintain an inventory of IDOT District One approved controllers and cabinets.
- (3) Be staffed with permanent sales and technical personnel able to provide traffic signal controller and cabinet expertise and support.
- (4) Have technical staff that hold current IMSA/IPSI Traffic Signal Technician Level III certification and shall attend traffic signal turn-ons as well as cabinet and/or controller modifications.

Submittals.

Revise Article 801.05 of the Standard Specifications to read:

“All material approval requests shall be submitted electronically following District guidelines unless directed otherwise by the Engineer. Submittal requirements shall include, but not limited to the following:

- (1) All material approval requests shall be made prior to or no later than the date of the preconstruction meeting. A list of major traffic signal items can be found in Article 801.05. Material or equipment which is similar or identical shall be the product of the same manufacturer, unless necessary for system continuity. Traffic signal materials and equipment shall bear the U.L. label whenever such labeling is available.
- (2) Product data and shop drawings shall be assembled by pay item. Only the top sheet of each pay item submittal will be stamped by the Department with the review status, except shop drawings for mast arm pole assemblies and the like will be stamped with the review status on each sheet.
- (3) Original manufacturer published product data and shop drawing sheets with legible dimensions and details shall be submitted for review.
- (4) When hard copy submittals are necessary, four (4) complete copies of the manufacturer's descriptive literatures and technical data for the traffic signal materials shall be submitted. For hard copy or electronic submittals, the descriptive literature and technical data shall be adequate for determining whether the materials meet the requirements of the plans and specifications. If the literature contains more than one item, the Contractor shall indicate which item or items will be furnished.
- (5) When hard copy submittals are necessary for structural elements, four (4) complete copies of the shop drawings for the mast arm assemblies and poles, and the combination mast arm assemblies and poles showing, in detail, the fabrication thereof and the certified mill analyses of the materials used in the fabrication, anchor rods, and reinforcing materials shall be submitted.
- (6) Partial or incomplete submittals will be returned without review.
- (7) Certain non-standard mast arm poles and special structural elements will require additional review from IDOT's Central Office. Examples include ornamental/decorative, non-standard length mast arm pole assemblies and monotube structures.
- (8) The Contract number or Permit number, project location/limits, and corresponding pay code number must be on each sheet of correspondence, material approval, and mast arm poles and assemblies drawings.

- (9) Where certifications and/or warranties are specified, the information submitted for approval shall include certifications and warranties. Certifications involving inspections and/or tests of material shall be complete with all test data, dates, and times.
- (10) After the Engineer reviews the submittals for conformance with the design concept of the project, the Engineer will stamp the drawings indicating their status as 'Approved', 'Approved-As-Noted', 'Disapproved', or 'Incomplete'. Since the Engineer's review is for conformance with the design concept only, it is the Contractor's responsibility to coordinate the various items into a working system as specified. The Contractor shall not be relieved from responsibility for errors or omissions in the shop, working, layout drawings, or other documents by the Department's approval thereof. The Contractor must still be in full compliance with Contract and specification requirements.
- (11) The Contractor shall secure approved materials in a timely manner to assure construction schedules are not delayed.
- (12) All submitted items reviewed and marked 'APPROVED AS NOTED', 'DISAPPROVED', or 'INCOMPLETE' are to be resubmitted in their entirety, unless otherwise indicated within the submittal comments, with a disposition of previous comments to verify Contract compliance at no additional cost to the Contract.
- (13) Exceptions to and deviations from the requirements of the Contract Documents will not be allowed. It is the Contractor's responsibility to note any deviations from Contract requirements at the time of submittal and to make any requests for deviations in writing to the Engineer. In general, substitutions will not be acceptable. Requests for substitutions must demonstrate that the proposed substitution is superior to the material or equipment required by the Contract Documents. No exceptions, deviations or substitutions will be permitted without the approval of the Engineer.
- (14) The Contractor shall not order major equipment such as mast arm assemblies prior to Engineer approval of the Contractor marked proposed traffic signal equipment locations to assure proper placement of Contract required traffic signal displays, push buttons and other facilities. Field adjustments may require changes in proposed mast arm length and other coordination.
- (15) Revised cabinet wiring diagrams shall be submitted whenever any wiring modifications are made to the traffic signal cabinet."

Marking Proposed Locations.

Revise "Marking Proposed Locations for Highway Lighting System" of Article 801.09 to read "Marking Proposed Locations for Highway Lighting System and Traffic Signals."

Add the following to Article 801.09 of the Standard Specifications:

"It shall be the Contractor's responsibility to verify all dimensions and conditions existing in the field prior to ordering materials and beginning construction. This shall include locating the mast arm foundations and verifying the mast arms lengths."

Inspection of Electrical Systems.

Add the following to Article 801.10 of the Standard Specifications:

- (c) All cabinets, including temporary traffic signal cabinets, shall be assembled by an approved Vendor in District One. The Department reserves the right to request any controller and cabinet to be tested at the Vendor's facility prior to field installation at no extra cost to the Contract.

Maintenance and Responsibility of Traffic Signal and Flashing Beacon Installations.

Replace Article 801.11(b) of the Standard Specifications to read:

- (b) Traffic Signals and Flashing Beacons. The Contractor shall be responsible for maintaining the traffic signal/flashing beacon installation in proper operating condition.

- (1) General.

- a. The Contractor must notify the Area Traffic Signal Maintenance and Operations Engineer of their intent to begin any physical construction work on the Contract or any portion thereof. This notification must be made a minimum of seven (7) working days prior to the start of construction to allow sufficient time for inspection of the existing traffic signal installation(s) and transfer of maintenance to the Contractor. The Department will attempt to fulfill the Contractor's inspection date request(s); however, workload and other conditions may prevent the Department from accommodating specific dates or times. The Contractor shall not be entitled to any other compensation if the requested inspection date(s) cannot be scheduled by the Department.

- b. Full maintenance responsibility shall start upon the successful completion of a maintenance transfer inspection, or as directed by the Engineer. If the Contractor begins any physical work on the Contract or any portion thereof prior to a traffic signal inspection, maintenance of the traffic signal installation(s) will be transferred to the Contractor without an inspection. The Contractor will become responsible for repairing or replacing all equipment that is not operating properly or is damaged at the time of transfer at no cost to the owner of the traffic signal equipment. Final repairs or replacement of damaged equipment must meet the approval of the Engineer prior to or at the time of final inspection, otherwise the traffic signal installation will not be accepted.
- c. All traffic signals within the limits of the Contract or those which have the item "MAINTENANCE OF EXISTING TRAFFIC SIGNAL INSTALLATION," "TEMPORARY TRAFFIC SIGNAL INSTALLATION", "TEMPORARY BRIDGE TRAFFIC SIGNAL INSTALLATION", "TEMPORARY PORTABLE BRIDGE TRAFFIC SIGNAL INSTALLATION", and/or "MAINTENANCE OF EXISTING FLASHING BEACON INSTALLATION" shall become the full responsibility of the Contractor. Maintenance responsibility shall end upon issuance of final acceptance by the Engineer.
- d. The Contractor shall have electricians with IMSA/IPSI Traffic Signal Technician Level II certification on staff to provide signal maintenance. A copy of the certification shall be immediately available upon request by the Engineer.
- e. This item shall include maintenance of all traffic signal equipment and other connected and related equipment such as flashing beacons, emergency vehicle preemption (EVP) equipment, master controllers, network switches, uninterruptable power supply (UPS) and batteries, pan-tilt-zoom (PTZ) cameras, vehicle detection, handholes, lighted signs, telephone service installations, cellular modems, radios, communication cables, and other traffic signal equipment. All conduit and related equipment to adjacent intersections shall be maintained to the far back handhole, or as directed by the Engineer. If adjacent intersections are part of Contract work, then maintenance of all conduit and related equipment shall be included in this item.
- f. Regional transit, County, and other agencies may also have equipment connected to existing traffic signal or peripheral equipment such as network switches and transit signal priority (TSP, SCP, and BRT) servers, radios, and other devices, where maintenance shall be coordinated with the owner.

- g. Maintenance shall not include automatic traffic enforcement equipment such as red light enforcement cameras, detectors, or peripheral equipment. This equipment is operated and maintained by others and shall be deactivated while on Contractor maintenance.
- h. The energy charges for the operation of the traffic signal installation shall be paid for by the Contractor.

(2) Maintenance.

- a. The Contractor shall inspect all traffic signal equipment and appurtenances every two (2) weeks to ensure they are functioning properly. Signal heads shall be properly adjusted, including plumb, and tightly mounted. All controller cabinets, signal posts, and controller pedestals shall be tight on their foundations and in alignment. Deficient equipment shall be repaired or replaced as necessary. The Contractor shall check signal system communications and phone lines to assure proper operation. This item includes, as routine maintenance, all portions of EVP equipment. The Contractor shall always maintain enough materials and equipment in stock to provide effective temporary and permanent repairs. The Contractor shall supply a detailed maintenance log monthly that includes dates, locations, names of electricians performing the required checks and inspections, and any other information requested by the Engineer. The Contractor shall attend any additional inspections as requested by the Engineer. The Contractor shall check the controllers, relays, and detectors after receiving complaints or calls to ascertain that they are functioning properly and make all necessary repairs and replacement.
- b. The Contractor is advised that the existing and/or temporary traffic signal installation must remain in operation during all construction stages, except for the most essential down time. Any shutdown of the traffic signal installation which exceeds fifteen (15) minutes must have prior approval from the Engineer. Approval to shut down the traffic signal installation will only be granted during the period extending from 9:00 a.m. to 3:00 p.m. on weekdays. Shutdowns shall not be allowed during inclement weather or holiday periods.

- c. The Contractor shall provide immediate corrective action when any part(s) of the signal fail to function properly. Two far side heads facing each approach shall be considered the minimum acceptable signal operation pending permanent repairs. When repairs at a signalized intersection require that the controller be disconnected or otherwise removed from normal operation, and power is available, the Contractor shall place the traffic signal installation in flashing operation. The signals shall flash RED for all directions unless a different indication has been specified by the Engineer. The Contractor shall install cones on all lane lines at the stop bar on each approach, R1-1 (36 in. minimum) "STOP" signs at the stop bar on each approach on the right side and on raised medians (where applicable), and black on fluorescent orange "SIGNALS OUT AHEAD" warning signs followed by fluorescent orange W3-1 symbolic stop ahead warning signs on all approaches to the intersection.
- d. Temporary replacement of a damaged or knocked down mast arm pole assembly shall require construction of a full or partial span wire signal installation or other method approved by the Engineer to assure signal heads are located overhead and over traveled pavement. Temporary replacement of mast arm mount signals with post mount signals is not permitted.
- e. The Contractor shall provide the Engineer with two (2) 24-hour telephone numbers for the maintenance of the traffic signal installation and for emergency calls by the Engineer.
- f. Traffic signal equipment which is lost, damaged, or not returned to the Department for any reason shall be replaced with new equipment meeting the requirements of the Standard Specifications and these special provisions.

- g. The Contractor shall be fully responsible for the safe and efficient operation of the traffic signals and other equipment noted herein. The Contractor shall respond to all emergency calls from the Department or others within one (1) hour after notification and provide immediate corrective action. When equipment has been damaged or becomes faulty beyond repair, the Contractor shall replace it with new equipment meeting current District One traffic signal specifications. The cost of furnishing and installing the replaced equipment shall be borne by the Contractor at no additional cost to the Contract. The Contractor may institute action to recover damages from a responsible third party. If at any time the Contractor fails to perform all work as specified herein to keep the traffic signal installation in proper operating condition, or if the Engineer cannot contact the Contractor's designated personnel, the Engineer shall have the Department's Electrical Maintenance Contractor perform the maintenance work. The Contractor shall be responsible for all of the Department's Electrical Maintenance Contractor's costs and liquidated damages of \$1,000 per day per occurrence. The Department's Electrical Maintenance Contractor shall bill the Contractor for the total cost of the work. The Contractor shall pay this bill within thirty (30) days of the date of receipt of the invoice or the cost of such work will be deducted from the amount due the Contractor. The Contractor shall allow the Electrical Maintenance Contractor to inspect the traffic signal installation that has been transferred to the Contractor for maintenance. Final replacement of damaged equipment must meet the approval of the Engineer prior to or at the time of final inspection, otherwise the traffic signal installation will not be accepted. Cable splices outside the controller cabinet shall not be allowed. The Department may inspect any signaling device on the Department's highway system at any time without notification. The Contractor shall not install padlocks on traffic signal cabinets or otherwise restrict the Department's access to the cabinet or controller.
- h. Any proposed activity in the vicinity of a highway-rail grade crossing must adhere to the guidelines set forth in the current edition of the Manual on Uniform Traffic Control Devices (MUTCD) regarding work in temporary traffic control zones in the vicinity of highway-rail grade crossings which states that lane restrictions, flagging, or other operations shall not create conditions where vehicles can be queued across the railroad tracks. If the queuing of vehicles across the tracks cannot be avoided, a uniformed law enforcement officer or flagger shall be provided at the crossing to prevent vehicles from stopping on the tracks, even if automatic warning devices are in place.

- i. The Contractor shall be responsible to clear snow, ice, dirt, debris, vegetation, temporary fence, or other condition that obstructs visibility of any traffic signal display or access to traffic signal equipment.
 - j. The Contractor shall maintain the traffic signal in normal operation during any loss of utility or battery backup power. Temporary power to the traffic signal must meet applicable NEC and OSHA guidelines and may include portable generators and/or replacement batteries. Temporary power shall not be paid for separately but shall be included in the Contract.
- (3) Basis of Payment. This work will be paid for at the Contract unit price per each for MAINTENANCE OF EXISTING TRAFFIC SIGNAL INSTALLATION, TEMPORARY TRAFFIC SIGNAL INSTALLATION, TEMPORARY BRIDGE TRAFFIC SIGNAL INSTALLATION, or TEMPORARY PORTABLE BRIDGE TRAFFIC SIGNAL INSTALLATION. Each location will be paid for separately. Maintenance of a flashing beacon shall be paid for at the Contract unit price for MAINTENANCE OF EXISTING FLASHING BEACON INSTALLATION. Each flashing beacon will be paid for separately.

Damage to Traffic Signal System.

Add the following to Article 801.12(b) of the Standard Specifications:

“Any traffic signal control equipment that is damaged and non-repairable or not operating properly from any cause shall be replaced with new equipment meeting current District One traffic signal specifications and provided by the Contractor at no additional cost to the Contract and/or owner of the traffic signal system, all as approved by the Engineer. Final replacement of damaged equipment must meet the approval of the Engineer prior to or at the time of final inspection. Repair or replace any equipment damaged within the time shown in the table below:

ITEM	RESPONSE TIME	SERVICE RESTORATION	PERMANENT REPAIR (calendar days)
Cabinet	1 hour	24 hours	21 days
Controllers and Peripheral Equipment	1 hour	4 hours	21 days
System Detector Loop	1 hour	N/A	7 days
All Other Detectors	1 hour	N/A	21 days
Signal Head and Lenses	1 hour	4 hours	7 days
Aviation Red Beacon	1 hour	4 hours	7 days
Mast Arm Assembly and Pole	1 hour	4 hours	7 days
Traffic Signal Post	1 hour	4 hours	7 days
Cable and Conduit	1 hour	4 hours	7 days
Interconnect and Telemetry	1 hour	4 hours	7 days
Graffiti Removal	N/A	N/A	7 days
Misalignment of Signal Heads	1 hour	4 hours	4 hours
Closed Loop Monitoring System	1 hour	24 hours	14 days
Post and Poles Plumb Vertically	N/A	N/A	21 days
Controller, Post & Pole Foundations	N/A	N/A	21 days
Complaints, Calls, Controller or System Alarms, Timing, Phasing, Programming	1 hour	4 hours	N/A
Patrol Truck Deficiencies	N/A	24 hours	24 hours
Signal Heads Visibility	1 day	2 days	14 days

Temporary replacement of a damaged or knocked down mast arm pole assembly shall require construction of a full or partial span wire signal installation or other method approved by the Engineer to assure signal heads are located overhead and over traveled pavement. Temporary replacement of mast arm mount signals with post mount signals will not be permitted.

Replacement of any equipment for any reason shall be reported to the Area Traffic Signal Maintenance and Operations Engineer in writing within 24 hours. Permanent and temporary replacement of the controller and/or cabinet shall require inspection and testing by the Vendor.

Automatic Traffic Enforcement equipment, such as red light enforcement cameras, detectors, and peripheral equipment, that is damaged or not operating properly from any cause, shall be the responsibility of the municipality or the automatic traffic enforcement company per Permit agreement.”

Traffic Signal Inspection (TURN-ON).

Revise Article 801.15(b) of the Standard Specifications to read:

“Turn-on. It is the intent to have all electric work completed and equipment field tested by the Contractor and/or Vendor prior to the Department’s “turn-on” field inspection. If in the event the Engineer determines work is not complete and the inspection will require more than two (2) hours to complete, the inspection shall be canceled, and the Contractor will be required to reschedule at another date. The maintenance of the traffic signals will not be accepted until all punch list work is corrected and re-inspected.

When the Contractor requests a turn-on and inspection of the completed traffic signal installation(s), the request must be made to the Area Traffic Signal Maintenance and Operations Engineer a minimum of seven (7) working days prior to the time of the requested inspection. The Department will attempt to fulfill the Contractor’s turn-on and inspection date request(s); however, workload and other conditions may prevent the Department from accommodating specific dates or times. The Contractor shall not be entitled to any other compensation if the requested turn-on and inspection date(s) cannot be scheduled by the Department. The Department will not grant a field inspection until written or electronic notification is provided from the Contractor that the equipment has been field tested and the intersection is operating according to Contract requirements. The Contractor must invite local fire department personnel to the turn-on when emergency vehicle preemption (EVP) is included in the project. When the Contract includes the item RE-OPTIMIZE TRAFFIC SIGNAL SYSTEM, OPTIMIZE TRAFFIC SIGNAL SYSTEM, and/or TEMPORARY TRAFFIC SIGNAL TIMING, the Contractor must notify the SCAT Consultant of the turn-on/detour implementation schedule, as well as stage changes and phase changes during construction.

The Contractor must have all traffic signal work completed and the electrical service installation connected by the utility company prior to requesting an inspection and turn-on of the traffic signal installation. The Contractor shall be responsible to provide a police officer to assist with traffic control at the time of testing.

The Contractor shall provide a representative from the Vendor who is knowledgeable of the cabinet design and controller functions to attend the traffic signal inspection for both permanent and temporary traffic signal turn-ons.

Upon demonstration that the signals are operating and all work is completed in accordance with the Contract and to the satisfaction of the Engineer, the Engineer will then allow the signals to be placed in continuous operation. The signals shall continue to be maintained by the Contractor until final acceptance.

The Department requires the following Final Project Documentation from the Contractor at traffic signal turn-ons in electronic format in addition to hard copies where noted. An electronic media device shall be submitted with separate folders corresponding to each numbered title below. The electronic media device shall be labeled with date, project location, company, and Contract or Permit number. Electronic record drawings and material approvals shall be submitted prior to traffic signal turn-on for review by the Department as described in the Record Drawings section herein.

Final Project Documentation:

- (1) Record Drawings. Electronically produced signal plans of record with field revisions marked in red. Two (2) hard copies of 11 in. x 17 in. record drawings shall also be provided.
- (2) Field Testing. Written notification from the Contractor and the Vendor of satisfactory field testing with corresponding material performance measurements, such as for detector loops and fiber optic systems (see Article 801.13).
- (3) Material Approvals. Material approval documentation.
- (4) Manuals. Operation and service manuals of the signal controller and associated control equipment.
- (5) Cabinet Wiring Diagram and Cable Logs. Five (5) hard copies of 11 in. x 17 in. cabinet wiring diagrams shall be provided along with electronic PDF and DGN files of the cabinet wiring diagram. Five (5) hard copies of the cable logs and electronic Excel files shall be provided with cable #, number of conductors and spares, connected device/signal head and intersection location.
- (6) Warranties and Guarantees. All manufacturer and Contractor warranties and guarantees required by Article 801.14.
- (7) GPS Coordinates. GPS coordinates of traffic signal equipment as described in the Record Drawings section herein.

Acceptance of the traffic signal equipment by the Department shall be based upon inspection results at the traffic signal "turn-on", completeness of the required documentation, and successful operation during a minimum 72 hour "burn-in" period following activation of traffic signal equipment. If approved, traffic signal acceptance shall be verbal at the final inspection followed by written correspondence from the Engineer. The Contractor shall be responsible for all traffic signal equipment and associated maintenance thereof until Departmental acceptance is granted.

All equipment and/or parts to keep the traffic signal installation operating shall be furnished by the Contractor. No spare traffic signal equipment is available from the Department.

All punch list work shall be completed within two (2) weeks after the turn-on. The Contractor shall notify the Area Traffic Signal Maintenance and Operations Engineer to schedule an inspection of all punch list work. Failure to meet these time constraints shall result in liquidated damage charges of \$500 per month per incident.

All cost of work and materials required to comply with the requirements herein shall be included in the pay item bid prices, under which the subject materials and signal equipment are paid, and no additional compensation will be allowed. Materials and signal equipment not complying with the requirements herein shall be subject to removal and disposal at the Contractor's expense."

Record Drawings.

The requirements listed for Electrical Installation shall apply for Traffic Signal Installations in Article 801.16. Revise the second and third paragraphs of Article 801.16 of the Standard Specifications to read:

"When the work is complete, and seven (7) days before the request for a final inspection, electronic Contract drawings, stamped "RECORD DRAWINGS", shall be submitted to the Engineer for review and approval and shall be stamped with the date and the signature of the Contractor's supervising Engineer or electrician. The record drawings shall be submitted in PDF format. If the Contract consists of multiple intersections, each intersection shall be saved as an individual PDF file with TS# and location name in its file name.

In addition to the record drawings, copies of the final material approvals which have been Approved or Approved as Noted shall be submitted in PDF format. The PDF files shall clearly indicate the pay item either by filename or PDF Table of Contents referencing the respective pay item number for multi-item PDF files. Specific part or model numbers of items which have been selected shall be clearly visible.

The Contractor shall provide two (2) 11 in. x 17 in. hard copies of electronically produced final record drawings to be kept inside each traffic signal cabinet within project limits."

Add the following to Article 801.16 of the Standard Specifications:

"In addition to the specified record drawings, the Contactor shall record GPS coordinates of the following traffic signal components being installed, modified or being affected in other ways by the Contract:

- All Mast Arm Poles and Posts
- Traffic Signal Wood Poles
- Railroad Bungalow
- UPS
- Handholes
- Controller Cabinets
- Communication Cabinets
- Electric Service Disconnect locations
- CCTV/PTZ Camera installations

Datum to be used shall be North American 1983.

Data shall be provided in electronic format and shall be in .csv format. Latitude and Longitude shall be in decimal degrees with a minimum of 6 decimal places. Each coordinate shall have the following information:

- File shall be named: TSXXX_YY-MM-DD.csv (i.e. TS22157_24-01-01.csv)
- Each intersection shall have its own file
- Row 1 should have the location name (i.e. IL 31 @ Klausen)
- Row 2 is blank
- Row 3 is the headers for the columns
- Row 4 starts the data
- Column A (Date) – should be in the following format: MM/DD/YYYY
- Column B (Item) – as shown in the table below
- Column C (Description) – as shown in the table below
- Column D and E (GPS Data) – should be in decimal form

Examples:

Date	Item	Description	Latitude	Longitude
01/01/2024	MP (Mast Arm Pole)	NEQ, NB, Dual, Combination Pole	41.580493	-87.793378
01/01/2024	HH (Handhole)	Heavy Duty, Fiber, Intersection, Double	41.558532	-87.792571
01/01/2024	ES (Electrical Service)	Ground mount, Pole mount	41.765532	-87.543571
01/01/2024	CC (Controller Cabinet)		41.602248	-87.794053
01/01/2024	PTZ (PTZ)	NEQ extension pole	41.593434	-87.769876
01/01/2024	POST (Post)		41.651848	-87.762053
01/01/2024	MCC (Master Controller Cabinet)		41.584593	-87.793378
01/01/2024	COMC (Communication Cabinet)		41.584600	-87.793432
01/01/2024	BBS (Battery Backup System)		41.558532	-87.792571

Data collection can be made as construction progresses or can be collected after all items are installed. If the data is unacceptable, the Contractor shall make corrections to the data collection equipment and/or process and resubmit the data for review and approval as specified.

Data shall have a minimum 1 ft accuracy after post processing.”

Restoration of Work Area.

Add the following article to Section 801 of the Standard Specifications:

“801.17 Restoration of Work Area. Restoration of the traffic signal work area shall be included in the related pay items such as foundation, conduit, handhole, underground raceways, detector loop installation or replacement, etc. All roadway surfaces such as shoulders, medians, sidewalks, pavement, etc. shall be replaced in kind. All damage to mowed lawns shall be replaced with an approved sod, and all damage to unmowed fields shall be seeded. All brick pavers disturbed in the work area shall be restored to their original configuration as directed by the Engineer. All damaged brick pavers shall be replaced with a comparable material approved by the Engineer.

Exposed holes created from removal or relocation of traffic signal equipment shall be sealed using a zinc-plated fender washer with toggle bolt.

Restoration of the work area shall be included in the Contract without any extra compensation allowed to the Contractor.

Removal, Disposal, and Salvage of Existing Traffic Signal Equipment.

The removal, disposal, and/or salvage of existing traffic signal equipment shall become the property of the Contractor and disposed of by the Contractor outside the State's right-of-way, unless otherwise noted. No additional compensation shall be provided to the Contractor for removal, disposal or salvage expense for the work in the Contract.”

Bagging Signal Heads.

Light tan colored traffic and pedestrian signal reusable covers shall be used to cover dark/unenergized signal sections, visors, and retroreflective backplates. Covers shall be made of outdoor fabric with urethane coating for repelling water, have elastic fully sewn around the cover ends for a tight fit over the visor, and have a minimum of two (2) straps with buckles to secure the cover to the backplate. A center mesh strip allows viewing without removal for signal status testing purposes. Covers shall include a message indicating the signal is not in service. Pedestrian pushbuttons that are not in service shall be covered with a durable material such as described above or burlap that is secured in a weather-resistant manner. The entire housing, including the pedestrian sign, shall also be covered on the front side.

Turn-on of New Traffic Signal Installations.

The following only applies to new traffic signals at previously unsignalized locations.

The signal responsibility shall begin at the start of signal construction and shall end upon issuance of final acceptance by the Engineer. New traffic signal heads and indications may not be installed more than two (2) weeks (14 calendar days) prior to the scheduled turn-on of the traffic signal to avoid motorist confusion caused by the presence of new signal heads, even if properly covered. Unenergized signal indications shall be bagged until one (1) hour prior to the scheduled turn-on per the Bagging Signal Heads section above.

New stop bars and crosswalks on approaches that did not previously have stop control shall NOT be installed until the day of the traffic signal turn-on.

A Portable Changeable Message Sign (PCMS) must be placed two (2) weeks prior to the scheduled new traffic signal turn-on for all approaches to the intersection with the following messages:



where "MMM" and "##" are the 3-character month abbreviation and day of the scheduled turn-on, respectively.

On the day of the turn-on, change messages to read:



The PCMS must remain in place for two (2) weeks following the day of the turn-on.

Conflicting Stop signs shall be removed immediately at the time of the traffic signal turn-on.

Locating Underground Facilities.

Revise Section 803 to the Standard Specifications to read:

"IDOT traffic signal facilities are not part of any of the one-call locating service such as J.U.L.I.E or Digger. If the Contract requires the maintenance services of an Electrical Contractor, the Contractor shall be responsible at their own expense for locating all existing IDOT electrical facilities, including but not limited to interconnect conduit and handholes, prior to performing any work. A maintenance transfer is required prior to any locating work. If this Contract does not require the maintenance services of an Electrical Contractor, the Contractor may request one free locate for existing IDOT electrical facilities from the District One Electrical Maintenance Contractor prior to the start of any work. Additional requests will be at the expense of the Contractor. The location of underground traffic facilities does not relieve the Contractor of their responsibility to repair any facilities damaged during construction at their expense.

The exact location of all utilities shall be field verified by the Contractor before the installation of any components of the traffic signal system. For locations of utilities, locally owned equipment, and leased enforcement camera system facilities, the local Counties or Municipalities may need to be contacted: in the City of Chicago contact Digger at (312) 744-7000, and for all other locations contact J.U.L.I.E. at 1-800-892-0123 or 811.

The Contractor shall take whatever precautions to protect the electric cable or electric conductors in conduit from damage during location and construction operations. If the wiring is damaged, the Contractor shall replace the entire length of cable or conductors in conduit, in a manner satisfactory to the Engineer. Splicing below grade will not be permitted.

In the event the repairs are not made by the Contractor, the Contractor shall reimburse the Department for such repairs within sixty (60) days of receiving written notification of said damage. Otherwise, the cost of such repairs will be deducted from monies due or which will become due the Contractor under the terms of the Contract."

Grounding of Traffic Signal Systems

Revise Section 806 of the Standard Specifications to read:

"All traffic signal systems, equipment and appurtenances shall be properly grounded in strict conformance with the NEC. This work shall be in accordance with IDOT's District One Traffic Signal Design Details.

The grounding electrode system shall include a ground rod installed with each traffic signal controller concrete foundation and all mast arm and post concrete foundations. An additional ground rod will be required at locations where measured resistance exceeds 25 ohms. Ground rods are included in the applicable concrete foundation or service installation pay item and will not be paid for separately.

Testing shall be according to Article 801.13 (a) (4) and (5).

- (a) The grounded conductor (neutral conductor) shall be white color coded. This conductor shall be bonded to the equipment grounding conductor only at the Electric Service Installation. All power cables shall include one neutral conductor of the same size.
- (b) The equipment grounding conductor shall be green color coded. The following is in addition to Article 801.04 of the Standard Specifications:
 - (1) Equipment grounding conductors shall be bonded to the grounded conductor (neutral conductor) only at the Electric Service Installation. The equipment grounding conductor is paid for separately and shall be continuous. The Earth shall not be used as the equipment grounding conductor.

- (2) Equipment grounding conductors shall be bonded, using a UL Listed grounding connector, to all traffic signal mast arm poles, traffic signal posts, pedestrian posts, pull boxes, handhole frames and covers, conduits, and other metallic enclosures throughout the traffic signal wiring system, except where noted herein. Bonding shall be made with a splice and pigtail connection, using a sized compression type copper sleeve, sealant tape, and heat-shrinkable cap. A UL listed electrical joint compound shall be applied to all conductors' terminations, connector threads and contact points. Conduit grounding bushings shall be installed at all conduit terminations, including spare or empty conduits and conduit protruding from handhole walls.
- (3) All metallic and non-metallic raceways, including spare or empty raceways, shall have a continuous equipment grounding conductor, except raceways containing only detector loop lead-in circuits, circuits under 50 V and/or fiber optic cable will not be required to include an equipment grounding conductor.
- (4) Individual conductor splices in handholes shall be soldered and sealed with heat shrink. When necessary to maintain effective equipment grounding, a full cable heat shrink shall be provided over individual conductor heat shrinks.
- (c) The grounding electrode conductor shall be similar to the equipment grounding conductor in color coding (green) and size. The grounding electrode conductor is used to connect the ground rod to the equipment grounding conductor and is bonded to ground rods via exothermic welding, UL listed pressure connectors, and UL listed clamps."

SERVICE INSTALLATION (TRAFFIC SIGNALS)

Effective: May 22, 2002

Revised: March 1, 2024

805.01TS

Revise Section 805 of the Standard Specifications to read:

Description.

This work shall consist of all materials and labor required to install, modify, or extend the electric service installation. All installations shall meet the requirements of the "District One Standard Traffic Signal Design Details".

General.

The electric service installation shall be the electric service disconnecting means and it shall be identified as suitable for use as service equipment.

The electric utility contact information is noted on the plans and represents the current information at the time of Contract preparation. The Contractor must request in writing for service and/or service modification within ten (10) days of Contract award and must follow-up with the electric utility to assure all necessary documents and payment are received by the utility. The Contractor shall forward copies of all correspondence between the Contractor and utility company to the Engineer and Area Traffic Signal Maintenance and Operations Engineer. The service agreement and sketch shall be submitted for signature to the IDOT's Traffic Operations Programs Engineer.

Materials.

(a) General. The completed control panel shall be constructed in accordance with UL Std. 508A, Industrial Control Panel, and carry the UL label. Wire terminations shall be UL listed.

(b) Enclosures.

(1) Pole Mounted Cabinet. The cabinet shall be UL 50, NEMA Type 4X, unfinished single door design, fabricated from minimum 0.080 in. (2.03 mm) thick Type 5052 H-32 aluminum. Seams shall be continuous welded and ground smooth. Stainless steel screws and clamps shall secure the cover and assure a watertight seal. The cover shall be removable by pulling the continuous stainless steel hinge pin. The cabinet shall have an oil-resistant gasket and a lock kit shall be provided with an internal O-ring in the locking mechanism assuring a watertight and dust-tight seal. The cabinet shall be sized to adequately house all required components with extra space for arrangement and termination of wiring. A minimum size of 14 in. (350 mm) high, 9 in. (225 mm) wide and 8 in. (200 mm) in depth is required. The cabinet shall be channel mounted to a wooden utility pole using assemblies recommended by the Vendor.

(2) Ground Mounted Cabinet. The cabinet shall be UL 50, NEMA Type 3R unfinished single door design with back panel. The cabinet shall be fabricated from Type 5052 H-32 aluminum with the frame and door 0.125 in. (3.175 mm) thick, the top 0.250 in. (6.350 mm) thick and the bottom 0.500-inch (12.70 mm) thick. Seams shall be continuous welded and ground smooth. The door and door opening shall be double flanged. The door shall be approximately 80% of the front surface, with a full length tamperproof stainless steel .075 in. (1.91 mm) thick hinge bolted to the cabinet with stainless steel carriage bolts and nylock nuts. The locking mechanism shall be slam-latch type with a keyhole cover. The cabinet shall be sized to adequately house all required components with extra space for arrangement and termination of wiring. A minimum size of 40 in. (1000 mm) high, 16 in. (400 mm) wide and 15 in. (375 mm) in depth is required. The cabinet shall be mounted upon a Type A concrete foundation as indicated on the plans. The foundation is paid for separately.

- (3) All enclosures shall include a green external power indicator LED light with circuitry as shown in the Electrical Service-Panel Diagram detail sheet. For pole mounted service enclosures, the power indicator light shall be mounted as shown in the detail. For ground mounted enclosures, the power indicator light shall be mounted on the side of the enclosure most visible from the major roadway.
- (c) Electric Utility Meter Housing and Riser. The electric meter housing and meter socket shall be supplied and installed by the Contractor. The Contractor is to coordinate the work to be performed and the materials required with the utility company to make the final connection at the power source. Electric utility required risers, weather/service head, and any other materials necessary for connection shall also be included in the pay item. Materials shall be in accordance with the electric utility's requirements. For ground-mounted service, the electric utility meter housing shall be mounted to the enclosure. The meter shall be supplied by the utility company.
- (d) Surge Protector. Overvoltage protection, with LED indicator, shall be provided for the 120 V load circuit by the means MOV and thermal fusing technology. The response time shall be < 5 ns and operate within a range of -40°C to +85°C. The surge protector shall be UL 1449 Listed.
- (e) Circuit Breakers. Circuit breakers shall be standard UL listed molded case, thermal-magnetic bolt-on type circuit breakers with trip free indicating handles. 120 V circuit breakers shall have an interrupting rating of not less than 65,000 rms symmetrical amperes. Unless otherwise indicated, the main disconnect circuit breaker for the traffic signal controller shall be rated 60 A, 120 V and the auxiliary circuit breakers shall be rated 10 A, 120 V.
- (f) Fuses and Fuseholders. Fuses shall be small-dimensional cylindrical fuses of the dual element time-delay type. The fuses shall be rated for 600 VAC and shall have a UL listed interrupting rating of not less than 10,000 rms symmetrical amperes at rated voltage.
- (g) Ground and Neutral Bus Bars. A single copper ground and neutral bus bar, mounted on the equipment panel shall be provided. Ground and neutral conductors shall be separated on the bus bar. Compression lugs, plus 2 spare lugs, shall be sized to accommodate the cables with the heads of the connector screws painted green for ground connections and white for neutral connections.
- (h) Utility Services Connection. The Contractor shall notify the utility company marketing representative a minimum of thirty (30) working days prior to the anticipated date of hook-up. This 30-day advance notification will begin only after the utility company marketing representative has received service charge payments from the Contractor. Prior to contacting the utility company marketing representative for service connection, the service installation controller cabinet and cable must be installed for inspection by the utility company.

- (i) Ground Rod. Ground rods shall be copper-clad steel, a minimum of 10 ft (3.0m) in length, and 3/4 in. (20mm) in diameter. Ground rod resistance measurements to ground shall be 25 ohms or less. If necessary additional rods shall be installed to meet resistance requirements at no additional cost to the Contract.

Installation.

- (a) General. The Contractor shall confirm the orientation of the traffic service installation and its door side with the Engineer prior to installation. All conduit entrances into the service installation shall be sealed with a pliable waterproof material.
- (b) Pole Mounted. Brackets designed for pole mounting shall be used. All mounting hardware shall be stainless steel. Mounting height shall be as noted on the plans or as directed by the Engineer.
- (c) Ground Mounted. The service installation shall be mounted plumb and level on the foundation and fastened to the anchor bolts with hot-dipped galvanized or stainless steel nuts and washers. The space between the bottom of the enclosure and the top of the foundation shall be caulked at the base with silicone.

Basis of Payment.

The service installation shall be paid for at the Contract unit price each for SERVICE INSTALLATION of the type specified which shall be payment in full for furnishing and installing the service installation complete. The CONCRETE FOUNDATION, TYPE A, which includes the ground rod, shall be paid for separately. SERVICE INSTALLATION, POLE MOUNTED shall include the 3/4 in. (20mm) grounding conduit, ground rod, and pole mount assembly. Any charges by the utility companies shall be approved by the Engineer and paid for as an addition to the Contract according to Article 109.05 of the Standard Specifications.

COILABLE NON-METALLIC CONDUIT

Effective: May 22, 2002

Revised: July 1, 2015

810.01TS

Description.

This work shall consist of furnishing and installing empty coilable non-metallic conduit (CNC).

General.

The CNC installation shall be in accordance with Sections 810 and 811 of the Standard Specifications except for the following:

Add the following to Article 810.03 of the Standard Specifications:

CNC meeting the requirements of NEC Article 353 shall be used for detector loop raceways to the handholes.

Add the following to Article 811.03 of the Standard Specifications:

On temporary traffic signal installations with detector loops, CNC meeting the requirements of NEC Article 353 shall be used for detector loop raceways from the saw-cut to 10 feet (3m) up the wood pole, unless otherwise shown on the plans

Basis of Payment.

All installations of CNC for loop detection shall be included in the contract and not paid for separately.

UNDERGROUND RACEWAYS

Effective: May 22, 2002

Revised: March 1, 2024

810.02TS

Revise Article 810.04 of the Standard Specifications to read:

“Installation. All underground conduits shall have a minimum depth of 30 in. (700 mm) below the finished grade and shall be installed to avoid existing and proposed utilities within the project limits.”

Add the following to Article 810.04 of the Standard Specifications:

“All metal conduit installed underground shall be Rigid Steel Conduit unless otherwise indicated on the plans.”

All raceways which extend outside of a structure or duct bank but are not terminated in a cabinet, junction box, pull box, handhole, post, pole, or pedestal shall extend a minimum of 1 ft (300 mm) or the length shown on the plans beyond the structure or duct bank. The end of this extension shall be capped and sealed with a cap designed for the conduit to be capped.

The ends of rigid metal conduit to be capped shall be threaded, the threads protected with full galvanizing, and capped with a threaded galvanized steel cap.

The ends of rigid nonmetallic conduit and coilable nonmetallic conduit shall be capped with a rigid PVC cap of not less than 1/8 in. (3 mm) thick. The cap shall be sealed to the conduit using a room-temperature-vulcanizing (RTV) sealant compatible with the material of both the cap and the conduit. A washer or similar metal ring shall be glued to the inside center of the cap with epoxy, and the pull cord shall be tied to this ring.”

HANDHOLES

Effective: January 01, 2002

Revised: November 1, 2023

814.01TS

Description.

Add the following to Section 814 of the Standard Specifications:

All conduits shall enter the handhole at a depth of 30 in. (762 mm) except for the conduits for detector loops when the handhole is less than 5 ft (1.52 m) from the detector loop. All conduit ends should be sealed with a waterproof sealant to prevent the entrance of contaminants into the handhole.

Steel cable hooks shall be epoxy coated and must meet the specifications set forth in 1006.10. Hooks shall be a minimum of 5/8 in. (16 mm) diameter with 90-degree bend and extend into the handhole at least 6 in. (152 mm). Hooks shall be placed a minimum of 12 in. (305 mm) below the lid or lower if additional space is required.

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

The cover of the handhole frame shall be labeled "Traffic Signals" with legible raised letters. Only handholes serving IDOT traffic signal equipment shall have this label. Handhole covers for Red Light Running Cameras shall be labeled "RLRC".

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

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

Revise Article 814.03(c) of the Standard Specifications to read:

"Precast Concrete. Precast concrete handholes shall be fabricated according to Article 1042.17. Where a handhole is contiguous to a sidewalk, preformed joint filler of 1/2 in. (13 mm) thickness shall be placed between the handhole and the sidewalk."

Add the following to Section 814 of the Standard Specifications:

Cast-In-Place Handholes.

All cast-in-place handholes shall be concrete with minimum inside dimensions of 21-1/2 in. (546 mm). Frames and lid openings shall match this dimension.

For grounding purposes, the handhole frame shall have provisions for a 7/16 in. (11 mm) diameter stainless steel bolt cast into the frame. The covers shall have a stainless steel threaded stint extended from the eye hook assembly for the purpose of attaching the grounding conductor to the handhole cover.

The minimum wall thickness for heavy duty hand holes shall be 1 ft (305mm).

Precast Round Handholes.

All precast handholes shall be concrete with an inside diameter of 30 in. (762mm). Frames and covers shall have a minimum opening of 26 in. (660mm) and no larger than the inside diameter of the handhole.

For grounding purposes, the handhole frame shall have provisions for a 7/16 in. (11 mm) diameter stainless steel bolt cast into the frame. For the purpose of attaching the grounding conductor to the handhole cover, the covers shall either have a 7/16 in. (11 mm) diameter stainless steel bolt cast into the cover or a stainless steel threaded stint extended from an eye hook assembly. A hole may be drilled for the bolt if one cannot be cast into the frame or cover. The head of the bolt shall be flush or lower than the top surface of the cover.

The minimum wall thickness for precast heavy duty hand holes shall be 6 in. (152 mm).

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

FIBER OPTIC TRACER CABLE

Effective: May 22, 2002

Revised: November 1, 2023

817.02TS

The cable shall meet the requirements of Section 817 of the Standard Specifications, except for the following:

Add the following to Article 817.03 of the Standard Specifications:

“In order to trace the fiber optic cable after installation, the tracer cable shall be installed in the same conduit as the fiber optic cable in locations shown on the plans. The tracer cable shall be continuous, extended into the controller cabinet and terminated on a barrier type terminal strip mounted on the side wall of the controller cabinet. The barrier type terminal strip and tracer cable shall be clearly marked and identified. All tracer cable splices shall be kept to a minimum and shall incorporate maximum lengths of cable supplied by the manufacturer. The tracer cable will be allowed to be spliced at handholes only. The tracer cable splice shall use a Western Union Splice soldered with resin core flux and shall be soldered using a soldering iron. Blow torches or other devices which oxidize copper cable shall not be allowed for soldering operations. All exposed surfaces of the solder shall be smooth. The splice shall be covered with a black shrink tube meeting UL 224 guidelines, Type V and rated 600V, minimum length 4 in. (100 mm) and with a minimum 1 in. (25 mm) coverage over the XLP insulation, underwater grade.”

Revise Article 817.05 of the Standard Specifications to read:

“Basis of Payment. The tracer cable shall be paid for separately as ELECTRIC CABLE IN CONDUIT, TRACER, NO. 14 1C per foot (meter), which price shall include all associated labor and material for installation.”

FULL-ACTUATED CONTROLLER IN EXISTING CABINET

Effective: September 26, 1995

Revised: November 1, 2023

857.01TS

Description.

This work shall consist of furnishing and installing a(n) "_____" brand traffic actuated solid state digital controller meeting the requirements of the current District One Traffic Signal Special Provisions 857.02TS FULL-ACTUATED CONTROLLER AND CABINET and 857.02TS RAILROAD, FULL-ACTUATED CONTROLLER AND CABINET. This pay item shall include furnishing and installing the controller complete including malfunction management unit, load switches and flasher relays, and all necessary connections for proper operation.

Materials.

Add the following to Article 857.02 of the Standard Specifications:

“Controllers shall be Econolite Cobalt or Eagle/Yunex M60 unless specified otherwise on the plans or elsewhere on these specifications. Only controllers supplied by one of the District One approved vendors will be allowed. The controller shall be of the most recent approved model and software version supplied by the vendor at the time of the traffic signal TURN-ON, unless specified otherwise on the plans or these specifications. A removable controller data key shall also be provided. Individual load switches shall be provided for each vehicle, pedestrian, and overlap phase. The controller shall prevent phases from being omitted during program changes and after all preemption events and shall inhibit simultaneous display of circular yellow and yellow arrow indications.

For integration into an Advanced Traffic Management System (ATMS) such as Centrac, Tactics, or TransSuite, the controller shall have the latest version of approved NTCIP software installed. For operation prior to integration into an ATMS, the controller shall maintain existing communications.”

Basis of Payment.

This work will be paid for at the contract unit price each for FULL-ACTUATED CONTROLLER IN EXISTING CABINET.

FULL-ACTUATED CONTROLLER AND CABINET

Effective: January 1, 2002

Revised: March 1, 2024

857.02TS

Description.

This work shall consist of furnishing and installing a traffic actuated solid state digital controller in the controller cabinet of the type specified, meeting the requirements of Section 857 of the Standard Specifications, as modified herein, including malfunction management unit, load switches and flasher relays, and all necessary connections for proper operation.

If the intersection is part of an existing system and/or when specified in the plans, this work shall consist of furnishing and installing a(n) "_____" brand traffic actuated solid state controller.

Materials.

Add the following to Article 857.02 of the Standard Specifications:

“Controllers shall be Econolite Cobalt or Eagle/Yunex M60 unless specified otherwise on the plans or elsewhere on these specifications. Only controllers supplied by one of the District One approved Vendors will be allowed. The controller shall be of the most recent approved model and software version supplied by the Vendor at the time of the traffic signal TURN-ON unless specified otherwise on the plans or these specifications. A removable controller data key shall also be provided. Individual load switches shall be provided for each vehicle, pedestrian, and overlap phase. The controller shall prevent phases from being omitted during program changes and after all preemption events and shall inhibit simultaneous display of circular yellow and yellow arrow indications.

For integration into an Advanced Traffic Management System (ATMS) such as Centrac, Tactics, or TransSuite, the controller shall have the latest version of approved NTCIP software installed. For operation prior to integration into an ATMS, the controller shall maintain existing communications.”

Revise Article 1074.03 (a) (5) paragraph “b.” to read:

“Thermostatically Controlled Exhaust Fans. The cabinet shall be equipped with two (2) thermostatically controlled exhaust fans. Each fan shall have a minimum air delivery capacity of 100 cfm (2.8 cu m/min) and shall be mounted on self-lubricating ball bearings. The thermostat control shall be adjustable between 91 and 113 °F (33 and 45 °C) and shall be set to turn the fan on at 95 °F (35 °C).”

Add the following to Article 1074.03 of the Standard Specifications:

(a) (6) Cabinets shall be designed for NEMA TS2 Type 1 operation. All cabinets shall be pre-wired for a minimum of eight (8) phases of vehicular, four (4) phases of pedestrian and four (4) phases of overlap operation.

Revise the second sentence in Article 1074.03 (b) (1) paragraph “a” to read:

“The malfunction management unit shall have a minimum of 16 fully programmable channels.”

Add the following to Article 1074.03 of the Standard Specifications:

- (b) (5) Cabinets – Provide 1/8 in. (3.2 mm) thick unpainted aluminum alloy 5052-H32. The surface shall be smooth, free of marks and scratches. All external hardware shall be stainless steel.
- (b) (6) Controller Harness – Provide a TS2 Type 2 “A” wired harness in addition to the TS2 Type 1 harness.
- (b) (7) Surge Protection – Shall be a 120 VAC Single phase Modular filter Plug-in type, supplied from an approved Vendor.
- (b) (8) BIU – shall be secured by mechanical means.
- (b) (9) Transfer Relays – Solid state or mechanical flash relays are acceptable.
- (b) (10) Switch Guards – All switches shall be guarded.
- (b) (11) Heating – One (1) 200 W, thermostatically-controlled, electric heater.
- (b) (12) Lighting – One (1) LED Panel shall be placed inside the cabinet top panel and one (1) LED Panel shall be placed on each side of the pull-out drawer/shelf assembly located beneath the controller support shelf. The LED Panels shall be controlled by a door switch. The LED Panels shall be provided from an approved Vendor.
- (b) (13) The cabinet shall be equipped with a pull-out drawer/shelf assembly. A 1-1/2 in. (38mm) deep drawer shall be provided in the cabinet, mounted directly beneath the controller support shelf. The drawer shall have a hinged top cover and shall be capable of accommodating one (1) complete set of cabinet prints and manuals. This drawer shall support 50 lb (23 kg) in weight when fully extended. The drawer shall open and close smoothly. Drawer dimensions shall make maximum use of available depth offered by the controller shelf and be a minimum of 18 in. (610mm) wide.
- (b) (14) Plan & Wiring Diagrams – 12 in. x 15 in. (305mm x 406mm) moisture sealed container attached to door.
- (b) (15) Detector Racks – Fully wired and labeled for four (4) channels of emergency vehicle preemption and sixteen channels (16) of vehicular operation.
- (b) (16) Field Wiring Labels – All field wiring shall be labeled.
- (b) (17) Field Wiring Termination – Approved channel lugs required.
- (b) (18) Power Panel – Provide a nonconductive shield.
- (b) (19) Circuit Breaker – The circuit breaker shall be sized for the proposed load but shall not be rated less than 30 A.
- (b) (20) Police Door – Provide wiring and termination for plug in manual phase advance switch.

Basis of Payment.

This work will be paid for at the contract unit price each for FULL-ACTUATED CONTROLLER AND TYPE IV CABINET; FULL-ACTUATED CONTROLLER AND TYPE IV STRETCHED CABINET; FULL-ACTUATED CONTROLLER AND TYPE V CABINET; FULL-ACTUATED CONTROLLER AND TYPE SUPER P CABINET; FULL-ACTUATED CONTROLLER AND TYPE SUPER P STRETCHED CABINET; FULL-ACTUATED CONTROLLER AND TYPE SUPER R CABINET; FULL-ACTUATED CONTROLLER AND TYPE IV CABINET, SPECIAL; FULL-ACTUATED CONTROLLER AND TYPE IV STRETCHED CABINET, SPECIAL; FULL-ACTUATED CONTROLLER AND TYPE V CABINET, SPECIAL; FULL-ACTUATED CONTROLLER AND TYPE SUPER P CABINET (SPECIAL); FULL-ACTUATED CONTROLLER AND TYPE SUPER P STRETCHED CABINET (SPECIAL); FULL-ACTUATED CONTROLLER AND TYPE SUPER R CABINET (SPECIAL).

RAILROAD, FULL-ACTUATED CONTROLLER AND CABINET

Effective: January 1, 2002

Revised: March 1, 2024

857.03TS

Description.

This work shall consist of furnishing and installing a traffic actuated solid state digital controller in the controller cabinet of the type specified, meeting the requirements of Section 857 of the Standard Specifications as modified herein and including conflict monitor or malfunction management unit, load switches and flasher relays, interlock function to the railroad preemptor, and all necessary connections for proper operation.

If the intersection is part of an existing system and/or when specified in the plans, this work shall consist of furnishing and installing a(n) "_____" brand traffic actuated solid state controller.

Controller and cabinet shall be assembled only by an approved IDOT District One traffic signal Vendor. The equipment shall be tested and approved in the Vendor's District One facility prior to field installation.

Materials.

Add the following to Article 857.02 of the Standard Specifications:

"Controllers shall be Econolite Cobalt or Eagle/Yunex M60 unless specified otherwise on the plans or elsewhere on these specifications. Only controllers supplied by one of the District One approved Vendors will be allowed. The controller shall be of the most recent model and software version approved by the Department for use with railroad intersections supplied by the Vendor at the time of the traffic signal TURN-ON unless specified otherwise on the plans. A removable controller data key shall also be provided. Individual load switches shall be provided for each vehicle, pedestrian, and overlap phase. The controller shall prevent phases from being omitted during program changes and after all preemption events and shall inhibit simultaneous display of circular yellow and yellow arrow indications. The controller shall have remote monitoring and dial-out capabilities.

For integration into an Advanced Traffic Management System (ATMS) such as Centrac, Tactics, or TransSuite, the controller shall have the latest version of approved NTCIP software installed. For operation prior to integration into an ATMS, the controller shall maintain existing communications.”

Controller shall comply with Article 1073.01 as amended herein.

Controller Cabinet and Peripheral Equipment shall comply with Article 1074.03 as amended in these Traffic Signal Special Provisions.

Revise Article 1074.03 (a) (5) paragraph “b.” to read:

“Thermostatically Controlled Exhaust Fans. The cabinet shall be equipped with two (2) thermostatically controlled exhaust fans. Each fan shall have a minimum air delivery capacity of 100 cfm (2.8 cu m/min) and shall be mounted on self-lubricating ball bearings. The thermostat control shall be adjustable between 91 and 113 °F (33 and 45 °C) and shall be set to turn the fan on at 95 °F (35 °C).”

Add the following to Articles 1073.01 (c) (2) and 1074.03 (a) (5) paragraph “e” of the Standard Specifications:

“Controllers and cabinets shall be new and NEMA TS2 Type 1 or NEMA TS2 Type 2 design.

Railroad interconnected controllers and cabinets shall be assembled only by an approved traffic signal equipment Manufacturer/Vendor. All railroad interconnected (including temporary railroad interconnected) controllers and cabinets shall be new, built, tested and approved by the Vendor, the Department, and the Illinois Commerce Commission in the Vendor's District One facility, prior to field installation. The Vendor shall provide the technical equipment and assistance as required by the Engineer to fully test this equipment.

Each cabinet shall have Controller Preempt Input Verification. This feature monitors the integrity of the controller railroad preemption input and associated wiring within the traffic controller cabinet. This utilizes a secondary railroad preemption input that is normally active/on when no demand for railroad preemption is present. When a demand for railroad preemption is received, the normal railroad preemptor input is applied, and the secondary input is dropped. If both inputs are either simultaneously on or simultaneously off for more than one (1) second, the controller recognizes this as an input failure. When a failure occurs, the traffic controller is configured to provide a track clearance interval followed by a flashing red condition. This occurrence sets a preempt input alarm and requires a manual reset of the controller.”

Add the following to Article 1074.03 of the Standard Specifications:

- (a) (6) Cabinets shall be designed for NEMA TS2 Type 1 or NEMA TS2 Type 2 Operation. All cabinets shall be pre-wired for a minimum of eight (8) phases of vehicular, four (4) phases of pedestrian and four (4) phases of overlap operation.

Revise the second sentence in Article 1074.03 (b) (1) paragraph "a" to read:

"The malfunction management unit or conflict monitor shall have a minimum of 16 fully programmable channels."

Add the following to Article 1074.03 of the Standard Specifications:

- (b) (5) Cabinets – Provide 1/8 in. (3.2 mm) thick unpainted aluminum alloy 5052-H32. The surface shall be smooth, free of marks and scratches. All external hardware shall be stainless steel.
- (b) (6) Controller Harness – Provide a TS2 Type 2 "A" wired harness in addition to the TS2 Type 1 harness.
- (b) (7) Surge Protection – Shall be a 120 VAC Single phase Modular filter Plug-in type, supplied from an approved vendor.
- (b) (8) BIU – shall be secured by mechanical means.
- (b) (9) Transfer Relays – Solid state or mechanical flash relays are acceptable.
- (b) (10) Switch Guards – All switches shall be guarded.
- (b) (11) Heating – One (1) 200 W, thermostatically-controlled, electric heater.
- (b) (12) Lighting – One (1) LED Panel shall be placed inside the cabinet top panel and one (1) LED Panel shall be placed on each side of the pull-out drawer/shelf assembly located beneath the controller support shelf. The LED Panels shall be controlled by a door switch. The LED Panels shall be provided from an approved vendor.
- (b) (13) The cabinet shall be equipped with a pull-out drawer/shelf assembly. A 1-1/2 in. (38mm) deep drawer shall be provided in the cabinet, mounted directly beneath the controller support shelf. The drawer shall have a hinged top cover and shall be capable of accommodating one (1) complete set of cabinet prints and manuals. This drawer shall support 50 lb (23 kg) in weight when fully extended. The drawer shall open and close smoothly. Drawer dimensions shall make maximum use of available depth offered by the controller shelf and be a minimum of 18 in. (610mm) wide.
- (b) (14) Plan & Wiring Diagrams – 12 in. x 15 in. (3.05mm x 4.06mm) moisture sealed container attached to door.
- (b) (15) Detector Racks – Fully wired and labeled for four (4) channels of emergency vehicle pre-emption and sixteen channels (16) of vehicular operation.
- (b) (16) Field Wiring Labels – All field wiring shall be labeled.
- (b) (17) Field Wiring Termination – Approved channel lugs required.
- (b) (18) Power Panel – Provide a nonconductive shield.
- (b) (19) Circuit Breaker – The circuit breaker shall be sized for the proposed load but shall not be rated less than 30 A.

- (b) (20) Police Door – Provide wiring and termination for plug in manual phase advance switch.
- (b) (21) Railroad Preemption Test Switch – Shall be provided from an approved vendor.

Installation.

Add the following to Article 857.03 of the Standard Specifications:

“The Contractor shall arrange to install a cellular modem and all equipment to dial into the controller and have the controller dial out to the RAILROAD, FULL-ACTUATED CONTROLLER AND CABINET as called for on the traffic signal installation plans. If the traffic signal installation is part of a traffic signal system, a cellular modem is usually not required unless called for on the traffic signal plans. The Contractor shall follow the requirements for the cellular modem installation as contained in the current District One Traffic Signal Special Provision 892.01TS CELLULAR MODEM.”

Basis of Payment.

This work will be paid for at the contract unit price each for RAILROAD, FULL-ACTUATED CONTROLLER AND TYPE IV CABINET; RAILROAD, FULL-ACTUATED CONTROLLER AND TYPE IV STRETCHED CABINET; RAILROAD, FULL-ACTUATED CONTROLLER AND TYPE V CABINET; RAILROAD, FULL-ACTUATED CONTROLLER AND TYPE SUPER P CABINET; RAILROAD, FULL-ACTUATED CONTROLLER AND TYPE SUPER P STRETCHED CABINET; RAILROAD, FULL-ACTUATED CONTROLLER AND TYPE SUPER R CABINET; RAILROAD, FULL-ACTUATED CONTROLLER AND TYPE IV CABINET, SPECIAL; RAILROAD, FULL-ACTUATED CONTROLLER AND TYPE IV STRETCHED CABINET, SPECIAL; RAILROAD, FULL-ACTUATED CONTROLLER AND TYPE V CABINET, SPECIAL; RAILROAD, FULL-ACTUATED CONTROLLER AND TYPE SUPER P CABINET (SPECIAL); RAILROAD, FULL-ACTUATED CONTROLLER AND TYPE SUPER P STRETCHED CABINET (SPECIAL) or RAILROAD, FULL-ACTUATED CONTROLLER AND TYPE SUPER R CABINET (SPECIAL).

ADVANCED TRANSPORTATION CONTROLLER AND CABINET

Effective: March 1, 2024
857.05TS

Description.

This work shall consist of furnishing and installing a traffic actuated solid state digital controller in an Advanced Transportation Controller (ATC) cabinet of the type specified, meeting the requirements of Section 857 of the Standard Specifications, and as modified herein, including Output Assembly, Input Assembly, Service Assembly, DC Power/Communications Bus, AC Clean Power Bus, Field Output Panel (FOP), and all necessary connections for proper operation. This specification describes the shelf mount versions of the ATC cabinet, which uses a NEMA-style cabinet with ATC subassemblies mounted either on a shelf or on the cabinet side walls.

If the intersection is part of an existing system and/or when specified in the plans, this work shall consist of furnishing and installing a(n) "_____" brand traffic actuated solid state controller.

Materials.

Add the following to Article 857.02 of the Standard Specifications:

“Controllers shall be Econolite Cobalt or Eagle/Yunex M60 unless specified otherwise on the plans or elsewhere on these specifications. Only controllers supplied by one of the District One approved Vendors will be allowed. The controller shall be of the most recent approved model and software version supplied by the Vendor at the time of the traffic signal TURN-ON unless specified otherwise on the plans or these specifications. A removable controller data key shall also be provided. The controller shall be equipped with a 2070 series controller module for proper operation in an ATC cabinet. The controller shall prevent phases from being omitted during program changes and after all preemption events and shall inhibit simultaneous display of circular yellow and yellow arrow indications.

For integration into an Advanced Traffic Management System (ATMS) such as Centrac, Tactics, or TransSuite, the controller shall have the latest version of approved NTCIP software installed. For operation prior to integration into an ATMS, the controller shall maintain existing communications.”

Add the following to Article 1074.03 of the Standard Specifications:

(a) The cabinet shall be designed and manufactured with materials that will allow rigid mounting. The cabinet shall be base mounted only. The cabinet shall not flex on its mount. The subassemblies in the cabinet shall be removable with simple hand tools, such as a screwdriver, and without removing any other equipment. Any components over 50 V with exposed terminals shall be protected from incidental contact per NEC requirements. All equipment in the cabinet shall be clearly and permanently labeled. All marker strips shall be made of material that can be easily written on using a pencil or ballpoint pen. Marker strips shall be located immediately below the item they are to identify and must be clearly visible with the items installed. Card guides (top and bottom) shall be provided for the plug-ins. All circuit boards shall be conformal coated to protect the boards from moisture. All switches shall be guarded.

Each cabinet assembly shall be tested as a complete entity under signal load. The cabinet shall be assembled and tested by the Manufacturer or Vendor to ensure proper component integration operation.

Revise the table in Article 1074.03 (a) (1) to read:

Type	Approx. Volume cu ft (cu m)	Police Door	Mounting	Ventilation	Remark
I	Reserved				
II	5.0 (0.14)	Yes	Post Top	Filtered Air Intake and One Thermo-Statically Controlled Fan	
III	11.5 (0.33)	Yes	Ground Mount	Filtered Air Intake and One Thermo-Statically Controlled Fan	For Traffic Actuated Controller.
IV	29.0 (0.82)	Yes	Ground Mount	Filtered Air Intake and Two Thermo-Statically Controlled Fan	For Traffic Actuated Controller. Back Panel with Minimum 12 Load Switch Positions or ATC Cabinet.
V	44.0 (1.25)	Yes	Ground Mount	Filtered Air Intake and Two Thermo-Statically Controlled Fan	For Traffic Actuated Controller. Back Panel with Minimum 12 Load Switch Positions or ATC Cabinet.

Add the following to Article 1074.03 of the Standard Specifications:

(a) (1) Optionally, a “Type 4.5/Type IV Stretched” or “Super P Stretched” cabinet shall be provided. This cabinet has the same dimensions as a Type IV or Super P cabinet with an additional 10 in. height. Additionally, it shall include a front and rear door with double, vented overhangs for protection from water intrusion.

(a) (2) a. The gaskets shall be permanently bonded to the cabinet. The gaskets shall include a polyester film to prevent the gaskets from sticking to the cabinet surface.

(a) (2) e. A rain channel shall be incorporated into the design of the main door opening to prevent liquids from entering the enclosure. The cabinet door opening shall be a minimum of 80 percent of the front surface of the cabinet. A stiffener plate shall be welded across the inside of the main door to prevent flexing.

(a) (2) f. The top of the cabinet shall incorporate a 1 in. slope towards the rear to prevent rain accumulation.

Revise Article 1074.03 (a) (3) paragraph "a" to read:

"Multiple Door-Stop. The main door on the cabinet shall be equipped with a three-point latching mechanism with nylon rollers. It shall include an automatic door stop mechanism capable of holding the door open at approximately 90°, 120°, and 180° under windy conditions. Manual placement of the mechanism shall not be required by field personnel."

Add the following to Article 1074.03 of the Standard Specifications:

(a) (3) b. The main door shall utilize stainless steel hardware. The handle shall include a vertically-mounted hasp for the attachment of an optional padlock. The handle shall not extend beyond the perimeter of the main door at any time.

(a) (3) c. The lock assembly shall be positioned so that the handle does not cause any interference with the key when opening the cabinet door. All external fasteners shall be tamper-proof. The police door assembly shall be flush-mounted to the main door.

(a) (3) d. The cabinet shall be supplied with a natural aluminum mill finish. Sufficient care shall be taken in handling to ensure that scratches are minimized. All surfaces shall be free from weld flash. Welds shall be smooth, neatly formed, and free from cracks, blowholes, and other irregularities. All sharp edges shall be ground smooth.

(a) (3) e. The cabinet seams shall be sealed with a tack weld on the interior of the cabinet and a double flange at the top only. Optionally, the cabinet can be supplied as a UL listed version with double flanges all the way around, and continuous welding of all seams.

(a) (3) f. All cabinets shall be supplied with a minimum of two removable shelves manufactured from 5052-H32 aluminum. Shelves shall be a minimum of 10 in. deep. The shelves shall include two (2) 1U mounting positions to install 1U rack-mounted equipment. The rack mounting holes shall be tapped for #10-32 screws.

(a) (3) g. Cabinets shall include a set of three vertical "C" channels mounted on each interior side wall of the cabinet for the purpose of mounting the cabinet components. The channels shall accommodate spring mounted nuts. All mounting rails shall extend 3-1/8 in. from the bottom of the cabinet. The sidewalls shall be supplied three channels, with the rear channel located at 8 in. from the back of the cabinet. Measured from center to center, the middle channel shall be 8-1/2 in. from the rear channel, and the front rail shall be 6 in. from the middle channel. The rear walls shall be supplied with three saw tooth rails, with the left-most rail located at 8 in. from the left side of the cabinet. Measured from center to center, the middle rail shall be located 9 in. from the left-most rail, and the right-most rail shall be 19-1/2 in. from the middle rail. The saw tooth rails on back wall shall allow shelf adjustments in 1/2 in. increments.

(a) (3) h. The lower section of the cabinet shall be equipped with a louvered air entrance. The air inlet shall be large enough to allow sufficient air flow per the rated fan capacity. Louvers shall satisfy the NEMA rod entry test for 3R ventilated enclosures. A removeable, disposable air filter shall be secured to the air entrance, as mentioned in 1074.03 (a) (2) paragraph "c".

(a) (3) i. The roof of the cabinet shall incorporate an exhaust plenum with a vent screen. Perforations in the vent screen shall be 1/8 in. x 1/2 in. rectangular slots.

(a) (3) j. Anchor bolts shall be used to properly secure the cabinet to its base. The cabinet flange for securing the anchor bolts shall not protrude outward from the bottom of the cabinet. Four (4) 3/4 in. x 18 in. long right-angle anchor bolts shall be provided with the cabinet.

(a) (3) k. All cabinets shall be pre-wired for a minimum of eight (8) phases of vehicular, four (4) phases of pedestrian and four (4) phases of overlap operation.

Revise Article 1074.03 (a) (4) paragraph "a" to read:

"Surge Suppressor. The suppressor protecting the cabinet equipment shall consist of two stages: stage one which shall include a controller cabinet AC power protection and stage two which shall include AC circuit protection."

Revise Article 1074.03 (a) (5) paragraph "a" to read:

"Signal Flash in Absence of Subassemblies. The cabinet shall be capable of remaining in flashing operation with any of the following subassemblies removed: Input Assembly, Output Assembly, Cabinet Power Supply, and Controller."

Remove Article 1074.03 (a) (5) paragraphs "b", "c", and "d".

Replace Article 1074.03 (b) to read:

(b) ATC Cabinet Subassemblies.

(1) Output Assembly.

- a. The Output Assembly shall accommodate 3U plug-in cards and be mounted on the shelf. The shelf mounting shall include mounting flanges to allow the rack to be bolted to the shelf.
- b. The Output Assembly shall accommodate eight (8) Model 2202 High-Density Switch Pack/Flasher Units (HDSP/FU), providing a total of 48 output channels.

- c. The Output Assembly shall accommodate one (1) Model 2218 Serial Interface Unit (SIU) to provide interface and control via system SB1/SB2.
- d. The Output Assembly shall accommodate one (1) Model 2212 Cabinet Monitor Unit (CMUip).
- e. The Output Assembly shall include a hinged front panel with four (4) Circuit Breakers. The front panel shall be attached with thumb screws to allow access to the wiring. The circuit breakers shall be rated at 5 A. The breakers shall be Carling Technologies "B" series or approved equal. Each breaker shall protect two (2) HDSPs. The breakers shall be protected by a flip-up cover to protect against accidental activation.
- f. The Output Assembly shall utilize four (4) 24-pin connectors (Molex 39-28-8240) or eight (8) 12-pin connectors (Molex 39-28-8120) to interface the HDSP outputs to the Field Output Panel (FOP).
- g. All exposed AC voltage on the Output Assembly circuit boards shall be protected using a removable Lexan cover mounted on standoffs.

For a 32-channel cabinet where a second Output Assembly is used, the second Output Assembly shall meet the same requirements as the first Output Assembly, with the exception of accommodating a CMUip.

(2) Field Output Panel (FOP).

- a. The 16-Channel FOP shall be coupled with its respective 16-Channel Output Assembly to provide pluggable connectors for the signal output field terminals, flash programming, and flash transfer relays.
- b. The FOP shall house eight (8) Model 21H High-Density Flash Transfer Relays (HDFTRs) and sixteen (16) Flash Program Blocks (FPBs). The HDFTRs and FPBs shall be provided to control and select the color (red, yellow, or dark) during flashing operation.
- c. HDSP Suppressors shall be provided at the field terminals for the protection of the HDSP. These suppressors shall plug in on the back side of the FOP.
- d. Each HDFTR position shall be labeled with the number of its associated HDSP. Each FPB position shall be labeled with the number of its associated channel.

- e. The FOP shall be provided with sixteen (16) 6-position Phoenix Contact terminal block model number 1777765 plugs and 1720615 sockets. Each Field Terminal Block socket shall be labeled with the number of its associated channel. Additional labels shall be provided to clearly indicate which terminals correspond to the red, yellow, and green switch pack outputs.
- f. The FOP shall be mounted on the sawtooth rails on the back wall and shall swing down using thumbscrews to provide access to the HDSP Suppressors and the wiring for the FOP. The panel shall be angled to allow easy access to the field terminals.
- g. The FOP shall utilize eight (8) 12-pin connectors, Molex 39-28-8120, to interface the HDSP outputs to the FOP. The cables shall be long enough to allow the FOP to swing down with no interference.

For a 32-channel cabinet where a second FOP is used, the second FOP shall meet the same requirements as the first FOP.

(3) Combination Output Assembly-Field Output Panel Unit (16-Channel Loadbay).

The Output Assembly and Field Output Panel shall be optionally available as a combined unit, similar to a NEMA loadbay. This version is only available for a 16-channel configuration.

- a. The loadbay shall be mounted on the sawtooth rails at the back of the cabinet below the bottom shelf.
- b. The Output Assembly shall be mounted at the top of the loadbay.
- c. The Field Output Panel shall be mounted below the Output Assembly on an angled plate to allow easy access to the field terminals.
- d. All other requirements for the Output Assembly shall meet Article 1074.03 (b) (1).
- e. All other requirements for the Field Output Panel shall meet Article 1074.03 (b) (2).

(4) Input Assembly.

- a. The Input Assembly shall be a 3U high shelf mounted assembly providing twelve (12) slots of 22/44 pin PCB sockets for utilizing input devices such as loop detectors, AC and DC isolators, and emergency vehicle preemption (EVP) equipment.

- b. The Input Assembly shall accommodate one (1) Model 2218 Serial Interface Unit (SIU) to provide interface and control between the controller and the input devices via system SB1/SB2.
- c. The Input Assembly shall house twelve (12) 2-channel detection modules, six (6) 4-channel detection modules, or a combination of 2 & 4 channel detection modules up to 24 channels.
- d. The Input Assembly shall utilize two (2) 26-position ribbon cable connectors, TE Connectivity model 102321-6, for connections to the Field Input Panel.

(5) Field Input Panel (FIP).

- a. The 24-Channel FIP shall be coupled with the 24-Channel Input Assembly. The FIP shall provide a convenient landing point with pluggable terminal blocks for the field input wires.
- b. The FIP shall have positions for landing twenty-four (24) two-wire inputs and their associated earth ground wires. The landing points shall be pluggable terminal blocks with 10 positions for each block. The terminal blocks shall be Phoenix Contact model 1757093 or approved equivalent.
- c. Each input terminal position shall be labeled with its associated channel number.
- d. The FIP shall have positions for twelve (12) pluggable Detection Module Suppressors. The Detection Module Suppressors shall be supplied with the cabinet if required by procurement.
- e. The circuit board shall be mounted on a 1/8 in. thick aluminum plate that includes mounting slots for channel mounting. The plate shall include pressed-in PEM standoffs to mount the circuit boards.

(6) Service Assembly.

The Service Assembly shall be modular and be accessible without the use of hand tools. The Service Assembly shall house the following items:

- a. Two (2) Model 2202-HV High-Density Switch Pack/Flasher Units (HDSPs/FUs).
- b. Pluggable Cabinet Suppressor/Filter – Hesco RLS model HE1750 or approved equal.
- c. Main Contactor.

- d. Four (4) HDFU output fuses (16-channel version) or eight (8) HDFU output fuses (32-channel version).
 - e. Six (6) Circuit Breakers. The circuit breakers shall be Carling Technologies "B" series or approved equal. The circuit breakers shall be protected by flip-up covers to protect against accidental activation. The circuit breakers shall be provided for the following functions:
 - 1. Main – 30 A
 - 2. Clean AC Power – 15 A
 - 3. Raw AC Power – 15 A
 - 4. Output Assembly – 15 A
 - 5. HDFU #1 – Maximum 15 A
 - 6. HDFU #2 – Maximum 15 A (optional, for 32-channel version only)
 - f. GFCI duplex receptacle.
 - g. Earth Ground and AC Neutral bus bars.
 - h. Raw AC utility power input terminal block having five screw terminals.
- (7) DC Power/Communication Bus.
- a. The DC Power/Communication Bus shall include eight (8) DB25 D-sub socket connectors, TE Connectivity model 5745886-2, to interconnect the SB1/SB2 communication ports of the assemblies and Controller. It shall include a termination circuit at the end of the connections (S8) to prevent radio frequency signal reflection.
 - b. The DC Power/Communication Bus shall include eight Phoenix Contact connectors, model 1830635, to bring DC power to the Bus and distribute it to the cabinet subassemblies. The copper traces for the DC voltages shall support at least 10 Amp.
 - c. The circuit board shall be protected by an aluminum cover that includes the cabinet mounting flanges.
 - d. The DC Power/Communication Bus shall be mounted on the left side wall of the cabinet.
- (8) AC Clean Power Bus.

The AC Clean Power Bus shall include eight (8) NEMA 5-15 receptacles to provide AC Clean Power to the ATC Cabinet Assemblies, the Controller, and Cabinet Power Supply.

(9) Switch Shield.

- a. The cabinet shall include a technician switch shield. This shield shall protect the police panel switch wiring and include technician test switches for Stop Time, Auto/Flash, and a 24 VDC Bypass Switch. This 24 VDC Bypass switch shall be a momentary push button switch that, when pressed, energizes the 24 VDC to the HDSPs during Flash Mode. The button shall be labeled "24 VDC BYPASS". This allows a technician to momentarily apply 24 VDC power to the HDSPs while in a Flash condition.
- b. The switch shield shall include a duplex receptacle with USB ports for device charging. This receptacle shall be powered by the Raw AC Power circuit breaker.

(10) Police Panel.

- a. The cabinet shall include a police panel with switches for Auto/Flash, Signals On/Off, and Auto/Manual. The Auto/Manual shall enable Manual Control Enable in the controller when in the Manual position.
- b. The cabinet shall include a hard-wired manual control cable with a 6 ft coiled cord. This cable shall enable Interval Advance in the controller when depressed.

(11) Slide-out Drawer/Shelf.

- a. A telescoping slide-out drawer shall be provided for document storage.
- b. The Slide-Out Drawer/Shelf shall be mounted underneath the shelf and include a lip or handle for pulling.
- c. The drawer shall have a hinged top cover.
- d. The drawer shall be capable of accommodating one (1) complete set of cabinet prints and manuals.
- e. The drawer shall support 50 lb (23 kg) in weight when fully extended.
- f. The drawer shall open and close smoothly.
- g. The drawer dimensions shall make maximum use of available depth offered by the controller shelf and be a minimum of 18 in. (610mm) wide.

(12) Detector Test Switch Assembly (optional).

- a. The Detector Test Switch Assembly shall allow a technician to initiate a call to the controller by actuating the detectors in the Input Assembly. This allows the detectors to be tested without a loop or pedestrian push button actuation. This assembly shall be optional and will only be included when directed by procurement.
- b. The Detector Test Switch Assembly shall include twenty-four (24) toggle switches. The switches shall be configured for On (constant call), Off (calls are only actuated through the detector) and Call (momentary call). The switches shall be C&K Components model 7107SYZQE or equivalent.
- c. The assembly shall include twenty-four (24) red LED indicators to indicate that a call has been initiated by the corresponding switch. The LED indicators shall be Avago model HLMP-C025-P0000 or equivalent.
- d. The detector switch calls shall be routed through the SIU located in the Input Assembly. The assembly shall not include a separate SIU.
- e. Multiple Detector Test Switch Assemblies may be used if multiple Input Assemblies are included in the cabinet.

Add the following to Article 1074.03 of the Standard Specifications:

(c) ATC Cabinet Plugins.

(1) Model 2202-HV High-Density Switch Pack/Flasher Unit (HDSP/FU).

- a. The HDSP/FU shall be compact, pluggable, modular PCB-based, and equipped with a DIN connector.
- b. The HDSP/FU shall be compatible with ultra-low power LED signal heads and shall have a current monitoring feature for each output of each channel.
- c. The HDSP/FU shall use real-time standardized high speed SB3 communications with the Cabinet Monitor Unit to send a complete set of RMS voltage and load current measurements.
- d. The HDSP/FU shall be 4.5 in. H x 6.5 in. D and shall be equipped with a handle, reset push button switch, six RYG LED indicators, four flasher LED indicators, one power LED indicator, and two Rx/Tx LED indicators.

- e. The HDSP/FU can function as either a switch pack (HDSP) or as a flasher unit (HDFU).
 - 1. When installed in the Output Assembly, the HDSP shall provide two RYG channels of operation (6 individual field outputs).
 - 2. When installed in the Service Assembly, the HDFU shall function as a four output flasher.

(2) Model 2212-HV Cabinet Monitor Unit (CMUip).

- a. The Cabinet Monitor Unit (CMUip) shall be compact, pluggable and modular.
- b. The CMUip shall use real-time standardized 614.4 kbps SDLC communications with the ATC to transfer command and response data on Serial Bus #1 (SB1).
- c. The CMUip shall be capable of monitoring up to 32 physical switch pack channels (RYG) and shall have optional four virtual channels.
- d. The CMUip shall provide a Flasher Alarm feature. This alarm shall not put the cabinet into a Flash condition.
- e. The CMUip shall analyze the ATC output commands and field input status to isolate the failure source by channel and color.
- f. The CMUip configuration programming shall be provided by an interchangeable Datakey nonvolatile memory device. This rugged key shall store all CMUip configuration parameters and shall eliminate programming using jumpers, diodes, or DIP switches.
- g. The CMUip shall maintain a nonvolatile event log recording the complete intersection status as well as time stamped previous fault events, AC Line events, configuration changes, monitor resets, cabinet temperature and true RMS voltages and currents for all field inputs.
- h. The signal sequence history log stored in nonvolatile memory graphically shall display up to 30 seconds of signal status prior to the fault trigger event with 50 ms resolution to ease diagnosing of intermittent and transient faults.

(3) Model 2218 Serial Interface Unit (SIU).

- a. The Model 2218 Serial Interface Unit (SIU) shall be a compact, pluggable and modular.
- b. The SIU shall use real-time standardized 614.4 kbps SDLC communications with the ATC to transfer command and response data on Serial Bus #1 (SB1).
- c. The SIU shall be equipped with 54 programmable input/output pins, four (4) optically isolated input pins, one line sync reference input pin, and four (4) address select input pins. The optically isolated inputs shall work with either 12 VAC or 24 VDC.
- d. The SIU outputs shall be rated at 150 mA continuous sink current. Each output shall provide a 500 mA typical current limit and shall be rated to 50 V and utilize a voltage clamp for inductive transient protection.
- e. The SIU shall be equipped with a front panel LED indicator that can report the current SIU assembly address assignment of the SIU for cabinet configuration verification.
- f. The SIU shall require a nominal supply voltage of 24 VDC (+/- 2 VDC). A voltage of 16 VDC or less shall be considered loss of power, and a voltage of 18 VDC or greater shall be considered adequate for operation. The SIU shall not require more than 300 mA over the voltage range of 16 VDC to 30 VDC and the power surge shall be limited to a maximum of 1.25 A from initial application of DC power. The SIU shall not be damaged by insertion to, or removal from, powered input or output assemblies. The SIU shall operate normally for 700 ms after power loss.

(4) Model 2220 Auxiliary Display Unit (ADU).

- a. The ADU shall install in a 1U height of the rack space and shall provide a menu driven user interface to the enhanced features of the CMUip monitor, including the built-in Diagnostic Wizard.
- b. The ADU shall provide 32 channels of Red, Yellow and Green LED indicators that display full intersection status and 32 Blue fault status LED indicators to identify faulty channels.
- c. The ADU shall provide proper electrical termination to SB3.
- d. The ADU shall have a 4 line by 20 character menu driven liquid crystal display with backlight and heater.

- e. The ADU built-in Diagnostic Wizard shall automatically pinpoint faulty signals, offer trouble-shooting guidance, and automatically isolate and identify problems.
- f. The ADU shall be equipped with Event Logging displaying the CMUip time-stamped nonvolatile event log records with the complete intersection status, as well as AC Line events, monitor resets, temperature and true RMS voltages and currents.

(5) Model 2216 Cabinet Power Supply (CPS).

- a. The Model 2216 Cabinet Power Supply is a modular 19 in. rack mounted power supply device providing the DC voltages necessary for operating the ATC Cabinet. Power Factor Correction shall be provided. The PS2216-24-HV provides a regulated 24 VDC output and a regulated 48 VDC output. The PS2216-2412-HV model provides a regulated 24 VDC output, a regulated 48 VDC output, and a regulated 12 VDC output option for powering the Input Assembly devices. Unless otherwise specified, all PS2216 requirements apply to both model types.
- b. The CPS shall be 1U in height maximum and designed to mount into a 19 in. EIA rack. The maximum depth of the PS2216 shall be less than 8 in.
- c. The CPS shall be powered from AC Line provided by an AC Line cord with NEMA Type 515 plug. The input voltage range shall be 80 to 270 VAC, 45 to 65 Hz. Power Factor Correction shall be greater than 0.95.
- d. The PS2216-2412 shall provide:
 - 1. 48 VDC +/- 2 VDC at 1 A maximum
 - 2. 24 VDC +/- 2 VDC at 4 A maximum
 - 3. 12 VDC +/- 1 VDC at 5 A maximum
- e. Each DC output shall be electrically isolated from AC Mains and Earth Ground. The 24 VDC and 12 VDC outputs share a common ground.
- f. The DC Output Ripple on each output shall be less than 300 mVpp when measured at 20 MHz of bandwidth using a 12 in. twisted pair-wire terminated with a 0.1 μ f & 47 μ f capacitor.
- g. The DC outputs shall attain regulated output levels within 500 ms of applied AC Line voltage of 110 VAC nominal across the operating temperature range and at rated full load.
- h. The DC outputs shall maintain regulated output level for a minimum of 50 ms across the operating temperature range and at rated full load.

- i. All indicators shall be clear LEDs. Clear LEDs shall not depend on a reflector or diffusion as part of its design. Clear LEDs shall not appear to be ON when exposed to ambient light. The following indicators shall be provided:
 - 1. A green AC Line indicator shall illuminate to indicate Operational input voltage is proper and the AC Line fuse is intact.
 - 2. A green indicator shall illuminate to indicate the 48 VDC output is active and the fuse is intact.
 - 3. A green indicator shall illuminate to indicate the 24 VDC output is active and the fuse is intact.
 - 4. A green indicator shall illuminate to indicate the 12 VDC output is active and the fuse is intact (PS2216-2412 only).
- j. Banana style test jacks shall be provided on the front panel for each DC output and DC ground. Mating banana plug spring width shall be 0.175 in. Nominal.
- k. The output connector shall be a Phoenix Contact #1825161 and shall mate with a Phoenix Contact #1825352 or equivalent. Pin #1 shall be the right most pin when viewed from the rear of the supply.

Table 2 – Power Supply Connector Pin-Out

Pin	Function
1	+48VDC
2	48VDC Ground**
3	+24VDC
4	+12VDC (PS2216-2412 only)
5	24/12VDC Ground
6	Chassis Ground

**The 48 VDC output shall be electrically isolated from the AC Line input and the 24VDC and 12 VDC outputs. The 48VDC Ground (pin #2) must be connected within the cabinet to the same AC Neutral that the Cabinet Monitor Unit (CMU) is connected to in the cabinet.

(6) MonitorKey Programming Tool.

- a. The Programming Tool provides the capability to read and write data from the CMUip Datakey device.
- b. The MonitorKey software shall be compatible with the CMUip-2212.

(7) Model 21H High-Density Flash Transfer Relay (HDFTR).

- a. The HDFTR shall be a Struthers-Dunn model 21XBXHL-48VDC or approved equal.
- b. The HDFTR shall have a hermetically sealed cover and shall be moisture proof.
- c. The HDFTR shall be filled with dry nitrogen to protect contacts from corrosion and to prevent condensation.
- d. The HDFTR shall have a cupronickel cover that is salt water resistant.
- e. The HDFTR contacts shall be rated at 10 A @ 120 VAC.
- f. The coil of the HDFTR shall be rated at 48 VDC.
- g. The HDFTR shall have an LED indicator to display contact transfer status.

(8) Main Contactor (MC).

- a. The MC shall be a combination solid-state and electromechanical relay in parallel and shall be rated at 60 A @ 120 VAC and 50 A @ 240 VAC. The coil of the MC shall be rated at 48 VDC.
- b. The MC shall be equipped with input indicator and shall have SPST- N.O. contacts.
- c. The MC shall be hermetically sealed.
- d. The MC shall be easily accessible without removing any covers or panels.
- e. The MC shall be mounted on the Service Assembly for access to the wiring and to view the LED indicator.

(9) Cabinet Suppressor-Filter.

- a. The cabinet shall be equipped with a pluggable Cabinet Suppressor-Filter mounted in the Service Assembly. The pluggable Cabinet Suppressor-Filter shall be an Asco Power SHA-1250, Hesco HE1750, or approved equivalent.
- b. The unit shall incorporate the use of warning and failure indicators and shall have a dry relay contact remote sensing circuit. The unit shall be modular and pluggable with a 12-position Beau 5412 connector.
- c. The unit shall be rated at continuous service current of 15 A and maximum clamp voltage of 390 VAC. The unit shall filter noise and spike from 10 KHz to 25 MHz and shall have a peak surge current of 48 kA.

(10) Detection Module Suppressor.

- a. The Detection Module Suppressor shall be Hesco model HE6LC-6 or Asco Power model MRA-6LC-6.
- b. The Detection Module Suppressor shall be modular and pluggable.
- c. The unit shall be epoxy encapsulated and equipped with 6-position 5.08 mm Phoenix Contact or approved equal connector.
- d. The unit shall be able to protect 6 circuits.
- e. The device operating voltage shall be 75 VAC and clamping voltage shall be 130 VDC.
- f. The device dimensions shall be 2 in. H x 7/10 in. W x 1-1/5 in. D.

(11) HDSP Protector.

- a. The HDSP Protector shall be modular and pluggable. The unit shall be a Hesco HE103C-9, Asco MPA303-9, or approved equal.
- b. The unit shall be epoxy encapsulated and equipped with 9-position 5.08 mm Phoenix Contact connector or approved equal.
- c. The unit shall be able to protect 6 circuits.
- d. The device operating voltage shall be 120 VAC and clamping voltage shall be 340 VAC.
- e. The unit dimensions shall be 2 in. H x 7/10 in. W x 2 in. D.

(d) Auxiliary Cabinet Equipment.

(1) Ventilation Fans.

- a. Two (2) thermostatically controlled fans shall be provided to ventilate the cabinet.
- b. The fans shall be equipped with ball or roller bearings and shall each have a minimum capacity of 100 cu ft of free air delivery per minute.
- c. The fans shall be protected by a finger guard.
- d. The fan circuit shall be protected at 125% of the fan motor ampacity.

(2) Heater.

A 200 W thermostatically controlled electric heater shall be provided.

(3) Thermostat.

- a. The thermostat shall be manually adjustable between 80°F and 170°F with a differential of not more than 10°F between automatic turn on and off.
- b. The manual adjustment shall be graded in 10°F increment scale.
- c. The Thermostat shall be a Bud Industries TS-15-A or approved equal.

(4) Lighting.

- a. The cabinet shall include two (2) LED light panels to illuminate the interior of the cabinet.
- b. One LED panel shall be mounted on the fan panel, and the other shall be mounted underneath the lower shelf.
- c. Both LED panels shall illuminate whenever the main cabinet door is opened.
- d. The LED panels shall be provided from an approved Vendor.

Basis of Payment.

This work will be paid for at the Contract unit price each for ADVANCED TRANSPORTATION CONTROLLER AND TYPE IV CABINET; ADVANCED TRANSPORTATION CONTROLLER AND TYPE IV STRETCHED CABINET; ADVANCED TRANSPORTATION CONTROLLER AND TYPE V CABINET; ADVANCED TRANSPORTATION CONTROLLER AND TYPE SUPER P CABINET; ADVANCED TRANSPORTATION CONTROLLER AND TYPE SUPER P STRETCHED CABINET; ADVANCED TRANSPORTATION CONTROLLER AND TYPE SUPER R CABINET; ADVANCED TRANSPORTATION CONTROLLER AND TYPE IV CABINET, SPECIAL; ADVANCED TRANSPORTATION CONTROLLER AND TYPE IV STRETCHED—CABINET, SPECIAL; ADVANCED TRANSPORTATION CONTROLLER AND TYPE V CABINET, SPECIAL; ADVANCED TRANSPORTATION CONTROLLER AND TYPE SUPER P CABINET (SPECIAL); ADVANCED TRANSPORTATION CONTROLLER AND TYPE SUPER P STRETCHED CABINET (SPECIAL); ADVANCED TRANSPORTATION CONTROLLER AND TYPE SUPER R CABINET (SPECIAL).

UPGRADE EXISTING CONTROLLER TO NTCIP SPECIAL

Effective: November 1, 2023
857.04TS

Description.

This work shall comply with Section 857 of the Standard Specifications and shall also comply with the following requirements.

General.

This item shall consist of installing the latest version of software, PROM, or PROM SET as well as enabling the NTCIP mode of the operations in an existing traffic signal controller. At locations that contain coordination modules, all PROMS in the controller module, telemetry module, and coordination module must be of the same version and revision. New system interface board shall be included in this item. updating all the communication parameters necessary for communication in the Ethernet-based signal system, including the NTCIP address. Contact IDOT System Engineer for the approved most up to date software version to be used for this item. Any modifications required for the completion of this work shall be included in the cost of this item.

Basis of Payment.

This work will be paid for at the contract unit price per each for UPGRADE EXISTING CONTROLLER TO NTCIP SPECIAL, which price shall be payment in full for performing all work described herein and includes furnishing, installing, testing, and all appurtenances necessary for a complete and operational unit as directed/approved by the Traffic Signal Engineer.

UNINTERRUPTABLE POWER SUPPLY, SPECIAL

Effective: January 1, 2013

Revised: March 1, 2024

862.01TS

This work shall be in accordance with section 862 of the Standard Specification except as modified herein.

Add the following to Article 862.01 of the Standard Specifications:

“The UPS shall have the power capacity to provide normal operation of a signalized intersection that utilizes all LED type signal head optics for a minimum of six (6) hours.”

Add the following to Article 862.02 of the Standard Specifications:

“Materials shall be according to Article 1074.04 as modified in UNINTERRUPTABLE POWER SUPPLY, SPECIAL.”

Add the following to Article 862.03 of the Standard Specifications:

“The UPS shall additionally include, but not be limited to, a battery cabinet, where applicable. For Super P and Super R cabinets, the battery cabinet is integrated to the traffic signal cabinet and shall be included in the cost for the traffic signal cabinet of the size and type indicated on the plans.”

Revise Article 862.04 of the Standard Specifications to read:

Installation.

When a UPS is installed at an existing traffic signal cabinet, the UPS cabinet shall partially rest on the lip of the existing controller cabinet foundation and be secured to the existing controller cabinet by means of at least four (4) stainless steel bolts. The UPS cabinet shall be completely enclosed with the bottom and back constructed of the same material as the cabinet.

When a UPS is installed at a new signal cabinet and foundation, it shall be mounted as shown on the plans.

At locations where UPS is installed and an emergency vehicle priority system is in use, any existing incandescent confirmation beacons shall be replaced with LED lamps in accordance with the District One Emergency Vehicle Priority System specification at no additional cost to the Contract. A concrete apron shall be provided and be in accordance with Articles 424 and 202 of the Standard Specifications. The concrete apron shall also follow the District 1 Standard Traffic Signal Design Detail, Type D for Ground Mounted Controller Cabinet and UPS Battery Cabinet.

For a ground mounted UPS, the UPS shall be mounted on its own Type A concrete foundation which will be paid for separately. A concrete apron shall be provided with a dimension of 36 in. in front of the UPS cabinet, 5 in. deep, and a width sized appropriately to the width of the concrete foundation. The concrete apron shall follow Articles 424 and 202 of the Standard Specifications.

This item shall include any required modifications to an existing traffic signal controller as a result of the addition of the UPS including the addition of alarms.

Materials.

Revise Article 1074.04(a)(1) of the Standard Specifications to read:

“The UPS shall be line interactive or double conversion and provide voltage regulation and power conditioning when utilizing utility power. The UPS shall be sized appropriately for the intersection(s) normal traffic signal operating load. The UPS must be able to maintain the intersection’s normal operating load plus 20 percent of the intersection’s normal operating load. When installed at a railroad-interconnected intersection, the UPS must maintain the railroad preemption load, plus 20 percent of the railroad preemption-operating load. The total connected traffic signal load shall not exceed the published ratings for the UPS. The UPS shall provide a minimum of six (6) hours of normal operation run-time for signalized intersections with LED type signal head optics at 77 °F (25 °C) (minimum 1000 W active output capacity, with 86 percent minimum inverter efficiency).”

Revise the first paragraph of Article 1074.04(a)(3) of the Standard Specifications to read:

“The UPS shall have a minimum of four (4) sets of normally open (NO) and normally closed (NC) single-pole double-throw (SPDT) relay contact closures, available on a panel mounted terminal block or locking circular connectors, rated at a minimum 120 V/1 A, and labeled so as to identify each contact according to the plans.”

Revise Article 1074.04(a)(17) of the Standard Specifications to read:

“When the intersection is in battery backup mode, the UPS shall bypass all internal cabinet lights, ventilation fans, cabinet heaters, service receptacles, luminaires, any lighted street name signs, any automated enforcement equipment and any other devices directed by the Engineer.”

Revise Article 1074.04(b)(2) paragraph “b.” of the Standard Specifications to read:

“Batteries, inverter/charger and power transfer relay shall be housed in a separate NEMA Type 3R cabinet. The cabinet shall be Aluminum alloy, 5052-H32, 0.125 in. thick and have a natural mill finish.”

Revise Article 1074.04(b)(2) paragraph “c.” of the Standard Specifications to read:

“No more than three (3) batteries shall be mounted on individual shelves for a cabinet housing six batteries and no more than four (4) batteries per shelf for a cabinet housing eight batteries.”

Revise Article 1074.04(b)(2) paragraph “e.” of the Standard Specifications to read:

“The battery cabinet housing shall have the following nominal outside dimensions: a width of 25 in. (785 mm), a depth of 16 in. (440 mm), and a height of 41 to 48 in. (1.1 to 1.3 m). Clearance between shelves shall be a minimum of 10 in. (250 mm).”

Revise Article 1074.04(b)(2) paragraph “g.” of the Standard Specifications to read:

“The door shall open to the entire cabinet, have a neoprene gasket, an Aluminum continuous piano hinge with stainless steel pin, and a three point locking system. The door shall be equipped with a two position doorstop, one a 90° and one at 120°. The cabinet shall be provided with a main door lock which shall operate with a traffic industry conventional No. 2 key. Provisions for padlocking the door shall be provided.”

Add the following to Article 1074.04(b)(2) of the Standard Specifications:

- j. The battery cabinet shall have provisions for an external generator connection.

Add the following to Article 1074.04(c) of the Standard Specifications:

- (8) The UPS shall include a tip or kill switch installed in the battery cabinet, which shall completely disconnect power from the UPS when the switch is manually activated.
- (9) The UPS shall include standard RS-232 and internal Ethernet interface.
- (10) The UPS shall incorporate a flanged electric generator inlet for charging the batteries and operating the UPS. The generator connector shall be male type, twist-lock, rated as 15A, 125VAC with a NEMA L5-15P configuration and weatherproof lift cover plate. Access to the generator inlet shall be from a secured weatherproof lift cover plate or behind a locked battery cabinet police panel.
- (11) The bypass switch shall include an internal power transfer relay that allows removal of the battery back-up unit, while the traffic signal is connected to utility power, without impacting normal traffic signal operation.

Revise Article 1074.04(d)(3) of the Standard Specifications to read:

“All batteries supplied in the UPS shall be either gel cell or AGM type, deep cycle, completely sealed, prismatic lead calcium based, silver alloy, valve regulated lead acid (VRLA) requiring no maintenance. All batteries in a UPS installation shall be the same type; mixing of gel cell and AGM types within a UPS installation is not permitted.”

Revise Article 1074.04(d)(4) of the Standard Specifications to read:

“Batteries shall be certified by the manufacturer to operate over a temperature range of -13°F to 160 °F (-25°C to 71 °C) for gel cell batteries and -40°F to 140°F (-40°C to 60 °C) for AGM type batteries.”

Add the following to Article 1074.04(d) of the Standard Specifications:

- (9) The UPS shall consist of an even number of batteries that are capable of maintaining normal operation of the signalized intersection for a minimum of six (6) hours. Calculations shall be provided showing the number of batteries of the type supplied that are needed to satisfy this requirement. A minimum of four (4) batteries shall be provided.
- (10) Battery heater mats shall be provided when gel cell type batteries are supplied.

Add the following to Article 1074.04 of the Standard Specifications:

- (e) Warranty. The warranty for an uninterruptable power supply (UPS) and batteries (full replacement) shall cover a minimum of five (5) years from date the equipment is placed in operation.
- (f) Installation. Bypass switch shall completely disconnect the traffic signal cabinet from the utility provider.
- (g) The UPS shall be set-up to run the traffic signal continuously without going to a red flashing condition when switched to battery power unless otherwise directed by the Engineer. The Contractor shall confirm set-up with the Engineer. The continuous operation mode when switched to battery may require modification to unit connections and these modifications are included in the unit price for this item.

Revise Article 862.04 of the Standard Specifications to read:

Basis of Payment.

This work will be paid for at the Contract unit price per each for UNINTERRUPTABLE POWER SUPPLY, SPECIAL, UNINTERRUPTABLE POWER SUPPLY, GROUND MOUNTED, or UNINTERRUPTABLE POWER SUPPLY AND CABINET, SPECIAL. Replacement of emergency vehicle priority system confirmation beacons and any required modifications to the traffic signal controller shall be included in the cost of the UNINTERRUPTABLE POWER SUPPLY, SPECIAL, UNINTERRUPTABLE POWER SUPPLY, GROUND MOUNTED, or UNINTERRUPTABLE POWER SUPPLY AND CABINET, SPECIAL item. The concrete apron and earth excavation required shall be included in the cost of the UNINTERRUPTABLE POWER SUPPLY, GROUND MOUNTED or UNINTERRUPTABLE POWER SUPPLY AND CABINET, SPECIAL item.

REMOVE AND REPLACE BATTERIES FOR UNINTERRUPTABLE POWER SUPPLY

Effective: November 1, 2023

862.03TS

Description.

Remove and Replace Batteries for Uninterruptable Power Supply (UPS) shall meet the requirements of Special Provision 862.01TS Uninterruptable Power Supply, Special for the batteries requirements including sizing, rating, and warranty. This item requires that the Contractor remove the existing batteries in the uninterruptable power supply and replace them with new batteries that provide a minimum of six (6) hours of full run- time operation.

The Contractor is responsible for modifying the existing uninterruptable power supply to make the cabinet and controller compatible for extra batteries if needed to ensure a minimum of six (6) hours of full run-time operation. Any connectors, wiring, seals, battery heating mats if needed shall be part of this pay item and included in the cost of this pay item. The Contractor is responsible for verifying that the existing battery heating mats are working properly and relocate these or replace with new heating mats as needed. This work shall also include properly cleaning of the inside of UPS cabinet of any battery acid residue or other debris to the satisfaction of the Engineer.

The existing batteries at an intersection shall be removed and recycled at an electronics recycling facility in an environmentally and properly way in meeting all applicable sections of US EPA and IL EPA publications along with the Code of Federal Regulations for transportation. Salvage value shall be included in the bid price.

All batteries in a UPS installation shall be the same type; mixing of gel cell and AGM types within a UPS installation is not permitted. All batteries shall have a clear label with the date it was manufactured and date it was installed inside a UPS.

Basis of Payment.

This work shall be paid for at the contract unit price each of all batteries in cabinet per intersection for REMOVE AND REPLACE BATTERIES FOR UNINTERRUPTABLE POWER SUPPLY, the price of which shall include the cost for all of the work and material described herein and includes furnishing, installing, and all mounting hardware necessary for proper operation to the satisfaction of the Traffic Engineer.

FIBER OPTIC CABLE, SINGLE MODE

Effective: September 1, 2024

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

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

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

Fibers.

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

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

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

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

Cable Construction.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

General Cable Performance Specifications

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

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

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

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

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

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

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

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

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

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

Quality Assurance Provision

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

Packaging

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

- Cable Number
- Gross Weight
- Shipped Cable Length in Meters
- Job Order Number
- Product Number
- Customer Order Number
- Date Cable was Tested
- Manufacturer Order Number
- Cable Length Markings

a: Top (inside end of cable)

b: Bottom (outside end of cable)

The reel (one flange) marking shall include:

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

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

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

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

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

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

Optical Patch Cords and Pigtails.

The optical patch cords and pigtails shall comply with the following:

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

Connectors.

The optical connectors shall comply with the following:

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

CONSTRUCTION REQUIREMENTS

Experience Requirements.

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

- A minimum of three (3) years experience in the installation of fiber optic cables, including fusion splicing, terminating and testing single mode fibers.
- Install two systems where fiber optic cables are outdoors in conduit and where the systems have been in continuous satisfactory operation for at least two years. The Contractor shall submit as proof, photographs or other supporting documents, and the names, addresses and telephone numbers of the operating personnel who can be contacted regarding the installed fiber optic systems.
- One fiber optic cable system (which may be one of the two in the preceding paragraph), which the Contractor can arrange for demonstration to the Department representatives and the Engineer.

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

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

Installation in Raceways.

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

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

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

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

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

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

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

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

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

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

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

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

Tracer Wire

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

Aerial Fiber Optic Cable

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

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

Construction Documentation Requirements

Installation Practices for Outdoor Fiber Optic Cable Systems

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

Operation and Maintenance Documentation

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

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

Testing Requirements

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

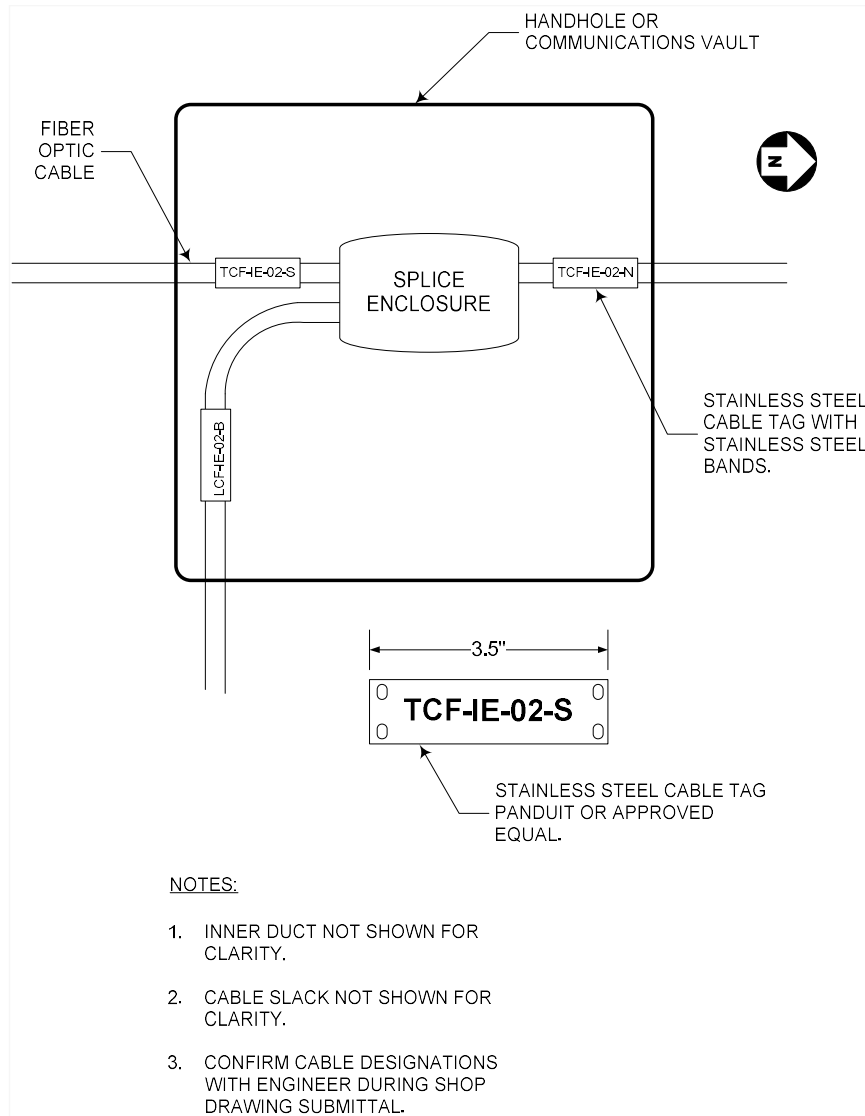
Splicing Requirements

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

Slack Storage of Fiber Optic Cables.

Included as a part of this item, slack fiber shall be supplied as necessary to allow splicing the fiber optic cables in a controlled environment, such as a splicing van or tent. After splicing has been completed, the slack fiber shall be stored underground in handholes or in the raised base adapters of ground mounted cabinets in accordance with the fiber optic cable manufacturer's guidelines. Fiber optic cable slack shall be 100 feet for each cable at each splice location, above or below ground. Fiber optic cable slack shall be 50 feet for each cable at access points, above or below ground, where splicing is not involved. If the innerduct is cut, the ends of the innerduct should extend beyond the first vertical rack so they can be secured at that point. This slack shall be measured for payment.

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



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

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

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

FIBER OPTIC CABLE, MICRO, SINGLE MODE

Effective: September 1, 2024

Description. This work shall consist of furnishing and installing loose-tube, single-mode, fiber optic cable of the number of fibers shown in the plans and as directed by the Engineer. The cable shall be capable of being installed via jetting in a microduct conduit system.

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

Materials The single-mode, fiber optic cable shall incorporate a loose, buffer-tube design. The cable shall be an accepted product of the United States Department of Agriculture Rural Utilities Service (RUS) 7 CFR 1755.900 and meet the requirements of ANSI/ICEA Standard for Fiber Optic Outside Plant Communications Cable, ANSI/ICEA S-87-640-1999 for a single sheathed, non-armored cable, and shall be new, unused and of current design and manufacture.

Fibers.

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

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

Physical Construction		
Requirement	Units	Value
Cable Diameter	mm	8.6
Buffer Tube Diameter	mm	1.5
Colored Fiber Nominal Diameter	µm	253 – 259
Mode Field Diameter (1310 nm)	µm	9.2 ± 0.4
Mode Field Diameter (1550 nm)	µm	10.4 ± 0.5
Minimum Bending Radius (Installation)	mm	170

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

Cable Construction.

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

Optical fibers shall be placed inside a loose buffer tube. The nominal outer diameter of the buffer tube shall be 1.5 mm. Each buffer tube shall contain up to 12 fibers. The fibers shall not adhere to the inside of the buffer tube.

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

Buffer tubes containing fibers shall be color coded with distinct and recognizable colors in accordance with TIA/EIA-598-B, "Optical Fiber Cable Color Coding."

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

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

Fillers may be included in the cable core to lend symmetry to the cable cross-section where needed. Fillers shall be placed so that they do not interrupt the consecutive positioning of the buffer tubes. In dual layer cables, any fillers shall be placed in the inner layer. Fillers shall be nominally 1.5 mm in outer diameter.

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

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

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

The cables shall contain one ripcord under the sheath for easy sheath removal. Tensile strength shall be provided by the central member, and additional dielectric yarns as required.

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

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

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

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

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

The maximum pulling tension shall be 1335 N (300 lbf) during installation (short term) and 400 N (90 lbf) long term installed.

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

The installation temperature range of the cable shall be -15°C to +60°C.

General Cable Performance Specifications

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

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

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

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

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

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

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

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

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

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

Quality Assurance Provision

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

Packaging

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

- Cable Number
- Gross Weight
- Shipped Cable Length in Meters
- Job Order Number
- Product Number
- Customer Order Number
- Date Cable was Tested
- Manufacturer Order Number
- Cable Length Markings

a: Top (inside end of cable)

b: Bottom (outside end of cable)

The reel (one flange) marking shall include:

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

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

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

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

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

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

Optical Patch Cords and Pigtails.

The optical patch cords and pigtails shall comply with the following:

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

Connectors.

The optical connectors shall comply with the following:

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

CONSTRUCTION REQUIREMENTS

Experience Requirements.

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

- A minimum of three (3) years experience in the installation of fiber optic cables, including fusion splicing, terminating and testing single mode fibers.
- Install two systems where fiber optic cables are outdoors in conduit and where the systems have been in continuous satisfactory operation for at least two years. The Contractor shall submit as proof, photographs or other supporting documents, and the names, addresses and telephone numbers of the operating personnel who can be contacted regarding the installed fiber optic systems.
- One fiber optic cable system (which may be one of the two in the preceding paragraph), which the Contractor can arrange for demonstration to the Department representatives and the Engineer.

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

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

Installation.

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

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

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

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

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

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

The cable shall be blown or jetted into the microduct. The Contractor shall use a micro cable blowing machine designed for use with the particular cable being installed. A Compressed air cooler shall be used when ambient air temperatures reaches 68°F or more.

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

A tracer wire shall be installed with all fiber raceways. Tracer wire shall be installed and paid for as specified for Tracer Wire.

Construction Documentation Requirements

Installation Practices for Outdoor Fiber Optic Cable Systems

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

Operation and Maintenance Documentation

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

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

Testing Requirements

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

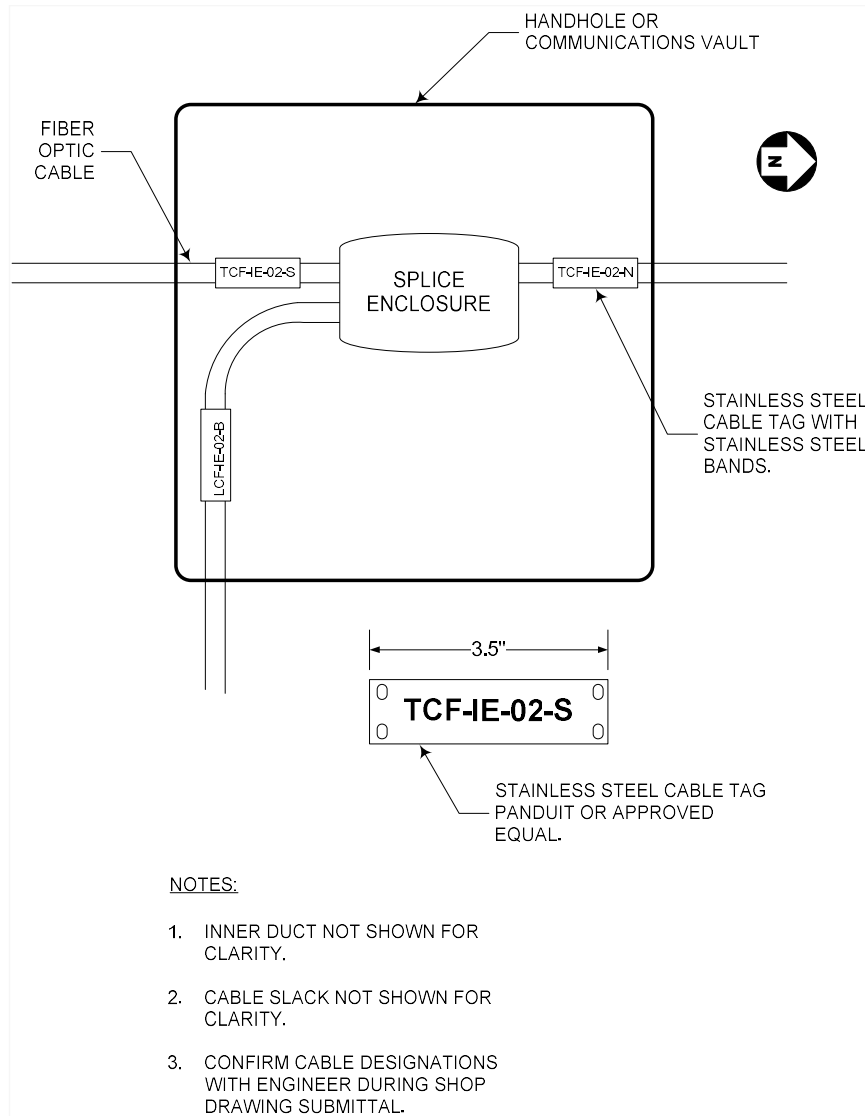
Splicing Requirements

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

Slack Storage of Fiber Optic Cables.

Included as a part of this item, slack fiber shall be supplied as necessary to allow splicing the fiber optic cables in a controlled environment, such as a splicing van or tent. After splicing has been completed, the slack fiber shall be stored underground in handholes or in the raised base adapters of ground mounted cabinets in accordance with the fiber optic cable manufacturer's guidelines. Fiber optic cable slack shall be 100 feet for each cable at each splice location, above or below ground. Fiber optic cable slack shall be 50 feet for each cable at access points, above or below ground, where splicing is not involved. If the innerduct is cut, the ends of the innerduct should extend beyond the first vertical rack so they can be secured at that point. This slack shall be measured for payment.

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



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

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

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

SPLICE FIBER IN CABINET

Effective: November 1, 2023

871.02TS

Description.

This work shall consist of fusion splicing singlemode or multimode fibers in a field cabinet, inside a building, as shown on the plans and/or as directed by the Traffic Engineer.

General.

This pay item shall include splices between existing fiber optic cables and any splices shown on the plans as a bid item. Splices shall be secured in fiber optic splice trays within fiber optic distribution enclosures. All fusion splices shall be secured on aluminum splice trays capable of accommodating the required number of fusion splices, including necessary splice holders and a compatible splice tray cover. The tray dimensions shall not exceed 7.5" x 4.1" x 0.45" and shall be mounted within the enclosure using suitable hardware that allows removal for maintenance purposes without the use of tools. All individual splice trays shall be labelled. Splice trays shall be included in the unit cost of SPLICE FIBER IN CABINET.

The quality of all fiber splices shall be verified by testing and documentation according to Article 801.13(d) of the "Standard Specifications," to the satisfaction of the Traffic Engineer.

All optical fibers shall be spliced to provide continuous runs. Splices shall only be allowed in equipment cabinets, in buildings, as shown on the plans and/or as directed by the Traffic Engineer.

All splices shall be made using a fusion splicer that automatically positions the fibers using a system of light injection and detection. The Contractor shall provide all equipment and consumable supplies.

An OTDR trace and power meter readings must be provided from end point termination to end point termination for any fiber that is spliced.

Basis of Payment.

This work shall be paid for at the contract unit price per each for SPLICE FIBER IN CABINET. The unit price shall include all equipment; materials; fiber optic splice trays; testing and documentation; and labor required to fusion splice singlemode fiber optic cable. Splices involving new fiber optic cable installed under this contract, and any splices shown on the plans as an included item, shall be included in the unit cost of the applicable FIBER OPTIC CABLE of the type, size, and number of fibers specified.

TERMINATE FIBER IN CABINET

Effective: November 1, 2023

871.03TS

Description.

This work shall consist of terminating existing or new fibers in a field cabinet, inside a building, as shown on the plans and/or as directed by the Traffic Engineer.

General.

This pay item shall include splices between existing fiber optic cables and any splices shown on the plans as a bid item. All multimode connectors shall be LC compatible, with ceramic ferrules. Singlemode fiber terminations shall utilize pre-fabricated, factory-terminated (LC compatible with ceramic ferrules) pigtails fusion spliced to bare fibers. The splicing of pigtails for singlemode fibers is included in the cost of TERMINATE FIBER IN CABINET. The prefabricated pigtails shall have all of their fibers color coded to match the singlemode fibers in the fiber optic cable. All fusion splices shall be secured on aluminum splice trays capable of accommodating the required number of fusion splices, including necessary splice holders and a compatible splice tray cover. The tray dimensions shall not exceed 7.5" x 4.1" x 0.45" and shall be mounted within the enclosure using suitable hardware that allows removal for maintenance purposes without the use of tools. All individual splice trays shall be labelled. Splice trays and connector bulkheads shall be included in the cost of TERMINATE FIBER IN CABINET. Connector bulkheads shall be the proper type for the fiber enclosure at the location, and shall be properly secured to the enclosure.

The quality of all fiber splices and terminations shall be verified by OTDR and power meter testing and documented according to Article 801.13(d) of the "Standard Specifications," to the satisfaction of the Traffic Engineer.

All bulkhead connectors / adapters shall be labeled with the fiber numbers and direction (i.e. 13-14N, 1-2W, etc.) with a laminated machine printed label.

Basis of Payment.

This work will be paid for at the contract unit price per each for TERMINATE FIBER IN CABINET. The unit price shall include all equipment; materials; connectors; pigtails; splice trays; bulkheads; testing and documentation; and labor required to terminating each required multimode or singlemode fiber. Terminations involving new fiber optic cable installed under this contract, including any terminations shown on the plans as an included item, shall be included in the unit cost of the applicable FIBER OPTIC CABLE of the type, size, and number of fibers specified.

FIBER OPTIC INTERCONNECT CENTER, 24 PORT OR 48 PORT

Effective: November 1, 2023

871.04TS

Description.

This work shall consist of removal of existing fiber optic interconnect center (FOIC) and replacement with a new FOIC wall mount in a traffic signal cabinet, as shown on the plans and/or as directed by the Traffic Engineer.

General.

This pay item shall include providing and installing a Corning WIC-024 (24 Port) or CCH-04U (48 Port) or approved equivalent. The connector panels shall be populated with LC connectors.

The existing FOIC shall be removed and disposed of. The existing terminations shall remain intact if LC or replaced with LC if not, and any active connections shall be restored. New fiber jumpers shall be provided as part of this pay item if required.

All bulkhead connectors / adapters shall be labeled with the fiber numbers and direction (i.e. 13-14N, 1-2W, etc.) with a laminated machine printed label.

Basis of Payment.

This work shall be paid for at the contract unit price per each for FIBER OPTIC INTERCONNECT CENTER, 24 PORT or FIBER OPTIC INTERCONNECT CENTER, 48 PORT. The unit price shall include all equipment; materials; fiber optic splice trays; testing and documentation; and labor required to fusion splice singlemode and multimode fiber optic cable.

ELECTRIC CABLE

Effective: May 22, 2002

Revised: July 1, 2015

873.01TS

Delete "or stranded, and No. 12 or" from the last sentence of Article 1076.04 (a) of the Standard Specifications.

Add the following to the Article 1076.04(d) of the Standard Specifications:

Service cable may be single or multiple conductor cable.

EMERGENCY VEHICLE PRIORITY SYSTEM LINE SENSOR CABLE, NO. 20 3/C

Effective: January 1, 2013

Revised: July 1, 2015

873.03TS

This work shall consist of furnishing and installing lead-in cable for light detectors installed at existing and/or proposed traffic signal installations as part of an emergency vehicle priority system. The work includes installation of the lead-in cables in existing and/or new conduit. The electric cable shall be shielded and have (3) stranded conductors, colored blue, orange, and yellow with a stranded tinned copper drain wire. The cable shall meet the requirements of the vendor of the Emergency Vehicle Priority System Equipment.

Basis of Payment.

This work will be paid for at the contract unit price per foot for EMERGENCY VEHICLE PRIORITY SYSTEM LINE SENSOR CABLE, NO. 20 3/C, which price shall be payment in full for furnishing, installing and making all electrical connections necessary for proper operations.

TRAFFIC SIGNAL POST

Effective: May 22, 2002

Revised: March 1, 2025

875.01TS

Revise Article 1077.01 (c) of the Standard Specifications to read:

- (c) Anchor Rods. The anchor rods shall be a minimum of 5/8 in. in diameter and 16 in. long and shall be according to Article 1006.09. The anchor rods shall be threaded approximately 6 in. at one end and have a bend at the other end. The first 12 in. at the threaded end shall be galvanized. One each galvanized nut and trapezoidal washer shall be furnished with each anchor rod. The washer shall be properly sized to fully engage and sit flush on all sides of the slot of the base plate.

Revise the first sentence of Article 1077.01 (d) of the Standard Specifications to read:

All steel posts and bases shall be hot dipped galvanized steel according to AASHTO M 111. If the Department approves painting, powder coating by the manufacturer will be required over the galvanization in accordance with 851.01TS TRAFFIC SIGNAL PAINTING Special Provisions.

PEDESTRIAN SIGNAL POST

Effective: January 1, 2020

Revised:

875.02TS

Description.

This work shall consist of furnishing and installing a metal pedestrian signal post. All installations shall meet the requirements of the "District One Standard Traffic Signal Design Details".

Materials.

- (c) General. The pedestrian signal post shall be designed to support the traffic signal loading shown on the plans. The design and fabrication shall be according to the Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals, as published by AASHTO.
- (d) Post. The post shall be made of steel or aluminum and have an outside diameter of 4 1/2 in. The post shall be threaded for assembly to the base. Aluminum posts shall be according to the specifications for Schedule 80 aluminum pipe. Steel posts shall be according to the specifications for Schedule 40 steel pipe.
- (e) Base. The base of a steel post shall be cast iron. The base of an aluminum post shall be aluminum. The base shall be threaded for the attachment to the threaded post. The base shall be approximately 10 in. high and 6 3/4 in. square at the bottom. The bottom of the base shall be designed to accept four 5/8 in. diameter anchor rods evenly spaced in a 6 in. diameter circle. The base shall be true to pattern, with sharp clean cutting ornamentation, and equipped with access doors for cable handling. The door shall be fastened to the base with stainless steel screws. A grounding lug shall be provided inside the base.
- (f) Anchor Rods. The anchor rods shall be 5/8 in. in diameter and 16 in. long and shall be according to Article 1006.09. The anchor rods shall be threaded approximately 6 in. at one end and have a bend at the other end. The first 12 in. at the threaded end shall be galvanized. One each galvanized nut and trapezoidal washer shall be furnished with each anchor rod. The washer shall be properly sized to fully engage and sit flush on all sides of the slot of the base plate.

The aluminum post and base shall be drilled at the third points around the diameter and 1/4 in. by 2 in. stainless steel bolts shall be inserted to prevent the post from turning and wobbling.

- (g) Finish. The steel post, steel post cap and the cast iron base shall be hot-dipped galvanized according to AASHTO M 111. If the Department approves painting, powder coating by the manufacturer will be required over the galvanization in accordance with 851.01TS TRAFFIC SIGNAL PAINTING Special Provisions. If the post and the base are threaded after the galvanization, the bare exposed metal shall be immediately cleaned to remove all cutting solvents and oils, and then spray painted with two coats of an approved galvanized paint.

The aluminum post shall have a natural finish, 100 grit or finer.

Installation.

The pedestrian signal post shall be erected plumb, securely bolted to a concrete foundation, and grounded to a ground rod according to the details shown on the plans. No more than 3/4 in. of the post threads shall protrude above the base.

A post cap shall be furnished and installed on the top of the post. The post cap shall match the material of the post. The Contractor shall apply an anti-seize paste compound on all nuts and bolts prior to assembly.

Prior to the assembly, the Contractor shall apply two additional coats of galvanized paint on the threads of the post and the base. The Contractor shall use a fabric post tightener to screw the post to the base.

Basis of Payment.

This work will be paid for at the contract unit price per each for PEDESTRIAN SIGNAL POST, of the length specified.

MAST ARM ASSEMBLY AND POLE

Effective: May 22, 2002

Revised: July 01, 2015

877.01TS

Revise the second sentence of Article 1077.03 (a)(3) of the Standard Specifications to read:

Traffic signal mast arms shall be one piece construction, unless otherwise approved by the Engineer.

Add the following to Article 1077.03 (a)(3) of the Standard Specifications:

If the Department approves painting, powder coating by the manufacturer will be required over the galvanization in accordance with 851.01TS TRAFFIC SIGNAL PAINTING Special Provisions.

CAMERA MOUNTING ASSEMBLY

Effective: November 1, 2023

877.02TS

Description.

This work shall consist of modifying an existing traffic signal mast arm pole to accommodate an extension pole suitable for mounting a CCTV Camera.

Materials.

The pole extension shall be a Schedule 40 galvanized steel pipe, 20 feet in length and 4 inch in diameter.

General.

The pole extension shall be fastened to the existing mast arm pole with adjustable, galvanized steel clamps as shown on the plan detail. The galvanized clamps shall fit securely around the tapered mast arm. The contractor shall use galvanized shims and shall modify clamps as required to maintain a plumb vertical alignment of the camera mounting assembly pole. The exposed wires shall be trained into a drip loop and protected with black plastic spiral cable wrap. Relocation, adjustments or any temporary removal and reinstallation of any mast arm mounted sign panels or any other equipment in conflict with the installation of Camera Mounting Assembly shall be part of this pay item and included in the unit price.

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

Basis of Payment.

This work will be paid for at the contract unit price each for CAMERA MOUNTING ASSEMBLY. The unit price shall include all equipment, materials, mounting hardware, shims, gromets, cable wrap, components, and labor required to securely fasten the assembly to an existing pole and place the camera into operation to the satisfaction of the Traffic Engineer. The camera and cables will be paid for separately as part of unit price for REMOTE CONTROLLER VIDEO SYSTEM, and OUTDOOR RATED NETWORK CABLE.

CONCRETE FOUNDATIONS

Effective: May 22, 2002

Revised: March 1, 2024

878.01TS

Add the following to Article 878.03 of the Standard Specifications:

“All anchor bolts shall be according to Article 1006.09, with all anchor bolts hot dipped galvanized a minimum of 12 in. at the threaded end.

Depending on the foundation type, the top of foundation shall be between 1 in. and 6 in. above finished grade or as directed by the Engineer.

No foundation is to be poured until the Resident Engineer gives their approval as to the depth of the foundation.”

Add the following to the first paragraph of Article 878.05 of the Standard Specifications:

“The concrete apron in front of the cabinet and UPS shall be included in this pay item.”

Revise the first paragraph of Article 878.05 of the Standard Specifications to read:

“Basis of Payment. This work will be paid for at the Contract unit price per foot (meter) of depth of CONCRETE FOUNDATION of the type specified, or CONCRETE FOUNDATION, TYPE A 12-INCH DIAMETER for pedestrian post concrete foundations.”

REMOVE AND REPLACE ANCHOR BOLTS

Effective: January 1, 2014

Revised: July 1, 2015

878.02TS

This item shall consist of replacing anchor rods at existing concrete foundations for traffic signal posts. At locations specified on the plans for new traffic signal post installation, the Contractor shall inspect the existing post foundations prior to removing the existing traffic signal post. The Contractor shall verify that the pattern, spacing, and condition of the existing anchor bolts are acceptable for reuse with a new post. The Contractor shall replace unacceptable anchor bolts as approved by the Engineer.

Anchor bolts shall be according to Article 1006.09 and shall be hot dipped galvanized.

Installation.

Existing anchor bolts shall be cut flush with the top of concrete foundation.

The bolt circle of the new anchor bolts shall be rotated a minimum of 2.5-inches away from the existing anchor bolts. New anchor bolts shall be $\frac{3}{4}$ -inch diameter with minimum 9-inch embedment into the existing concrete foundation and 3-inch threaded length above the top of foundation. New anchor bolts shall be installed using a HIT-RE 500 exposed adhesive anchoring system.

Method of Measurement.

The removal and replacement of anchor bolts will be measured for payment as per each foundation requiring anchor bolt replacement. This shall include all anchor bolts replaced, labor, equipment, and materials required for replacing anchor bolts at an existing foundation as specified herein.

Basis of Payment.

This item will be paid for at the contract unit price each for REMOVE AND REPLACE ANCHOR BOLTS.

LIGHT EMITTING DIODE (LED) SIGNAL HEAD AND OPTICALLY PROGRAMMED LED SIGNAL HEAD

Effective: May 22, 2002

Revised: March 1, 2025

880.01TS

Materials.

Add the following to Section 1078 of the Standard Specifications:

“LED modules proposed for use and not previously approved by IDOT District One will require independent testing for compliance to current VTCSH-ITE standards for the product and be Intertek ETL Verified. This would include modules from new Vendors and new models from IDOT District One approved Vendors.

The proposed independent testing facility shall be approved by IDOT District One. Independent testing must include a minimum of two (2) randomly selected modules of each type of module (i.e. ball, arrow, pedestrian, etc.) used in the District and include as a minimum Luminous Intensity and Chromaticity tests. However, complete module performance verification testing may be required by the Engineer to assure the accuracy of the Vendor's published data and previous test results. An IDOT representative will select sample modules from the local warehouse and mark the modules for testing. Independent test results shall meet current ITE standards and vendor's published data. Any module failures shall require retesting of the module type. All costs associated with the selection of sample modules, testing, reporting, and retesting, if applicable, shall be the responsibility of the LED module Vendor and not be a cost to this Contract.

All signal heads shall provide 12 in. (300 mm) displays with glossy yellow or black polycarbonate housings. All head housings shall be the same color (yellow or black) at the intersection. For new signalized intersections and existing signalized intersections where all signals heads are being replaced, the proposed head housings shall be black. Where only selected heads are being replaced, the proposed head housing color (yellow or black) shall match existing head housings. Connecting hardware and mounting brackets shall be polycarbonate (black). A corrosion resistant anti-seize lubricant shall be applied to all metallic mounting bracket joints and shall be visible to the inspector at the signal turn-on. Post top mounting collars are required on all posts and shall be constructed of the same material as the brackets.

The LED signal modules shall be replaced or repaired if an LED signal module fails to function as intended due to workmanship or material defects. LED signal modules which exhibit luminous intensities less than the minimum values specified in Table 1 of the ITE Vehicle Traffic Control Signal Heads: Light Emitting Diode (LED) Circular Signal Supplement (June 27, 2005) [VTCSH], or applicable successor ITE specifications, or show signs of entrance of moisture or contaminants, shall be replaced or repaired. The Vendor's written warranty for the LED signal modules shall be dated, signed by a Vendor's representative, and included in the product submittal to the State. See Article 801.14 of the Standard Specifications for warranty information.

(a) Physical and Mechanical Requirements

(1) Modules can be manufactured under this specification for the following faces:

- a. 12 in. (300 mm) circular, multi-section
- b. 12 in. (300 mm) arrow, multi-section

(2) The maximum weight of a module shall be 4 lb (1.8 kg).

(3) Each module shall be a sealed unit to include all parts necessary for operation (a printed circuit board, power supply, a lens and gasket, etc.) and shall be weatherproof after installation and connection.

(4) The lens of the module shall be tinted with a wavelength-matched color to reduce sun phantom effect and enhance on/off contrast. The tinting shall be uniform across the lens face. Polymeric lens shall provide a surface coating or chemical surface treatment applied to provide abrasion resistance. The lens of the module shall be integral to the unit, convex with a smooth outer surface and made of plastic. The lens shall have a textured surface to reduce glare.

(5) The use of tinting or other materials to enhance ON/OFF contrasts shall not affect chromaticity and shall be uniform across the face of the lens.

- (6) Each module shall have a symbol of the type of module (i.e. circle, arrow, etc.) in the color of the module. The symbol shall be 1 in. (25.4 mm) in diameter. Additionally, the color shall be written out in 1/2 in. (12.7mm) letters next to the symbol.

(b) Photometric Requirements

- (1) The LEDs utilized in the modules shall be AlInGaP technology for red and InGaN for green and amber indications and shall be the ultra bright type rated for 100,000 hours of continuous operation from -40 °C to 74 °C.

(c) Electrical

- (1) Maximum power consumption for LED modules as per the tables in Article 1078.01.
- (2) Operating voltage of the modules shall be 120 VAC. All parameters shall be measured at this voltage.
- (3) The modules shall be operationally compatible with currently used controller assemblies (solid state load switches, flashers, and conflict monitors).
- (4) When a current of 20 mA AC or less is applied to the unit, the voltage read across the two leads shall be 15 VAC or less.
- (5) The LED modules shall provide constant light output under power. Modules with dimming capabilities shall have the option disabled or set on a non-dimming operation.
- (6) LED arrows shall be wired such that a loss or the failure of one or more LEDs will not result in the loss of the entire module.

(d) Retrofit Traffic Signal Module

The following specification requirements apply to the Retrofit module only. All general specifications apply unless specifically superseded in this section.

- (1) Retrofit modules can be manufactured under this specification for the following faces:
 - a. 12 in. (300 mm) circular, multi-section
 - b. 12 in. (300 mm) arrow, multi-section
- (2) Each Retrofit module shall be designed to be installed in the doorframe of a standard traffic signal housing. The Retrofit module shall be sealed in the doorframe with a one-piece EPDM (ethylene propylene rubber) gasket.
- (3) The maximum weight of a Retrofit module shall be 4 lb (1.8 kg).

- (4) Each Retrofit module shall be a sealed unit to include all parts necessary for operation (a printed circuit board, power supply, a lens and gasket, etc.) and shall be weatherproof after installation and connection.
 - (5) Electrical conductors for modules, including Retrofit modules, shall be 39-2/5 in. (1 m) in length, with quick disconnect terminals attached.
 - (6) The lens of the Retrofit module shall be integral to the unit, shall be convex with a smooth outer surface and made of plastic or of glass.
- (e) The following specification requirements apply to the 12 in. (300 mm) arrow module only. All general specifications apply unless specifically superseded in this section.
- (1) The arrow module shall meet specifications stated in Section 9.01 of the Equipment and Material Standards of the Institute of Transportation Engineers (November 1998) [ITE Standards], Chapter 2 (Vehicle Traffic Control Signal Heads) or applicable successor ITE specifications for arrow indications.
 - (2) The LEDs arrow indication shall be a solid display with a minimum of three (3) outlining rows of LEDs and at least one (1) fill row of LEDs.
- (f) The following specification requirement applies to the 12 in. (300 mm) programmed visibility (PV) module only. All general specifications apply unless specifically superseded in this section.
- (1) The LED module shall be a module designed and constructed to be installed in a programmed visibility (PV) signal housing without modification to the housing.

Delete the fourth paragraph of Article 880.03 of the Standard Specifications. Refer to the "Bagging Signal Heads" section of the District 1 Traffic Signal Special Provision 800.01TS TRAFFIC SIGNAL GENERAL REQUIREMENTS."

Basis of Payment.

Add the following to the first paragraph of Article 880.04 of the Standard Specifications:

"The price shall include furnishing the equipment described above, all mounting hardware and installing them in satisfactory operating condition."

Revise the second paragraph of Article 880.04 of the Standard Specifications to read:

If the work consists of retrofitting an existing polycarbonate traffic signal head with light emitting diodes (LEDs), it will be paid for as a SIGNAL HEAD, LED, RETROFIT, of the type specified, and of the particular kind of material, when specified. Price shall be payment in full for removal of the existing module, furnishing the equipment described above including LED modules, all mounting hardware, and installing them in satisfactory operating condition. The type specified will indicate the number of signal faces, the number of signal sections in each signal face and the method of mounting.

LED SIGNAL FACE, LENS COVER

Effective: July 1, 2021

Revised: March 1, 2025

880.03TS

Description.

This work shall consist of furnishing and installing a signal lens cover with the purpose or preventing snow buildup on and around a signal lens allowing for clear indication during inclement weather.

This item shall fit over a 12 in. signal head lens and shall include the clear lens cover, attachment collar, and any clips or fasteners necessary to fit it flush. The cover must be installed in accordance with the Manufacturer's instructions and in a manner that prevents dust, debris, or moisture buildup on the inside of the lens cover that could affect the signal indication visibility. All mounting hardware including screws used for lens cover installation must be stainless steel. Lens covers shall be installed on all red signal head indications.

The snow resistant signal head lens cover must be warrantied for a period of three (3) years from final inspection and must be free from material and workmanship defects.

Basis of Payment.

This work shall be paid for at the Contract unit price each for LED SIGNAL FACE, LENS COVER, the price of which shall include the cost for all work and material described herein and includes furnishing, installing, and all mounting hardware necessary for a fully operational snow resistant signal head lens cover.

LED SIGNAL FACE, VISOR HEATER

Effective: July 1, 2021

Revised: April 1, 2024

880.04TS

Description.

This work shall consist of furnishing and installing a heated signal visor or retrofitting an existing signal visor with a heater to prevent snow buildup on and around a signal lens allowing for clear signal indication during inclement weather.

The heater shall keep a constant temperature on every point of the heating element and shall not rise above the Manufacturer's safe temperature levels. The heater shall be made from flexible material mounted to the underside of an existing or proposed signal visor. The heater shall be controlled by a temperature and humidity probe to determine if conditions for snow are present. A single probe with the LED confirmation light should be installed at the traffic signal cabinet to control the entire intersection with the confirmation light visible from the street. Power for the heater shall be supplied using an extra, unused wire from the signal head. Installation of the heater shall not create conditions where dust, debris, or water can enter the inside of the signal head. Any control modules necessary for the proper operation should be installed inside the cabinet for easy maintenance, and its capacity should match the number of red signal head indications present at the intersection or as directed by the Engineer. Signal visor heaters shall be installed on all red signal head indications.

The heating element shall operate during typical snowing conditions below 35.6°F and above 75 percent relative humidity. The heater shall be installed such that it is de-energized when traffic signals are powered by an alternative energy source such as a generator or uninterruptible power supply (UPS).

Revised cabinet wiring diagrams showing the heater shall be provided.

The snow resistant heated signal visor shall be warrantied for a period of three (3) years from final inspection and free from material and workmanship defects.

Basis of Payment.

This work shall be paid for at the Contract unit price each for LED SIGNAL FACE, VISOR HEATER, the price of which shall include the cost for all work and material described herein and includes furnishing, installing, and all mounting hardware necessary for proper operation.

LED MODULE REPLACEMENT

Effective: August 1, 2023
880.05TS

Description.

This work shall be in accordance with Sections 880, 881, 895, and 1078 of the Standard Specifications except as modified herein. The Contractor shall remove LED modules from an existing traffic or pedestrian signal head and furnish and install new LED modules for each indication as shown on the plans. Lens covers and visor heaters shall be removed and reinstalled if needed. In case of discrepancies between the plans and existing field conditions, the Contractor shall coordinate the correct module installation with the Traffic Signal Area Engineer. The Contractor shall recycle all LED modules at an electronics recycling facility. The LED module must be replaced in kind for whatever color, size, and movement is being replaced (Red, Yellow, Green, Any Color Arrows, Ped, Walk, Don't Walk, etc.). All LED modules shall conform to the requirements specified in the special provisions 880.01TS – LED SIGNAL HEAD AND OPTICALLY PROGRAMMED LED SIGNAL HEAD and 881.01TS – LED PEDESTRIAN SIGNAL MODULE REPLACEMENT.

Basis of Payment.

This work will be paid for at the contract unit price per each for LED SIGNAL MODULE REPLACEMENT and LED PEDESTRIAN SIGNAL MODULE REPLACEMENT. All labor and equipment required to complete this work, including removal and reinstallation of lens covers and visor heaters, shall be included in the contract unit price.

LIGHT EMITTING DIODE (LED) PEDESTRIAN SIGNAL HEAD

Effective: May 22, 2002

Revised: March 1, 2024

881.01TS

Add the following to the third paragraph of Article 881.03 of the Standard Specifications:

“No mixing of different types of pedestrian traffic signals or displays shall be permitted.”

Delete the fourth paragraph of Article 881.03 of the Standard Specifications. Refer to the “Bagging Signal Heads” section of the District 1 Traffic Signal Special Provision 800.01TS TRAFFIC SIGNAL GENERAL REQUIREMENTS.

Add the following to Article 881.03 of the Standard Specifications:

“Pedestrian Countdown Signal Heads shall be 16 in. (406mm) x 18 in. (457mm) single units with glossy yellow or black polycarbonate housings. All pedestrian head housings shall be the same color (yellow or black) at the intersection. For new signalized intersections and existing signalized intersections where all pedestrian heads are being replaced, the proposed head housings shall be black. Where only selected heads are being replaced, the proposed head housing color (yellow or black) shall match existing head housings. Connecting hardware and mounting brackets shall be polycarbonate (black). A corrosion resistant anti-seize lubricant shall be applied to all metallic mounting bracket joints, and shall be visible to the inspector at the signal turn-on.

Each pedestrian signal LED module shall be fully MUTCD compliant and shall consist of double overlay message combining full LED symbols of an Upraised Hand and a Walking Person. “Egg Crate” type sun shields are not permitted. Numerals shall measure 9 in. (229mm) in height and easily identified from a distance of 120 ft (36.6m).”

Materials.

Add the following to Article 1078.02 of the Standard Specifications:

“The module shall operate in one mode: Clearance Cycle Countdown Mode Only. The countdown module shall display actual controller programmed clearance cycle and shall start counting when the flashing clearance signal turns on and shall countdown to “0” and turn off when the steady Upraised Hand (symbolizing Don’t Walk) signal turns on. The module shall not have user accessible switches or controls for modification of cycle.

At power on, the module shall enter a single automatic learning cycle. During the automatic learning cycle, the countdown display shall remain dark.

The module shall re-program itself if it detects any increase or decrease of Pedestrian Timing. The counting unit will go blank once a change is detected and then take one complete pedestrian cycle (with no counter during this cycle) to adjust its buffer timer.

If the controller preempts during the Walking Person (symbolizing Walk), the countdown will follow the controller's directions and will adjust from Walking Person to flashing Upraised Hand. It will start to count down during the flashing Upraised Hand.

If the controller preempts during the flashing Upraised Hand, the countdown will continue to count down without interruption.

The next cycle following the preemption event shall use the correct, initially programmed values.

If the controller output displays Upraised Hand steady condition and the unit has not arrived to zero or if both the Upraised Hand and Walking Person are dark for some reason, the unit suspends any timing and the digits will go dark.

The digits will go dark for one pedestrian cycle after loss of power of more than 1.5 seconds.

The countdown numerals shall be two (2) "7 segment" digits forming the time display utilizing two rows of LEDs.

The LED module shall meet the requirements of the Institute of Transportation Engineers (ITE) LED purchase specification, "Pedestrian Traffic Control Signal Indications - Part 2: LED Pedestrian Traffic Signal Modules," or applicable successor ITE specifications, except as modified herein.

The LED modules shall provide constant light output under power. Modules with dimming capabilities shall have the option disabled or set on a non-dimming operation.

In the event of a power outage, light output from the LED modules shall cease instantaneously.

The LEDs utilized in the modules shall be AlInGaP technology for Portland Orange (Countdown Numerals and Upraised Hand) and GaN technology for Lunar White (Walking Person) indications.

The individual LEDs shall be wired such that a loss or the failure of one or more LED will not result in the loss of the entire module.

See Article 801.14 of the Standard Specifications for warranty information."

Basis of Payment.

Add the following to the first paragraph of Article 881.04 of the Standard Specifications:

“The price shall include furnishing the equipment described above, all mounting hardware, and installing them in satisfactory operating condition.”

Add the following to Article 881.04 of the Standard Specifications:

“If the work consists of retrofitting an existing polycarbonate pedestrian signal head and pedestrian countdown signal head with light emitting diodes (LEDs), it will be paid for as a PEDESTRIAN SIGNAL HEAD, LED, RETROFIT, of the type specified, and of the particular kind of material, when specified. Price shall be payment in full for furnishing the equipment described above including LED modules, all mounting hardware, and installing them in satisfactory operating condition.”

TRAFFIC SIGNAL BACKPLATE

Effective: May 22, 2002

Revised: March 1, 2024

882.01TS

Revise the first sentence of Article 1078.03 of the Standard Specifications to read:

“All backplates shall be louvered and made of formed ABS plastic or composite aluminum.”

Revise the first sentence of the second paragraph of Article 1078.03 of the Standard Specifications to read:

“The backplate shall be composed of one or two pieces.”

Delete the second sentence of the fourth paragraph of Article 1078.03 of the Standard Specifications.

Add the following to the fourth paragraph of Article 1078.03 of the Standard Specifications:

“When retro reflective sheeting is specified, it shall be Type ZZ sheeting according to Article 1091.03 and applied in preferred orientation for the maximum angularity according to the vendor's recommendations. The retroreflective sheeting shall be installed under a controlled environment by the Manufacturer/Vendor before shipment to the Contractor. The formed plastic backplate shall be prepared and cleaned, following recommendations of the retroreflective sheeting Manufacturer.”

DETECTOR LOOP

Effective: May 22, 2002

Revised: March 1, 2024

886.01TS

Procedure.

A minimum of seven (7) working days prior to the Contractor cutting loops, the Contractor shall mark the proposed loop locations and contact the Area Traffic Signal Maintenance and Operations Engineer to inspect and approve the layout. When preformed detector loops are installed, the Contractor shall have them inspected and approved prior to the pouring of the Portland cement concrete surface using the same notification process as above.

Installation.

Revise Article 886.04 of the Standard Specifications to read:

“Loop detectors shall be installed according to the requirements of the “District One Standard Traffic Signal Design Details.” Saw-cuts (homeruns on preformed detector loops) from the loop to the edge of pavement shall be made perpendicular to the edge of pavement when possible in order to minimize the length of the saw-cut (homerun on preformed detector loops) unless directed otherwise by the Engineer or as shown on the plans.

The detector loop cable insulation shall be labeled with the cable specifications.

Each loop detector lead-in wire shall be labeled in the handhole using a waterproof tag secured to each wire with nylon ties.

Resistance to ground shall be a minimum of 500 mega-ohms under any conditions of weather or moisture. Inductance shall be more than 50 and less than 700 microhenries.

- (a) Type I. All loops installed in new asphalt pavement shall be installed in the binder course and not in the surface course. The edge of pavement, curb, and handhole shall be cut with a 1/4 in. (6.3 mm) deep x 4 in. (100 mm) saw cut to mark the location of each loop cable.
- (b) Loop sealant shall be two-component thixotropic chemically cured polyurethane from an approved Vendor. The sealant shall be installed 1/8 in. (3 mm) below the pavement surface. If installed above the surface, the excess shall be removed immediately.
- (c) Preformed. This work shall consist of furnishing and installing a rubberized or cross-linked polyethylene heat resistant preformed traffic signal loop in accordance with the Standard Specifications, except for the following:
 - (1) Preformed detector loops shall be installed in the sub-base under the Portland cement concrete pavement. Loop lead-ins shall be extended to a temporary protective enclosure near the proposed handhole location. The protective enclosure shall provide sufficient protection from other construction activities and may be buried for additional protection.

- (2) Handholes shall be placed next to the shoulder or back of curb when preformed detector loops enter the handhole. CNC, included in this pay item, shall be used to protect the preformed lead-ins from back of curb to the handhole.
- (3) Preformed detector loops shall be factory assembled with ends capped and sealed against moisture and other contaminants. The loop configurations and homerun lengths shall be assembled for the specific application. The loop and homerun shall be constructed using a minimum 5/8 in. (16 mm) outside diameter, minimum 3/8 in. (9.5 mm) inside diameter Class A oil resistant synthetic cord reinforced hydraulic hose with 250 psi (1,720 kPa) internal pressure rating or a similarly sized XLPE cable jacket. The hose for the loop and homerun assembly shall be one continuous piece. No joints or splices shall be allowed in the hose except where necessary to connect homeruns to the loops. This will provide maximum wire protection and loop system strength. Hose tee connections shall be heavy duty high temperature synthetic rubber. The tee shall be of proper size to attach directly to the hose, minimizing glue joints. The tee shall have the same flexible properties as the hose to ensure that the whole assembly can conform to pavement movement and shifting without cracking or breaking. For XLPE jacketed preformed loops, all splice connections shall be soldered, sealed, and tested before being sealed in a high impact glass impregnated plastic splice enclosure. The wire used shall be #16 THWN stranded copper. The number of turns in the loop shall be application specific. Homerun wire pairs shall be twisted a minimum of eight turns per foot. No wire splices will be allowed in the preformed loop assembly. The loop and homeruns shall be filled and sealed with a flexible sealant to ensure complete moisture blockage and further protect the wire. The preformed loops shall be constructed to allow a minimum of 6-1/2 ft of extra cable in the handhole."

Method of Measurement.

Add the following to Article 886.05 of the Standard Specifications:

"Preformed detector loops will be measured along the detector loop embedded in the pavement rather than the actual length of the wire. Detector loop measurements shall include the saw cut and the length of the detector loop wire to the edge of pavement. The detector loop wire, including all necessary connections for proper operations, from the edge of pavement to the handhole, shall be included in the price of the detector loop. CNC, trench and backfill, and drilling of pavement or handholes shall be included in detector loop quantities."

Basis of Payment.

This work shall be paid for at the contract unit price per foot (meter) for DETECTOR LOOP, TYPE I or PREFORMED DETECTOR LOOP as specified in the plans, which price shall be payment in full for furnishing and installing the detector loop and all related connections for proper operation.

EMERGENCY VEHICLE PRIORITY SYSTEM

Effective: May 22, 2002

Revised: July 1, 2015

887.01TS

Revise Section 887 of the Standard Specifications to read:

It shall be the Contractor's responsibility to contact the municipality or fire district to verify the brand of emergency vehicle pre-emption equipment to be installed prior to the contract bidding. The equipment must be completely compatible with all components of the equipment currently in use by the Agency.

All new installations shall be equipped with Confirmation Beacons as shown on the "District One Standard Traffic Signal Design Details." The Confirmation Beacon shall consist of a 6 watt Par 38 LED flood lamp with a 30 degree light spread, or a 7 watt Par 30 LED flood lamp with a 15 degree or greater spread, maximum 7 watt energy consumption at 120V, and a 2,000 hour warranty for each direction of pre-emption. The lamp shall have an adjustable mount with a weatherproof enclosure for cable splicing. All hardware shall be cast aluminum or stainless steel. Holes drilled into signal poles, mast arms, or posts shall require rubber grommets. In order to maintain uniformity between communities, the confirmation beacons shall indicate when the control equipment receives the pre-emption signal. The pre-emption movement shall be signalized by a flashing indication at the rate specified by Section 4L.01 of the "Manual on Uniform Traffic Control Devices," and other applicable sections of future editions. The stopped pre-empted movements shall be signalized by a continuous indication.

All light operated systems shall include security and transit preemption software and operate at a uniform rate of 14.035 Hz ± 0.002 , or as otherwise required by the Engineer, and provide compatible operation with other light systems currently being operated in the District.

This item shall include any required modifications to an existing traffic signal controller as a result of the addition of the EMERGENCY VEHICLE PRIORITY SYSTEM.

Basis of Payment.

The work shall be paid for at the contract unit price each for furnishing and installing LIGHT DETECTOR and LIGHT DETECTOR AMPLIFIER. Furnishing and installing the confirmation beacon shall be included in the cost of the Light Detector. Any required modifications to the traffic signal controller shall be included in the cost of the LIGHT DETECTOR AMPLIFIER. The preemption detector amplifier shall be paid for on a basis of (1) one each per intersection controller and shall provide operation for all movements required in the pre-emption phase sequence.

RELOCATE EXISTING EMERGENCY VEHICLE PRIORITY SYSTEM, DETECTOR UNIT

Effective: January 1, 2002

Revised: July 1, 2015

887.02TS

This item shall consist of relocating the existing emergency vehicle priority system, detector unit (single channel or dual channel) from its existing location to a new traffic signal post or mast arm assembly and pole, and connecting it to an emergency vehicle priority system, phasing unit. If the existing Emergency Vehicle Priority System, Detector Unit Assembly includes a Confirmation Beacon, the Confirmation Beacon shall also be relocated and connected to the Emergency Vehicle Priority System, Detector Unit and shall be included at no cost in this item.

The emergency vehicle system is not to be inoperative for more than 8 hours and the Contractor must notify the Municipality or Fire Protection District 72 hours prior to the disconnection of the equipment.

Basis of Payment.

This item will be paid for at the contract unit price each for RELOCATE EXISTING EMERGENCY VEHICLE PRIORITY SYSTEM, DETECTOR UNIT.

RELOCATE EXISTING EMERGENCY VEHICLE PRIORITY SYSTEM, PHASING UNIT

Effective: January 1, 2002

Revised: July 1, 2015

887.03TS

This item shall consist of relocating the existing emergency vehicle priority system phasing unit from an existing traffic signal controller cabinet to a new traffic signal controller cabinet, as indicated in the plans or as directed by the Engineer.

The work shall include disconnecting the emergency vehicle priority system phasing unit(s) and reconnecting it into the new traffic signal controller cabinet.

The emergency vehicle system is not to be inoperative for more than 8 hours and the Contractor must notify the Municipality or Fire Protection District 72 hours prior to the disconnection of the equipment. The Contractor must demonstrate to the satisfaction of the Engineer that the emergency vehicle system operates properly.

Basis of Payment.

This item will be paid for on a basis of one (1) each per intersection for RELOCATE EXISTING EMERGENCY VEHICLE PRIORITY SYSTEM, PHASING UNIT.

OUTDOOR RATED NETWORK CABLE

Effective: November 1, 2023
887.04TS

Description.

This work shall consist of furnishing and installing a network cable from the traffic signal cabinet to the associated field device as shown on the plans

Materials.

The outdoor rated network cable shall be a black Category 5e cable, meeting the TIA/EIA 568-B.2 telecommunication standards. The cable shall be composed of 24 AWG solid bare copper conductors, twisted pairs, polyolefin insulation, inner LLPE jacket, overall shield (100% coverage), 24 AWG stranded TC drain wire, industrial grade sunlight- and oil-resistant LLPE jacket. The cable shall be capable of performing from -40 °F to 160 °F.

Each end of the cable shall be terminated with an RJ-45 connector installed according to the TIA/EIA 568B standard. The drain wire at the cabinet end shall be terminated with a ring lug and attached to a suitable ground point.

The work shall be performed according to the applicable portions of Section 873 of the "Standard Specifications", and details as shown on the plans.

Basis of Payment.

This work will be paid for at the contract unit price per foot for OUTDOOR RATED NETWORK CABLE, the unit price shall include all equipment, materials and labor required to furnish and install the cable and making all connections necessary for proper operation. The unit price shall also include furnishing and installing the RJ-45 connectors, ring terminals and grounding the cable.

TEMPORARY TRAFFIC SIGNAL INSTALLATION

Effective: May 22, 2002
Revised: March 1, 2025
890.01TS

Revise Section 890 of the Standard Specifications to read:

Description.

This work shall consist of furnishing, installing, maintaining, and removing a temporary traffic signal installation as shown on the plans, including but not limited to temporary signal heads, emergency vehicle priority systems, interconnect, vehicle detectors, uninterruptable power supply, and signing. When temporary traffic signals will be operating within a traffic signal system, the equipment shall be compatible with the current operating requirements of the system. For integration into an Advanced Traffic Management System (ATMS) such as Centrac, Tactics, or TransSuite, the controller shall have the latest version of approved NTCIP software installed.

General.

Only an approved controller Vendor will be allowed to assemble a temporary traffic signal and railroad traffic signal cabinet. Traffic signal inspection and TURN-ON shall be according to 800.01TS TRAFFIC SIGNAL GENERAL REQUIREMENTS special provision.

Construction Requirements.

- (a) Controllers. Only controllers supplied by one of the District approved Vendors will be approved for use at temporary signal locations. All controllers used for temporary traffic signals shall be fully actuated NEMA microprocessor based with RS232 data entry ports compatible with existing monitoring software approved by IDOT District 1, installed in NEMA TS2 cabinets with 8 phase back panels, capable of supplying 255 seconds of cycle length and individual phase length settings up to 99 seconds. On projects with one lane open and two-way traffic flow, such as bridge deck repairs, the temporary signal controller shall be capable of providing an adjustable all red clearance setting of up to 250 seconds in length. All controllers used for temporary traffic signals shall meet or exceed the requirements of Section 857 of the Standard Specifications with regards to internal time base coordination and preemption. All railroad interconnected temporary controllers and cabinets shall be new and shall satisfy the requirements of Article 857.02 of the Standard Specifications and as modified herein. On projects with multiple temporary traffic signal installations, all controllers shall be the same Manufacturer brand and model number with the latest version software installed at the time of the signal TURN-ON, or as specified in the Contract.
- (b) Cabinets. Only control equipment, including controller cabinet and peripheral equipment, supplied by one of the District approved Vendors will be approved for use at temporary traffic signal locations. All control equipment for the temporary traffic signal(s) shall be furnished by the Contractor unless otherwise stated in the Contract. All temporary traffic signal cabinets shall have a closed bottom. The bottom shall be sealed along the entire perimeter of the cabinet base to ensure a water, dust, animal, and insect-proof seal. The bottom shall provide a minimum of two (2) 4 in. (100 mm) diameter holes to run the electric cables through. The 4 in. (100 mm) diameter holes shall have a bushing installed to protect the electric cables and shall be sealed after the electric cables are installed.
- (c) Grounding. Grounding shall be provided for the temporary traffic signal cabinet meeting or exceeding the applicable portions of the National Electrical Code, Section 806 of the Standard Specifications and shall meet the requirements of the "Grounding of Traffic Signal Systems" section of 800.01TS TRAFFIC SIGNAL GENERAL REQUIREMENTS special provision.

(d) Traffic Signal Heads. All traffic signal sections shall be 12 in. (300 mm). Pedestrian signal sections shall be 16 in. (406mm) x 18 in. (457mm). All signal heads shall be furnished with tunnel visors unless otherwise specified in the contract. Traffic signal sections shall be Light Emitting Diode (LED) with expandable view, unless otherwise approved by the Engineer. Pedestrian signal heads shall be LED Pedestrian Countdown Signal Heads. The temporary traffic signal heads shall be placed as indicated on the temporary traffic signal plan or as directed by the Engineer. If no traffic staging is in place or will not be staged on the day of the turn on, the temporary traffic signal shall have the signal head displays, signal head placements and controller phasing match the existing traffic signal or shall be as directed by the Engineer. The Contractor shall furnish enough extra cable length to relocate heads to any position on the span wire or at locations illustrated on the plans for construction staging. The temporary traffic signal shall remain in operation during all signal head relocations. Each temporary traffic signal head shall have its own cable from the controller cabinet to the signal head.

(e) Interconnect.

(1) Temporary traffic signal interconnect shall be provided using fiber optic cable or wireless interconnect technology as specified in the Contract. If the Contract specifies fiber optic cable to be used for temporary interconnect, the Contractor may request, in writing, to substitute the fiber optic temporary interconnect with a wireless interconnect. The Contractor must provide assurances that the radio device will operate properly at all times and during all construction staging. If approved for use by the Engineer, the Contractor shall submit marked-up traffic signal plans indicating locations of radios and antennas and installation details. If wireless interconnect is used, and in the opinion of the Engineer it is not viable, or if it fails during testing or operations, the Contractor shall be responsible for installing all necessary poles, fiber optic cable, and other infrastructure for providing temporary fiber optic interconnect at no cost to the Contract.

(2) The existing system interconnect and phone lines are to be maintained as part of the Temporary Traffic Signal Installation specified for on the plan. If the existing traffic signal has a cellular modem, the modem shall be temporarily relocated to the temporary signal and then back to the existing or proposed cabinet at the end of the contract unless the contract specifies otherwise. The temporary signal cabinet shall have an antenna supplied by the Contractor. Any existing network switches shall be temporarily relocated to the temporary signal and relocated back to the existing cabinet at the end of construction if a new switch is not being installed. Any existing pan-tilt-zoom (PTZ) cameras shall be temporarily relocated to the temporary signal. The interconnect, including any required fiber splices and terminations, shall be installed into the temporary controller cabinet as per the notes or details on the plans. All labor and equipment required to install and maintain the existing interconnect as part of the Temporary Traffic Signal Installation shall be included in the cost of TEMPORARY TRAFFIC SIGNAL INSTALLATION. The temporary traffic signal interconnect shall maintain interconnect communications throughout the entire signal system for the duration of the project.

(3) Temporary wireless interconnect for closed-loop systems. The radio interconnect system shall be compatible with Eagle/Yunex or Econolite controller closed loop systems. This work shall include all temporary wireless interconnect components at the adjacent existing traffic signal(s) to provide a completely operational closed loop system. This work shall include all materials, labor and testing to provide the completely operational closed loop system as shown on the plans. The radio interconnect system shall include the following components:

- a. Rack or Shelf Mounted RS-232 Frequency Hopping Spread Spectrum (FHSS) Radio
- b. Software for Radio Configuration (Configure Frequency and Hopping Patterns)
- c. Antennas (Omni Directional or Yagi Directional)
- d. Antenna Cables, LMR400, Low Loss. Maximum 100 ft from controller cabinet to antenna
- e. Brackets, Mounting Hardware, and Accessories Required for Installation
- f. RS232 Data Cable for Connection from the radio to the local or master controller
- g. All other components required for a fully functional radio interconnect system

All controller cabinet modifications and other modifications to existing equipment that are required for the installation of the radio interconnect system components shall be included in the cost of TEMPORARY TRAFFIC SIGNAL INSTALLATION.

The radio interconnect system may operate at 900Mhz (902-928) or 2.4 Ghz depending on the results of a site survey. The telemetry shall have an acceptable rate of transmission errors, time outs, etc. comparable to that of a hardwire system.

The proposed or existing master controller and telemetry module shall be configured for use with the radio interconnect at a minimum rate of 9600 baud.

The radio interconnect system shall include all other components required for a complete and fully functional telemetry system and shall be installed in accordance with the Vendor's recommendations.

Temporary wireless interconnect for Advanced Traffic Management Systems. The radio interconnect system shall be compatible with an ATMS.

- (f) Emergency Vehicle Preemption. All emergency vehicle preemption equipment (light detectors, light detector amplifiers, confirmation beacons, etc.) as shown on the temporary traffic signal plans shall be provided by the Contractor. It shall be the Contractor's responsibility to contact the municipality or fire district to verify the brand of emergency vehicle preemption equipment to be installed prior to the Contract bidding. The equipment must be completely compatible with all components of the equipment currently in use by the Agency. All light operated systems shall operate at a uniform rate of 14.035 hz \pm 0.002, or as otherwise required by the Engineer, and provide compatible operation with other light systems currently being operated in the District. All labor and material required to install and maintain the Emergency Vehicle Preemption installation shall be included in the item TEMPORARY TRAFFIC SIGNAL INSTALLATION.
- (g) Vehicle Detection. All temporary traffic signal installations shall have vehicular detection installed at all approaches of the intersection and as directed by the Engineer. Video vehicle detection systems shall be approved by IDOT prior to the Contractor furnishing and installing. The Contractor shall install, wire, and adjust the alignment of the video vehicle detection system in accordance to the Manufacturer's recommendations and requirements. The Contractor shall be responsible for adjusting the alignment of the video vehicle detection system for all construction staging changes and for maintaining proper alignment throughout the project. The Vendor shall be present and assist the contractor in setting up the video vehicle detection system. An in-cabinet video monitor shall be provided with all video vehicle detection systems and shall be included in the item TEMPORARY TRAFFIC SIGNAL INSTALLATION.
- (h) Pedestrian push-buttons. Pedestrian push-buttons shall be provided for all pedestrian signal heads/phases or as directed by the Engineer. Accessible Pedestrian Signal (APS) buttons shall be installed at any location where they currently exist. All push-buttons shall be latching and have MUTCD R10-3e signs with proper arrows.
- (i) Uninterruptable Power Supply. All temporary traffic signal installations shall have an Uninterruptable Power Supply (UPS). The UPS cabinet shall be mounted to the temporary traffic signal cabinet and shall be according to the applicable portions of Section 862 of the Standard Specifications and as modified in the current District One Traffic Signal Special Provision 862.01TS UNINTERRUPTABLE POWER SUPPLY, SPECIAL.

- (j) Signs. All existing signs shall be removed from existing poles and relocated to the temporary signal. If new mast arm assembly and pole(s) and posts are specified for the permanent signals, the signs shall be relocated to the new equipment at no extra cost. Any signs that are required for the temporary traffic signal shall be provided as shown on the plans or as directed by the Engineer. Relocation, removing, bagging and installing signs for the various construction stages shall be provided as shown on the plans or as directed by the Engineer. If Illuminated Street Name Signs exist, they shall be taken down and stored by the Contractor, and the Contractor shall furnish reflectorized street name signs on the temporary traffic signal installation.
- (k) Energy Charges. The electrical utility energy charges for the operation of the temporary traffic signal installation shall be paid for by others if the installation replaces an existing signal. Otherwise, charges shall be paid for under 109.05 of the Standard Specifications.
- (l) Maintenance.
 - (1) Maintenance shall meet the requirements of the Standard Specifications and the "Maintenance and Responsibility of Traffic Signal and Flashing Beacon Installations" section of the current District One Traffic Signal Special Provision 800.01TS TRAFFIC SIGNAL GENERAL REQUIREMENTS.
 - (2) Maintenance of temporary signals and of the existing signals shall be included in the cost of the TEMPORARY TRAFFIC SIGNAL INSTALLATION pay item. When temporary traffic signals are to be installed at locations where existing signals are presently operating, the Contractor shall be fully responsible for the maintenance of the existing signal installation as soon as they begin any physical work on the Contract or any portion thereof.
 - (3) The temporary signal responsibility shall begin at the start of temporary signal construction and shall end with the removal of the signal as directed by the Engineer.
- (m) Temporary Traffic Signals for Bridge Projects. Temporary Traffic Signals for bridge projects shall follow the State Standards, Standard Specifications, Special Provisions and any plans for Bridge Temporary Traffic Signals included in the Contract. The installation shall meet the Standard Specifications and all other requirements in this TEMPORARY TRAFFIC SIGNAL INSTALLATION specification. In addition, all electric cable shall be aurally suspended at a minimum height of 18 ft (5.5m) on temporary wood poles (Class 5 or better) of 45 ft (13.7 m) minimum height. The signal heads shall be span wire mounted or bracket mounted to the wood pole or as directed by the Engineer. The Controller cabinet shall be mounted to the wood pole as shown in the plans, or as directed by the Engineer. A video vehicle detection system may be used in place of detector loops as approved by the Engineer or as shown in the Contract.

(n) Temporary Portable Traffic Signal for Bridge Projects.

- (1) The controller and cabinet shall be NEMA type designed for NEMA TS2 Type 1 operation. Controller and LED signal displays shall meet the applicable Standard Specifications and all other requirements in this TEMPORARY TRAFFIC SIGNAL INSTALLATION special provision.
- (2) Work shall be according to Article 701.18(b) of the Standard Specifications except as noted herein.
- (3) General.
 - a. The temporary portable bridge traffic signals shall be trailer-mounted units. The trailer-mounted units shall be set up securely and level. Each unit shall be self-contained and consist of two signal heads. The left signal head shall be mounted on a mast arm capable of extending over the travel lane. Each unit shall contain a solar cell system to facilitate battery charging. There shall be a minimum of twelve (12) days backup reserve battery supply and the units shall be capable of operating with a 120 V power supply from a generator or electrical service.
 - b. All signal heads located over the travel lane shall be mounted at a minimum height of 17 ft (5 m) from the bottom of the signal back plate to the top of the road surface. All far right signal heads located outside the travel lane shall be mounted at a minimum height of 8 ft (2.5 m) from the bottom of the signal back plate to the top of the adjacent travel lane surface.
 - c. The long all red intervals for the traffic signal controller shall be adjustable up to 250 seconds in one-second increments.
 - d. As an alternative to detector loops, temporary portable bridge traffic signals may be equipped with other approved methods of vehicle detection and traffic actuation.
 - e. All portable traffic signal units shall be interconnected using hardwire communication cable. Radio communication equipment may be used only with the approval of the Engineer. If radio communication is used, a site analysis shall be completed to ensure that there is no interference present that would affect the traffic signal operation. The radio equipment shall meet all applicable FCC requirements.

- f. The temporary portable bridge traffic signal system shall meet the physical display and operational requirements of conventional traffic signals as specified in Part IV and other applicable portions of the currently adopted version of the Manual on Uniform Traffic Control Devices (MUTCD) and the Illinois MUTCD. The signal system shall be designed to continuously operate over an ambient temperature range between -30°F (-34°C) and 120°F (48°C). When not being utilized to inform and direct traffic, portable signals shall be treated as non-operating equipment according to Article 701.11.

Basis of Payment.

This work shall be paid for at the Contract unit price each for TEMPORARY TRAFFIC SIGNAL INSTALLATION, TEMPORARY BRIDGE TRAFFIC SIGNAL INSTALLATION, or TEMPORARY PORTABLE BRIDGE TRAFFIC SIGNAL INSTALLATION, the price of which shall include all costs for the modifications required for traffic staging, changes in signal phasing as required in the Contract plans, video vehicle detection systems, any maintenance or adjustment to the video vehicle detection system, the temporary wireless interconnect system, temporary fiber optic interconnect system, all material required, the installation and complete removal of the temporary traffic signal, and any changes required by the Engineer. Each location will be paid for separately.

TEMPORARY TRAFFIC SIGNAL TIMING

Effective: May 22, 2002

Revised: March 1, 2024

890.02TS

Description.

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

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

The following tasks are associated with TEMPORARY TRAFFIC SIGNAL TIMING:

- (a) Consultant shall attend temporary traffic signal inspection (turn-on) and/or detour meeting and conduct on-site implementation of the traffic signal timings.
- (b) Consultant shall be responsible for making fine-tuning adjustments to the timings in the field to alleviate observed adverse operating conditions and to enhance operations.
- (c) Consultant shall provide monthly observation of traffic signal operations in the field.

- (d) Consultant shall provide on-site consultation and adjust timings as necessary for construction stage changes, temporary traffic signal phase changes, and any other conditions affecting timing and phasing, including lane closures, detours, and other construction activities.
- (e) Consultant shall make timing adjustments and prepare comment responses as directed by the Area Traffic Signal Maintenance and Operations Engineer.
- (f) Return original timing plan once construction is complete.

Basis of Payment.

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

BRICK PAVER REMOVAL

Description. This work shall consist of the removal of the existing sidewalk paving bricks or concrete pavers at locations impacted by the installation of new sidewalk curb ramps or as directed by the Engineer in accordance with the applicable portions of Section 424 of the Standard

Specifications. Brick Paver Removal shall include the complete removal of the existing pavers, leveling and jointing sand, and compacted aggregate base. Any whole bricks or pavers that remain that are not to be reinstalled shall be disposed of off-site by the Contractor. Method of Measurement. This work will be measured for payment in square feet based on the total area of brick pavers removed less the area of REMOVE AND REINSTALL BRICK PAVER.

Basis of Payment. This work will be paid for at the contract unit price per Square Foot for BRICK PAVER REMOVAL which price shall include the cost of removal, delivery for disposal and all necessary labor, material and equipment necessary to complete the work. Earth Excavation shall be paid for separately.

TERMINAL SERVER

Effective: November 1, 2023

892.02TS

Description.

This work shall consist of furnishing and installing a terminal server used to transmit signal controller data from one or more traffic signal controllers onto the District 1 Advanced Traffic Management System Ethernet network. The Contractor shall furnish and install the required hardware at the location shown on the plans and/or as directed by the Traffic Engineer.

General.

The terminal server shall be one of the following:

- Digi PortServer TS Hcc 4 four-port serial-to-Ethernet device with 120V power supply and Digi RJ45/DB25-male-DCE-48" cable
- Control DeviceMaster DM-2304 four-port serial-to-Ethernet device with 120V power supply and a 9-pin to 25-pin serial cable

The Contractor shall provide a null modem if required by the manufacturer for communication.

The terminal server 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 device menus.

The terminal server shall be properly configured for its location within the District 1 Traffic Ethernet Network, and for proper communication with the signal equipment being connected to it. Except where indicated otherwise in the special provisions or plans, District 1 Traffic will provide the IP address and serial drop addresses upon request.

The required programming shall be included in the cost of this pay item.

Basis of Payment.

This work shall be paid for at the contract unit price per each for TERMINAL SERVER. The unit price shall include all equipment; materials; licenses, programming; testing and documentation; and labor required to add a traffic signal controller to the centralized system.

LAYER II DATALINK SWITCH

Effective: November 1, 2023
Revised: September 1, 2024
892.04TS

Description.

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

Materials.

The Layer II switch shall be environmentally hardened with a minimum of (2) 1Gbps SFP ports and (8) 1Gbps copper RJ45 ports. Two SFP ports shall be populated with environmentally hardened optical modules capable of transmitting the designed distance on single-mode and / or multi-mode fiber optic cable as defined in the plans. An environmentally hardened power supply with input of 120 VAC and sufficient wattage for the switch shall be provided.

The switch shall conform to the following minimum specifications:

- Forwarding Bandwidth 3.8Gbps
- Switching Bandwidth 7.6Gbps
- Forwarding rate: 5.66Mpps with 64-byte packets (Line-rate at all packet sizes)
- Egress buffer: 2 MB
- Unicast MAC addresses: 8000
- Internet Group Management Protocol (IGMP) multicast groups: 255
- Virtual LANs (VLANs): 256
- IPv4 MAC security ACEs: 384 (default Ternary Content-Addressable Memory [TCAM] template)
- Bidirectional, 128 NAT translation entries
- IPv4 routing: 2000 routes, IPv6 routing: 1750 routes
- Layer 2 switching: IEEE 802.1, 802.3, 802.3at, 802.3af standard (see Table 8), VTPv2, NTP, UDLD, CDP, LLDP, Unicast MAC filter, Resilient Ethernet Protocol (REP), Media Redundancy Protocol (MRP) Ring (IEC 62439-2)
- Security: SCP, SSH, SNMPv3, TACACS+, RADIUS Server/Client, MAC Address Notification, BPDU Guard, SPAN session
- Multicast: IGMPv1, v2, v3 Snooping, IGMP filtering, IGMP Querier
- Safety certifications:
 - UL/CSA 60950-1
 - EN 60950-1
 - CB to IEC 60950-1 (with country deviations)
 - NOM to NOM-019-SCF1 (through partners and distributors)
 - CE Marking

- Hazard location:
 - ANSI/ISA 12.12.01 (Class1, Div2 A-D)
 - EN 60079-0, -15 ATEX Certificate (Class 1, Zone2 A-D)
- EMC emissions and immunity compliance:
 - FCC 47 CFR Part 15 Class A
 - EN 55022A Class A
 - VCCI Class A
 - RoHS compliance
 - AS/NZS CISPR 22 Class A, AS/NZS CISPR 24
 - CISPR11 Class A, CISPR22 Class A
 - ICES 003 Class A
 - CE Marking
 - IEC/EN/EN61000-4-2 (Electro Static Discharge), 15kV air/8kV contact
 - IEC/EN 61000-4-3 (Radiated Immunity, 10 and 20 V/m)
 - IEC/EN 61000-4-4 (Fast Transients - 4kV power line, 4kV data line)
 - IEC/EN 61000-4-5 (Surge 2 kV/1 kV)
 - IEC/EN 61000-4-6 (Conducted Immunity, 10 V/emf)
 - IEC/EN 61000-4-8 (Power Frequency Magnetic Field Immunity)
 - IEC/EN 61000-4-9 (Pulse Magnetic Field Immunity)
 - IEC/EN 61000-4-10 (Oscillatory Magnetic Field Immunity)
 - IEC/EN 61000-4-11 (AC power Voltage Immunity)
 - IEC/EN 61000-4-29 (Voltage Dips Immunity)
 - IEC/EN 61000-6-1 (Immunity for Light Industrial Environments)
 - IEC/EN 61000-6-2 (Immunity for Industrial Environments)
 - IEC/EN 61000-6-4 Class A
 - EN 61326
- Shock and vibration:
 - IEC 60068-2-27 (Operational Shock: 30G 11ms, half sine)
 - IEC 60068-2-27 (Non-Operational Shock 55-70G, trapezoidal)
 - IEC 60068-2-6, IEC 60068-2-64, EN 61373 (Operational Vibration)
 - IEC 60068-2-6, IEC 60068-2-64, EN 61373 (Non-operational Vibration)
- Industry standards:
 - UL508
 - CSA C22.2 No. 142
 - EN 61131-2 (EMC/EMI, environmental, mechanical)
 - Substation KEMA (IEEE 1613, IEC 61850-3)
 - EN50121-3-2
 - EN50121-4
 - NEMA TS-2 (EMC, environmental, mechanical)
 - ABB Industrial IT certification
 - IP30
 - ODVA Industrial Ethernet/IP support
- Corrosive testing:
 - ISO-12944-6
 - IEC-60068-2-60

- Humidity:
 - IEC 60068-2-52 (salt fog mist, test Kb) marine environments
 - IEC 60068 -2-3
 - IEC 60068-2-30
 - Relative humidity: 5% to 95% non-condensing
- Operating temperature:
 - -40C to +70C (vented enclosure - 40 LFM Air Flow)
 - -40C to +60C (sealed enclosure – 0 LFM Air Flow)
 - -34C to +75C (fan or blower-equipped enclosure – 200 LFM Air Flow)
 - -40C to +85C (IEC 60068-2-2 Environmental Type Testing – 16 hours)
- Operational altitude: Up to 15,000 ft
- Storage temperature:
 - -40 C to +85 C (storage temperature)
 - IEC 60068-2-14
- Storage altitude: Up to 15,000 ft
- Mean time between failure: 374,052 hours (42.7 years)
- Warranty: Five-year

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

Construction Requirements

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

Configuration Design Document.

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

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

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

Basis of Payment.

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

LAYER III NETWORK SWITCH

Effective: November 1, 2023
892.05TS

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.

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 sparse-dense mode
- IP unicast routing protocols: OSPF, EIGRP, BGPv4, IS-IS, RIPv2, Policy-Based Routing (PBR), HSRP
- IPv6 routing: RIPng, OSPFv6, and EIGRPv6 support
- 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 D1 field network design. High level guidance (IP Scheme / VLANs / routing protocols, etc.) will be provided by IDOT but the integration, functionality and compatibility with the existing network are the responsibility of the contractor.

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

Basis of Payment.

This work will be paid for at the contract unit price per each for LAYER 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 Traffic Engineer.

CENTRACS LICENSE EXPANSION

Effective: November 1, 2023

892.06TS

Description.

This work shall consist of providing a license for the addition of a traffic signal controller to the existing CENTRACS system and programming the intersection into the existing CENTRACS system.

General.

This pay item may be grouped per job. For example a 50 unit license pack is acceptable for a job with 45 intersections. Individual licenses not needed but part of package shall be provided to IDOT Electrical Maintenance Contractor. Vendor shall coordinate with EMC contractor to transfer the unused licenses.

The CENTRACS system shall be programmed for complete functionality of the intersection traffic signal controller.

Basis of Payment.

This work shall be paid for at the contract unit price per each for CENTRACS LICENSE EXPANSION. The unit price shall include all equipment; materials; licenses, programming; testing and documentation; and labor required to add a traffic signal controller to the CENTRACS system

REMOTE CONTROLLED VIDEO SYSTEM

Effective: November 1, 2023

892.08TS

Description.

This work shall consist of furnishing and installing an IP based remote controlled video system at a location designated by the Traffic Engineer. 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. Any licensing required for adding the camera to the CENTRACS CCTV VIDEO MODULE will be provided by The Department. Configuration of the camera into the centralized system shall be part of this pay item.

Materials.

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

- TKH Security Solutions PD1103Z2-E
- AXIS Q6075-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. The remote controlled video system shall be warranted, free from material and workmanship defects for a period of three years from final acceptance.

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 Traffic Engineer. The OUTDOOR RATED NETWORK cable from the traffic signal cabinet will be paid for separately. If required, the LAYER II (DATALINK) SWITCH and/or the LAYER III (NETWORK) SWITCH will be paid for separately.

REMOVE EXISTING TRAFFIC SIGNAL EQUIPMENT

Effective: May 22, 2002

Revised: March 1, 2024

895.02TS

Add the following to Article 895.05 of the Standard Specifications:

“The traffic signal equipment which is to be removed and is to become the property of the Contractor shall be disposed of outside the right-of-way at the Contractor’s expense.

All equipment to be returned to the State shall be delivered by the Contractor to the State's Traffic Signal Maintenance Contractor's main facility. The Contractor shall contact the State's Electrical Maintenance Contractor to schedule an appointment to deliver the equipment. No equipment will be accepted without a prior appointment. All equipment shall be delivered within thirty (30) days of removing it from the traffic signal installation. The Contractor shall provide one hard copy and one electronic file of a list of equipment that is to remain the property of the State, including model and serial numbers, where applicable. The Contractor shall also provide a copy of the Contract plan or special provision showing the quantities and type of equipment. Controllers and peripheral equipment from the same location shall be boxed together (equipment from different locations may not be mixed) and all boxes and controller cabinets shall be clearly marked or labeled with the location from which they were removed. If equipment is not returned according to these requirements, it will be rejected by the State's Electrical Maintenance Contractor. The Contractor shall be responsible for the condition of the traffic signal equipment from the time Contractor takes maintenance of the signal installation until approval by the Department. A delivery receipt will be signed by the State's Electrical Maintenance Contractor indicating the items have been returned.

The Contractor shall safely store and arrange for pick up or delivery of all equipment to be returned to agencies other than the State. The Contractor shall package the equipment and provide all necessary documentation as stated above.

Traffic signal equipment which is lost, damaged, or not returned to the Department for any reason shall be replaced with new equipment meeting the requirements of these Specifications at no cost to the contract.”

REBUILD EXISTING HANDHOLE

Effective: January 1, 2002

Revised: March 1, 2025

895.04TS

This item shall consist of rebuilding and bringing to grade a handhole, double handhole, or heavy duty handhole at a location shown on the plans or as directed by the Engineer. The work shall consist of removing the handhole frame and cover and the walls of the handhole to a depth of eight (8) inches below the finished grade.

Handhole and Heavy Duty Handhole

Four (4) holes, four (4) inches in depth and one half (1/2) inch in diameter, shall be drilled into the remaining concrete; one hole centered on each of the four handhole walls. Four (4) #3 epoxy coated steel rebar, eight (8) inches in length, shall be furnished and shall be installed in the drilled holes with a masonry epoxy.

Double Handhole

Six (6) holes, four (4) inches in depth and one half (1/2) inch in diameter, shall be drilled into the remaining concrete; one hole centered on both short walls and two spaced equally on both long walls. Six (6) #3 epoxy coated steel rebar, eight (8) inches in length, shall be furnished and shall be installed in the drilled holes with a masonry epoxy.

All concrete debris shall be disposed of outside the right-of-way. All rebar must meet the specifications set forth in 1006.10.

The area adjacent to each side of the handhole shall be excavated to allow forming. All steel hooks, handhole frame, cover, and concrete shall be provided to construct a rebuilt handhole according to applicable portions of Section 814 of the Standard Specification and as modified in 814.01TS HANDHOLES Special Provision. The existing frame and cover shall be replaced if it was damaged during removal or as determined by the Engineer.

Basis of Payment.

This work shall be paid for at the contract unit price each for REBUILD EXISTING HANDHOLE, which price shall be payment in full for all labor, materials, and equipment necessary to complete the work described above and as indicated on the drawings.

ACCESSIBLE PEDESTRIAN SIGNALS

Effective: April 1, 2003

Revised: November 1, 2023

888.02TS

Description. This work shall consist of furnishing and installing accessible pedestrian signals (APS). Each APS shall consist of an interactive vibrotactile pedestrian pushbutton with speaker, an informational sign, a light emitting diode (LED) indicator light, a solid-state electronic control board, a power supply, wiring, and mounting hardware. The APS shall meet the requirements of the MUTCD and Sections 801 and 888 of the Standard Specifications, except as modified herein.

Add the following to Article 888.03 of the Standard Specifications:

A mounting bracket and/or extension shall be used to assure proper orientation and accessibility where needed. The price of the bracket and/or extension shall be included in the cost of the pedestrian push button. The contractor is not allowed to install a push-button assembly with the sign below the push-button to meet mounting requirements.

Add the following to Article 1074.02(e) of the Standard Specifications:

Stations shall be designed to be mounted to a post, mast arm pole or wood pole. The station shall be aluminum and shall accept a 3 inch round push-button assembly and a regulatory pedestrian instruction sign according to MUTCD, sign series R10-3e 9" x 15" sign with arrow(s) for a count-down pedestrian signal. Stations shall be powder coated yellow with a black pushbutton and stainless steel arrow on pushbutton.

Electrical Requirements. The APS shall operate with systems providing 95 to 130 VAC, 60 Hz and throughout an ambient air temperature range of -29 to +160 °F (-34 to +70 °C).

The APS shall contain a power protection circuit consisting of both fuse and transient protection.

Audible Indications. A pushbutton locator tone shall sound at each pushbutton and shall be deactivated during the associated walk indication and when associated traffic signals are in flashing mode. Pushbutton locator tones shall have a duration of 0.15 seconds or less and shall repeat at 1-second intervals. Each actuation of the pushbutton shall be accompanied by the speech message "Wait". Locator tones shall be audible 6 to 12 ft from pushbutton.

If two accessible pedestrian pushbuttons are placed less than 10 ft apart or placed on the same pole, the audible walk and don't walk indication shall be a speech message. This speech message shall sound throughout the WALK interval only. Common street name shall be used and not the route number of the street unless there is no common street name. The street name used in programming shall reflect the street name mast arm mounted sign panel. Locations without street name (ex. private benefit driveways, shopping plaza entrance, etc.) shall use a general term "Commercial Driveway" as a street name for that leg. The speech message shall be modeled after: "Street Name. Walk Sign is on to cross "Street Name." For signalized intersections utilizing exclusive pedestrian phasing, the verbal message shall be "Walk sign is on for all crossings". In addition, a speech pushbutton information message shall be provided by actuating the APS pushbutton during DON'T WALK interval. This verbal message shall be modeled after: "Wait". The extended press option verbal message shall be: "Wait to cross 'Street Name' at 'Street Name'".

Railroad Preemption.

At locations with railroad interconnection APS pushbutton shall be capable of receiving a railroad preemption similar to a traffic signal controller and shall be hard wired to the railroad preemption relay inside the traffic signal cabinet. A shelf mount control unit shall be provided and installed inside the cabinet capable of receiving and transmitting the railroad preemption to all the push buttons.

At railroad intersections all APS pushbuttons shall use the speech message and shall follow the below speech models.

During Don't Walk: "Wait to cross 'Street Name' at 'Street Name', Caution, Walk time shortened when train approaches" – this does not repeat, plays only once with every push button press.

During Walk: "Walk sign is on to cross 'Street Name', – this repeats as many times as possible during Walk interval only.

During Railroad preemption: All push buttons at same time "Train Approaching" – this message shall be repeated two times.

At locations with emergency vehicle preemption, NO additional speech message shall be provided.

At locations with Equestrian Pushbuttons style installation the APS push buttons shall use speech message only and shall emit the audible message from the bottom mounted push button only.

Locations with Corner Islands or Center Medians

At locations with corner islands pushbuttons shall follow the requirement of the 10 ft as specified herein regarding the percussive tone vs a speech message. When push buttons are closer than 10 ft apart the speech message shall follow the format specified herein for the main street crossing. The speech message shall follow the below speech models for the unusual configurations.

Crossing of the right turn lane from or to Corner Island: “Wait to cross right turn lane for ‘Street Name’ at ‘Street Name’ crosswalks” and “Walk sign is on to cross right turn lane for ‘Street Name’ at ‘Street Name’ crosswalks”

Crossing from Corner Island to Corner Island where second pushbutton actuation is required: “Wait to cross ‘Street Name’ at ‘Street Name’ to median with second pushbutton” and “Walk sign is on to cross ‘Street Name’ to median with second pushbutton”

Center Medians on a divided highways with push buttons will require pushbutton to have a dual arrow on the pushbutton.

Where two accessible pedestrian pushbuttons are separated by 10 ft or more, the walk indication shall be an audible percussive tone. It shall repeat at 8 to 10 ticks per second with a dominant frequency of 880 Hz. Percussive tone shall be uniform at all stations at the intersection and shall not change for different directions.

Automatic volume adjustments in response to ambient traffic sound level shall be provided up to a maximum volume of 100 dBA. Locator tone and verbal messages shall be no more than 5 dB louder than ambient sound. Locator tone and speech message shall be programmed at same volume one shall not be significantly louder than the other and shall be adjusted as directed by the Engineer.

Pedestrian Pushbutton. Pedestrian pushbuttons shall be at least 2 in. (50 mm) in diameter or width. The force required to activate the pushbutton shall be no greater than 3.5 lb (15.5 N).

A red LED shall be located on or near the pushbutton which, when activated, acknowledges the pedestrians request to cross the street.

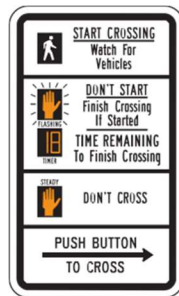
APS pushbutton systems that utilize any wireless technology including Bluetooth technology to place calls or communicate with controller will not be allow. A central master control unit shall be provided and installed in the traffic signal cabinet. Push button shall be connected directly to the master control unit in the traffic signal cabinet using only 2 wires. All pushbuttons shall be capable of placing a pedestrian call request into the controller and shall be hard wired. APS pushbuttons shall be a direct replacement of existing standard push buttons and shall be weather resistant with a minimum warranty of 5 years.

APS push buttons shall be compatible with one another and easily replaceable on future replacements or maintenance repairs no multiple model variations will be allowed.

All APS pushbuttons shall come with the messages pre-programmed for each particular intersection regardless of the location or the 10 ft separation. Final field adjustments including percussive tone vs speech message use shall be completed once push buttons are installed in the final location. All push buttons shall be programmed with the appropriate parameters and settings as directed by the Engineer. These settings shall be standard for all pushbuttons and will vary based on the manufacturer. Access to pushbutton settings shall be provided through an app either through wired, wireless, or Bluetooth connection. Pushbutton information, settings, and access instructions shall all be provided in a weatherproof pouch and safely stored inside each traffic signal cabinet.

Contractor shall remove any existing pedestrian isolation boards, field wire terminals, and any wires to the board when easily accessible. If the pedestrian isolation board has been installed from the factory on the back panel of the cabinet, contractor is to disconnect the power to the isolation board and any wires while leaving the board mounted. This work shall be included in the cost of Accessible Pedestrian Signals and will not be paid for separately.

Signage. A sign shall be located immediately above the pedestrian pushbutton and parallel to the crosswalk controlled by the pushbutton. The sign shall conform to the following standard MUTCD design: R10-3e.



R10-3E

Tactile Arrow. A tactile arrow, pointing in the direction of travel controlled by a pushbutton, shall be provided on the pushbutton.

Vibrotactile Feature. The pushbutton shall pulse when depressed and shall vibrate continuously throughout the WALK interval.

Basis of Payment. This work will be paid for at the contract unit price per each for ACCESSIBLE PEDESTRIAN SIGNALS and shall include furnishing, installation, mounting hardware including extension brackets if required, and programming of the push button.

BLUETOOTH DETECTOR

Description. This work shall consist of furnishing and installing a Bluetooth travel time detector on an existing or proposed camera pole, mast arm, or light pole and all items required for installation including but not limited to cabling, brackets, and hardware.

The Bluetooth detector shall continuously monitor and timestamps the presence of Bluetooth devices within the range of the receiver. This data will be transmitted to the vendors cloud based application.

The proposed Bluetooth detector shall be installed perpendicular to the roadway.

Equipment and component parts furnished shall be new, be of the latest design and manufacture, and be in an operable condition at the time of delivery and installation. All parts shall be of high-quality workmanship, and no part or attachment shall be substituted or applied contrary to the manufacturer's recommendations and standard practices. The Contractor shall be responsible for providing all materials (Mounting brackets, connectors, cabling, software and hardware) to install and place into operation, a complete and operational system.

All cabling shall be rated shielded and rated for outdoor use and shall be installed in accordance with the manufacturer's recommendations.

The detector shall consist of the Bluetooth sensor equipped with Ethernet, POE power injector, processor, and antennas integrated into a NEMA 4 enclosure with no penetrations to the enclosure except for the antenna. All devices must comply with FCC regulations governing Bluetooth and Cellular emissions. The enclosure shall be self-contained, with provision for mounting to light poles, sign trusses, and other structures using stainless steel straps.

The Bluetooth sub assembly shall have the highest allowed transceiver power. The internal microprocessor should be capable of up to 1 GB storage.

The Bluetooth sensor shall contain advanced features designed to allow the unit to operate efficiently in a remote environment. Diagnostic heartbeat information such as voltage and temperature monitoring, as well as software stability information should be periodically sent along with the MAC addresses. The system is to be designed to be able to automatically reboot if a condition is detected that requires such action. In the case when a total system recovery is required, the sensor is to be designed to automatically re-image the system memory.

In addition, the sensor should have the ability to download software patches and upgrades over the air without the need to physically visit the unit. These patches and upgrades shall be included in this pay item at no additional cost to the Department.

The Bluetooth detector shall be a TrafficCast Bluetooth Spectra Ethernet detector or approved equal that meets or exceeds the following specifications:

Power Specifications:

Power over Ethernet (PoE)

IEEE 802.3af standard

PoE Voltage: 48 VDC

110/230 VAC supply to injector

DC Power:

DC Supply Current:

@ 12V - Typical 150 mA

@ 12V - Maximum 250 mA

DC Supply Voltage: Minimum – 9.5 VDC

Maximum – 50 VDC

AC Power:

100/230 VAC 50 Hz to 60 Hz

Operating Range:

-40°C to + 85°C

Processor:

Real Time Microcontroller

8GB Removable microSD Card

Connectivity:

PoE – Ethernet 10 BASE-T / 100 BASE-T

Static or DHCP IP Addressing (Only one Ethernet connection needed per unit)

Bluetooth:

Non-Discoverable 2.4 GHz Demodulator

Discoverable CSR Bluecore 4 Class 1

Minimum Detection Range: 300 in all directions

Bluetooth Radio (adjustable) Transmit Power

Range:

-90 dBm to +20 dBm

Antennae:

Bluetooth: (2) - 2 dBi Omni

NEMA 4X Enclosure:

10" in. x 3.0" in. x 3.0" in.

Weight: < 5 lbs.

Software Subscription:

Each sensor shall include a two-year subscription to the TrafficCast cloud based BlueARGUS travel time-based performance software. The Department will program each Bluetooth detector to report to the cloud-based application server.

Installation:

The Contractor, shall install the detectors at the locations shown on the plans. It shall be the Contractor's responsibility to verify each location's viability and make any alternate site recommendations to the Department.

If needed, the Contractor shall perform a site survey and the cost of the site survey shall be incidental to the cost of the roadside detector pay item.

The manufacturer shall provide guidance and assistance during site survey and installation. The Bluetooth Detectors shall be mounted on poles and oriented perpendicular to the roadway. The recommended mounting height for the Bluetooth sensor is 12' – 15' feet above the travelled lane (or as recommended by the manufacturer).

Warranty: The Bluetooth manufacturer shall provide a five-year warranty, to IDOT and its Agents, on parts, labor and postage, for all detectors, hardware and software. The warranty shall also include five years of software patches and updates. Software licenses shall not expire.

Basis of Payment: This work will be paid for at the contract unit price of Each for BLUETOOTH DETECTOR, which shall be payment in full for all labor, equipment, and materials required to furnish and install the Bluetooth detector and two-year subscription to the cloud based application server as described above, complete.

CABINET, MODEL 334

Description

This work shall consist of furnishing and installing a ground-mounted Model 334 cabinet fully equipped for power distribution for the DMS at locations as shown in the Plans. The cabinet shall include all components and cabling to support sign control and communications as shown on the plans.

Materials

General

Cabinet Model 334 shall be an aluminum durable, weatherproof enclosure, with nominal outside dimensions of 66 in (1.7 m) high X 24 in (600 mm) wide X 30 in (762 mm) deep. Cabinet Model 334 shall consist of the following components: double door each equipped with a lock for front and rear cabinet entry, housing, mounting cage, service panel, thermostatically controlled fan, all necessary mounting hardware and wiring, and other equipment as shown on the plans and specified in these special provisions.

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

Cabinet Components

The housing and the mounting cage assembly shall conform to those of the Model 334 cabinet provisions of the "Traffic Signal Control Equipment Specifications" (TSCES) and Qualified Products List (QPL) issued by the State of California's Department of Transportation and to all addenda thereto current at the time of project's advertising. The housing shall be rainproof with the top of the enclosure crowned to prevent standing water. All exterior seams for the enclosure and doors shall be continuously welded and shall be smooth. The housing shall have no provisions for a police panel or door.

The cabinet shall have single front and rear doors, each equipped with a lock. The enclosure door frames shall be double flanged out on all 4 sides and shall have strikers to hold tension on and form a firm seal between the door gasketing and the frame. The front and rear doors shall be provided with catches to hold the door open at both 90° and 180° ±10°. Gasketing shall be provided on all door openings and shall be dust-tight. For horizontal support and bolt attachment, cage bottom support mounting angles shall be provided on either side, level with the bottom edge of the door.

The latching handles on the doors shall have provisions for padlocking in the closed position. When the door is closed and latched, the door shall be locked. The locks and handles shall be on the right side of the front door and the left side of the rear door. The lock and lock support shall be rigidly mounted to the door. The locks shall be Corbin #2, and two keys shall be supplied to the Department with each lock. The keys shall be removable in the locked position only.

The front and rear doors shall be provided with louvered vents. A removable and reusable air filter shall be housed behind the door vents. The filter filtration area shall cover the vent opening area, and the filter shell provided shall fit over the filter providing mechanical support for the filter. The shell shall be louvered to direct the incoming air downward.

The intake (including filter with shell) and exhaust areas shall pass a minimum of 60 cubic feet of air per minute for housing #1 and 26 cubic feet of air per minute for housing #2. The thermostatically controlled fan with ball or roller bearings shall be mounted within the housing and vented. The fan shall provide a capacity of at least 150 cubic feet of free air delivery per minute of ventilation. The fan shall be thermostatically controlled and activated when the temperature inside the cabinet exceeds 75°F (24°C) and shut off when the temperature is less than 64°F (18°C). In addition, the fan shall be manually adjustable for automatic turn on and off. The fan circuit shall be protected at 125% of the fan motor ampacity.

The housing shall, also, be equipped with a heating element installed in the bottom front of the cabinet and mounted along the side of the rack. The heating element shall draw 500 watts and have an output of at least 1,700 BTU/hr. The heater shall have a built-in quick response thermostat with sealed contacts that has a temperature control range of 40°F to 100°F and have a built-in thermal cut-off to automatically shut-off the heater in the event of overheating.

All subassemblies shall be mounted in removable 19 in (482 mm) EIA self-standing rack assemblies. The EIA rack portion of the cage shall consist of 2 pairs of continuous, adjustable equipment mounting angles that comply with Standard EIA RS-310-B. The cage shall be centered within the cabinet and bolted to the cabinet at 4 points.

Each cabinet shall be equipped with 2 shelves and one slide out keyboard tray. Shelves shall be the full width of the rack and 12" (300 mm) deep. The shelves shall be designed to support a minimum of 50 pounds.

The cabinet shall be equipped with one rack-mounted 96-fiber enclosure equipped with 96 fiber connectors of the type matching the fiber jumpers to equipment and the fiber pigtails spliced with incoming fiber-optic cables.

Each cabinet shall be equipped with one LED lighting fixture mounted to the inside top front portion of the cabinet. The fixture shall have an F-15-T-8 cool white lamp; operated from a normal power factor, UL listed cold weather ballast. A door-activated switch shall be installed to turn the cabinet light on when the front door is opened. The door switch shall be on a separate circuit by itself and used only to turn on the cabinet light.

Each cabinet shall be supplied with a heavy-duty plastic envelope to store plans, wiring diagrams, schematics, etc. This envelope shall have metal grommets so that it hangs from the door hooks. The envelope shall have minimum dimensions of 10 in (250 mm) x 15 in (381 mm).

Foundations shall be included and conform to those shown on the plan sheets.

All cabinet cabling shall be furnished and installed by the Contractor. Cables shall be in accordance with the manufacturer's requirements.

Power Protection

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

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

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

Construction Requirements

The Contractor shall deliver the Cabinet Model 334 mounted on a plyboard-shipping pallet that is bolted to the cabinet base. The cabinet shall be enclosed in a slipcover cardboard packaging shell. The housing doors shall be blocked to prevent movement during transportation to the site.

The Contractor shall securely fasten the Cabinet Model 334 on the new concrete foundation at the locations shown on the plans. The Contractor shall confirm the orientation of the Cabinet Model 334 installation and its front door side with the Engineer prior to installation. Stainless steel bolted connections shall be provided with lock-washers, locking nuts, or other approved means to prevent the connection nuts from backing off. Dissimilar materials shall be isolated from one another by stainless steel fittings.

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

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

Cabinet Acceptance Test

In addition to the environmental and design approval tests specified in the FHWA Type 170 Traffic Signal Control System Hardware Specification, the following water spray test shall be performed for each type of cabinet:

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

Documentation

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

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

Method of Measurement

Cabinet Model 334 will be measured as a unit, completely installed and operational.

Basis of Payment

Work will be paid for at the contract unit price per each for CABINET MODEL 334, which price shall be payment in full for furnishing and installing the cabinet and all connections; testing, and for all labor, tools, equipment, transportation, and incidentals necessary to complete this item of work.

CCTV CAMERA STRUCTURE, 50 FT. MOUNTING HEIGHT

Description

This work shall consist of furnishing and installing a conventional type round tapered aluminum pole complete with CCTV camera mount and all required hardware including bolt covers as specified herein.

MATERIALS

Pole Shaft

Unless otherwise indicated the pole shaft shall be made of aluminum conforming to current ASTM designation B 221, alloy 6063 with final temper T6. The shaft shall be spun drawn to smooth circular, tubular, seamless, tapered design.

Unless otherwise indicated, the pole shall be designed and manufactured to withstand equipment dead loadings of up to and including a 75 pound camera having an effective projected area of 1.6 ft² on a single 4 foot arm, and shall also to withstand loadings of up to and including the same camera on each of two 4-foot arms oriented at any angle from 45 to 180 degrees apart, meeting the criteria of 2015 AASHTO LRFD for 120 mph wind zone. These loading requirements shall include all camera and arm orientations possible for the given pole height, up to and including the limits given. Information submitted for approval shall document satisfaction of this requirement.

The indicated mounting height shall be taken from the bottom of the pole shaft base plate and shall be obtained with a nominal arm rise of 12 inches as specified elsewhere herein. This shall determine the required length of the pole shaft regardless of the actual mounting method of the pole.

Unless otherwise indicated, poles shall have a 10 inch outside bottom diameter tapering to 6 inch outside top diameter. The shaft shall be designed to accommodate loading of the arm configuration indicated, with a minimum wall thickness of 0.312 inch. Where the indicated arm configuration exceeds these minimum criteria, the wall thickness shall be increased to satisfy the design loading requirements.

Handhole

There shall be an oval shaped opening in the side of the shaft for the purpose of a handhole. Unless otherwise indicated, the centerline of the handhole shall be 18 inch from the bottom of the shaft. The handhole shall be 4 inch x 8 inch in size with the 8 inch dimension being situated vertically and in the same plane as any one of the sides of the base. The opening in the shaft shall be reinforced with a handhole frame situated on the inside of the shaft and welded to the shaft. A 1/2"-13 tapped hole shall be provided in the frame for attaching a mechanical grounding connector. The handhole cover shall be fastened to the frame with 1/4"-20 size steel core nylon hex-head screws and the holes for the screws shall be tapped to match the screws. Unless otherwise indicated, the orientation of the handhole shall be such that its pole face shall be opposite to the pole face exposed to oncoming traffic and unless otherwise indicated, the handhole shall be oriented on a face 90 degrees from arm orientation.

All exposed surfaces of the shaft shall be of a smooth, even texture, free from marks and imperfections. The pole shall have a satin ground finish, 100 grit or finer.

Top Plate

The top of the pole shaft shall be enclosed with a removable top plate. The top plate shall be secured in place with 300 series galvanized steel screws. The design of the top plate shall be such that it shall not permit entry of water into the shaft.

Grommets at the top portion of the shaft two 1½ inch diameter openings shall be made and two 1¼ inch inside diameter rubber grommets shall be provided, for wiring purposes through the arm(s). The grommet openings shall be at 90 degree angles from the position of the handhole, i.e., there shall be two (2) grommet openings for each shaft, 180 degrees apart from each other and at 90 degrees apart from the handhole, unless otherwise indicated.

Base Plate

The bottom portion of the shaft shall be fitted with a base. The base shall be a permanent mold casting of aluminum alloy conforming to current Aluminum Association designations 356.0 or 4356.0, with final temper T6. The base shall be welded to the shaft by the inert gas shielded arc method. All welds shall be free from cracks and pores. All shafts with base plates shall be heat treated after welding. The base shall be equipped with anchor bolt covers. Four anchor bolt slots shall be provided in the base to accommodate the required bolt circle diameter. Unless otherwise indicated, poles shall have 15 inch bolt circles. The size of the slots shall be 1¼ inch by 2 inches as detailed on the pole drawing. Rodent Guard

The space between the finished top of the foundation and the bottom of the base plate of the pole shall be enclosed with an expanded metal screen made of stainless steel. The size of the mesh of the screen shall be 1/4 in. (6 mm) or less and #18 gauge (1.22 mm) thick, or heavier as approved by the Engineer. The screen shall be held in place with a stainless-steel band installed around the tower base plate. The band shall be held tight by a ratchet-type device. Grouting shall not be used to enclose the above described space.”

Anchor Bolt Covers

The anchor bolt covers shall be made from aluminum, conforming to current ASTM B 108, S5A F or, B 26, SG70A. The anchor bolt covers shall be fastened to the base with ¼ inch - 20 threaded steel reinforced plastic fasteners. The fasteners shall be threaded with ¼ inch - 20 threaded holes for bolt covers.

Vibration Damper

The pole shall be coordinated with all cameras being provided on this project to be free of susceptibility to harmful harmonics and vibrations. The pole shall incorporate an internal vibration damper. The material submitted for approval shall address this requirement.

Bundling

The shafts shall be shipped in bundles without any wrapping on the individual shafts or the entire bundle. Appropriate bundling materials shall be used to make a rigid, long lasting bundle capable of being handled, shipped and stored without shifting or breaking of contents.

Arm

The arm (bracket) shall be manufactured by the CCTV camera manufacturer and be fully coordinated with the CCTV camera pay item. All openings extending to the camera the bracket shall be free of burrs and rough edges that may be injurious to the wires.

Vibration Requirements

The detailed design and fabrication of the shaft and of the arms shall be such as to withstand 120 mph AASHTO criteria for wind and vibrations, caused by the wind pressure. There shall be no excessive vibrations in the shaft, arm(s) under moderate wind pressure, where damage may result to the camera(s) and/or its component parts, and/or arms(s). A dampening device, as an integral part of the shaft, shall be installed in the shaft to alleviate such excessive vibrations. The proposed vibration dampening device shall be submitted for Engineer's approval.

No information contained herein shall be construed to relieve the Contractor of the above requirements.

Certification and Guarantee

The submittal information shall include a written certification of compliance with the contract requirements from the Manufacturer. The certification shall specifically identify the project route, location, section number, and contract number, as applicable and shall identify specifically the equipment covered by the certification. The certification shall be made on the Manufacturer's corporate stationary and it shall be dated and signed by a responsible officer of the company, with the signee's title listed.

In addition, submittal information shall include the guarantee as specified under General Electrical Provisions.

CONSTRUCTION REQUIREMENTS

The structure shall be set plumb on the foundation without the use of shims, grout or any other leveling devices under the pole base. The arm or bracket shall be set at right angles to the centerline of the pavement, unless otherwise indicated. This item shall be coordinated with the applicable camera (with pole wire and fusing) and foundation with anchor bolts, which shall be provided under separate pay items, as applicable.

Poles shall not be installed until cameras are available for installation at the same time the poles are installed. Poles shall not be installed and left standing without a coordinated installation of arm and camera.

METHOD OF MEASUREMENT

This work will be paid for at the contract unit price for each camera structure installed.

BASIS OF PAYMENT

This work will be paid for at the contract unit price each for CLOSED CIRCUIT TELEVISION CAMERA STRUCTURE, 50 FT. MOUNTING HEIGHT.

CLOSED CIRCUIT TELEVISION CABINET

Description

This work consists of furnishing and installing a pole mounted equipment cabinet and peripheral equipment at locations indicated in the plans. The cabinet will be utilized to house critical electrical, optical, and communications equipment as defined in other contract pay items.

MATERIAL

General

The equipment cabinet shall conform to the details shown on the plan sheet. Equipment cabinets shall be mounted and anchored to the poles and structures at locations indicated in the Plans. In addition, all mounting hardware and brackets required to install the equipment cabinet on the pole shall be stainless steel or galvanized steel and provided by the Contractor. The mounting height and pole diameters shall be as indicated in the plans.

The cabinet shall be a NEMA 3R Single Door Enclosure, constructed from 0.125" thick aluminum, with nominal outside dimensions of 18" (H) x 14" (W) x 10" (D). The cabinet shall have a natural finish.

The cabinet shall be equipped with an appropriate exhaust fan, heater, and thermostat and shall be appropriately vented.

The cabinet shall be furnished with a slam lock, neoprene door gasket, vent slots, continuous stainless steel door hinge, and all stainless-steel hardware. The cabinet shall also have a Corbin #2 dead bolt lock or skeleton key. The key shall be removable in the lock position only. Two keys shall be supplied for each lock, and all equipment cabinet locks shall be keyed the same.

All cables shall be labeled utilizing marking tags.

The cabinet shall be equipped with a main power panel as shown on the cabinet plan detail sheet. The power panel shall include one 15A main breaker, power terminal blocks, and one six outlet power strip with integral surge protection. The power panel shall include a plexi-glass safety shield that covers the power panel.

Power Strip

The cabinet power strip shall have a minimum of six outlets and integral surge suppression that meets or exceeds the following minimum specifications:

- Let Through Voltage: <85 Volts
- Operating Voltage: 120VAC, 50/60H
- UL Suppressed Voltage Rating: 330V
- Energy Rating: 320J
- Peak Current NM/CM: 13k Amps NM, 13k Amps CM
- EMI/RFI Noise Filtration: >25-60dB

The power strip shall be wired directly to the power terminals in the cabinet.

CONSTRUCTION REQUIREMENTS

The Contractor shall prepare and submit shop drawings that detail all the components to be supplied, along with associated mounting hardware for the equipment cabinet. The shop drawings must be approved by the Engineer prior to installation of the completed cabinet in the field.

The Engineer reserves the right to inspect and/or factory test any completed cabinet assemblies prior to shipment of the material to the project site. Any deviations from these specifications that are identified during such testing shall be corrected prior to delivery of the assembly to the project site.

The AC power service to be run to the equipment cabinet shall be terminated. In addition, the cabinet shall be connected to an adequate ground/bond following the Standard Specifications.

Lugs shall be installed at the end of each conductor suitable for connection to the barrier terminal blocks. The Contractor shall terminate six (6) of the incoming fibers with LC connectors and carefully secure the cable in the cabinet to the satisfaction of the Engineer. The contractor shall terminate the incoming CAT 6 cable. The contractor shall neatly wrap 4' of slack for the fiber optic and ethernet cables inside the cabinet.

BASIS OF PAYMENT

This item shall be measured for payment by each pole mounted equipment cabinet installed in place.

This work shall be paid for at the contract unit price per EACH for CLOSED CIRCUIT TELEVISION CABINET and shall include all equipment, material, and labor required to furnish and install the cabinet as described above complete.

CLOSED CIRCUIT TELEVISION CAMERA EQUIPMENT

Description

This work shall consist of furnishing and installing equipment for the control and distribution of CCTV video from the CCTV camera to a Video Collection Point (VCP). This work includes all CAT-6 cable required to interface to the CCTV camera and this equipment. Transmission for the video and control signals shall be by fiber optic cable as specified elsewhere herein and as indicated in the plans.

MATERIALS

General

The CCTV equipment shall be mounted in a cabinet provided and paid for separately. The installation and mounting of the CCTV equipment shall be fully coordinated with the cabinet. The equipment shall be securely mounted on a mounting back panel or on a corrosion resistant DIN rail if equipment is configured as such.

The CCTV equipment may be co-located within another equipment controller cabinet as indicated in the Plans.

Closed Circuit Television Camera Power Supply

The Closed Circuit Television Camera Power Supply shall supply power to the camera dome assembly. The requirements include:

- Input voltage 120 VAC \pm 10%
- Output voltage 24 VAC \pm 10%
- Operating Temperature Range: -40°C to +70°C (minimum)
- Storage Temperature Range: -40°C to +75°C (minimum)

The power supply shall include an AC power indicator with power on/off switch. All outputs shall be fused. The power supply shall be sized for the dome units being supplied, considering pan/tilt, heating, and blower requirements, and shall not be less than 100 VA.

Over-voltage Protection

Over-voltage protection shall be provided on the power conductors, camera control conductors, and the video cables. The specific protection is based on the elements being protected.

Incoming Power Protection

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

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

inches Camera Cable Surge Protection

The CAT6 cable from the camera shall be protected with a lightning surge protector. The unit shall be fully compatible with the camera cabling and PoE and shall have shielded RJ45 jacks for EMI noise suppression. The unit shall provide high performance 3-stage protection:

- Differential gas discharge tube
- PTC resettable fuse
- Low capacitance diode array Specific requirements include:
- Ethernet Connectors (2) Shielded RJ45 Ports
- Gas Tube Voltage +/- 90 V
- PTC Fuse Rating +/- 1 A
- Clamping Voltage +/- 58 V
- Operating Temperature -40° C to +80° C
- Nominal dimensions 6.3 x 3.2 x 2.2 (inches)

The protector shall protect a minimum of four conductors. [Transmit Data (2 wires) and Receiver Data (2 wires)]

IP Relay

The IP Relay shall be capable of remotely shutting off power to the CCTV camera in order to reboot operation. The IP Relay shall be capable of interfacing with the Ethernet Switch installed in the cabinet using Ethernet protocols. Specific requirements include:

- Ethernet Connectors (1) RJ45 Port
- Relays (8) T-90 SPDT relays
- Relay Rating 12A each
- Operating Temperature -34° C to +77° C
- Nominal dimensions 6.0 x 4.25 x 2.25 (inches)

Cabinet

The CCTV cabinet shall meet the requirements specified for the CLOSED CIRCUIT TELEVISION CABINET and shall be paid for separately under that pay item.

Cat 6 Ethernet Cable

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
- Cat 6 rated to 550MHz (great for 10/100 or even 1000mbps Gigabit Ethernet)
- Meets TIA/EIA 568-B.2-1 Standard
- Shielded Twist Pair
- 4 Pairs, 8 Conductors
- 23 AWG, Solid Core Copper
- UL 444 ANSI TIA/EIA-568.2 ISO/IEC 11801
- RoHS Compliant
- Water Blocking

Gel Construction

Requirements General

The Contractor shall prepare and submit a shop drawing detailing the complete closed-circuit television equipment installation. The shop drawings shall identify the installation and specifications 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.

Appropriate connectors shall be furnished and installed to interface the in-cabinet components to the integrated dome camera assembly. The Contractor shall mount the in-cabinet components in the equipment cabinet and connect them to AC power, communications, and video feeds.

Testing

The Contractor shall test each installed CCTV Camera Equipment. 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 corresponding 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.

Documentation

One copy of all operations and maintenance manuals for each CCTV component shall be delivered for each assembly installed. In addition, full documentation for all software and associated protocols shall be supplied to the Department on a CD-ROM. The Department reserves the right to provide this documentation to other parties who may be contracted with in order to provide overall integration or maintenance of this item.

Warranty

The Contractor shall warranty all materials and workmanship including labor for a period of two years after the completion and acceptance of the installation, unless other warranty requirements prevail. The warranty period shall begin when the Contractor completes all construction obligations related to this item and when the components for this item have been accepted, which shall be documented as the final completion date in the construction status report. This warranty shall include repair and/or replacement of all failed components via a factory authorized depot repair service. All items sent to the depot for repair shall be returned within two weeks of the date

of receipt at the facility. The depot location shall be in the United States. Repairs shall not require more than two weeks from date of receipt and the provider of the warranty shall be responsible for all return shipping costs.

The depot maintainer designated for each component shall be authorized by the original manufacturer to supply this service. A warranty certificate shall be supplied for each component from the designated depot repair site indicating the start and end dates of the warranty. The certificate shall be supplied at the conclusion of the system acceptance test and shall be for a minimum of two years after that point. The certificate shall name the Department as the recipient of the service. The Department shall have the right to transfer this service to other private parties who may be contracted to perform overall maintenance of the facility.

METHOD OF MEASUREMENT

This work will be paid for at the contract unit price for each installation.

BASIS OF PAYMENT

This work will be paid for at the contract unit price each for CLOSED CIRCUIT TELEVISION CAMERA EQUIPMENT.

CLOSED CIRCUIT TELEVISION CAMERA STRUCTURE FOUNDATION, 30" DIAMETER

Description

This work shall consist of constructing a reinforced concrete foundation, of the dimensions indicated, complete with raceways. The foundation depth shall be as shown in the Plans or as directed by the Engineer. The foundation shall include boring/excavation, reinforcement, concrete, grout, anchor bolts, nuts, washers and raceways as well as clean up and restoration of the location.

MATERIALS

Concrete shall be Class SI complying with Article 1020.04 of the Standard Specifications.

Reinforcement bars shall comply with Article 1006.10 of the Standard Specifications.

Anchor bolts/rods shall comply with Article 1006.09 of the Standard Specifications.

The entire length of the anchor bolts as well as the nuts and washers shall be hot dip galvanized in accordance with the requirements of ASTM Designation A 153.

Unless otherwise indicated, conduit raceways shall be heavy wall rigid polyvinylchloride (PVC) conduit, (Schedule 40) UL listed and in conformance with NEMA TC2 and Federal Specification WC 1094A. Raceways shall be of the number and size as indicated.

CONSTRUCTION REQUIREMENTS

The foundation depths shall be as directed by the Engineer based upon evaluation of the soil conditions encountered. The Engineer may determine soil condition by visual inspection or, where practical, by the use of a pocket penetrometer and will establish foundation depth based upon the Foundation Depth Table shown in the Plans, where applicable.

The hole for the foundation shall be made by drilling with an auger, of the same diameter as the foundation. The foundation shall be cast in place and allowed to cure for 10 days minimum before the light pole is erected. If soil conditions require the use of a liner to form the hole, the liner shall be withdrawn as the concrete is deposited. The top of the foundation shall be constructed level so that no shims or other leveling device will be needed to set the light standard plumb on the foundation. A liner or form shall be used to produce a uniform smooth side to the top of the foundation. Foundation top shall be chamfered $\frac{3}{4}$ inch unless otherwise indicated.

Extreme care shall be used in establishing the top elevation of concrete foundations, especially when foundations are installed before final grading is complete. Foundations shall not protrude above grade more than the limits indicated in the Plans, except for specifically indicated locations, and where not otherwise indicated, foundation shall not protrude above grade more than 4 inches above a 60 inch chord centered at the foundation, at any point around the circumference. Where foundation heights extend beyond specified limits, the Engineer may direct replacement of the foundation and the incorrect foundation will not be measured for payment.

The steel reinforcement, the raceway conduits and the anchor bolts shall be secured in place to each other and properly positioned in the augered hole so that at time of pouring of concrete mixture in place the above said components retain their proper positions. Special attention shall be paid to the

positioning of the anchor bolts. It is of utmost importance that the anchor bolt projections on top of the foundation, after placement of the concrete, remain in a perfectly vertical position.

The Contractor shall restore areas that have been disturbed or temporarily graded to their original condition. The cost of seeding the restored areas is included in this pay item.

METHOD OF MEASUREMENT

This work will be measured for payment in feet in place. The length measured will be limited to that shown in the Plans or authorized by the Engineer.

BASIS OF PAYMENT

This work will be paid for at the contract unit price per foot for CLOSED CIRCUIT TELEVISION CAMERA STRUCTURE FOUNDATION, 30" DIAMETER.

CLOSED CIRCUIT TELEVISION DOME CAMERA, HD

Description

This work shall consist of furnishing and installing an integrated Closed-Circuit Television (CCTV) Dome Camera Assembly, camera bracket, 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 outdoor rated dome camera with 1920x1080 HD resolution, 31x optical zoom, laser focus, speed dry, and full API support for software integration.

The Contractor shall provide all materials required to install the proposed camera on the proposed camera pole or existing light pole 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 prior to installation. The camera shall meet or exceed the following specifications:

Part 1 – General

1.01 System Description

A. General Requirements

1. The specified unit shall be of manufacturer's official product line, designed for commercial and/or industrial 24/7/365 use.
2. The specified unit shall be based upon standard components and proven technology using open and published protocols.

3. Related Requirements

- a. 28 05 07.21 PoE Power Sources for Electronic Safety and Security
- b. 28 05 11 Cyber Security Requirements for Electronic Safety and Security
- c. 28 05 19 Storage Appliances for Electronic Safety and Security
- d. 28 05 21 Network Attached Storage for Electronic Safety and Security
- e. 28 05 23 Storage Area Network for Electronic Safety and Security
- f. 28 23 11 Video Management System Analytics
- g. 28 23 13 Video Management System Interfaces

B. Sustainability

1. The specified unit shall be manufactured in accordance with ISO 14001.
2. The specified unit shall be compliant with the EU directives 2011/65/EU (RoHS) and 2012/19/EU (WEEE).
3. The specified unit shall be compliant with the EU regulation 1907/2006 (REACH).
4. The specified unit, including all its components, shall not contain any added PVC.
5. The manufacturer shall have signed and support the UN Global Compact initiative as defined by United Nations.

1.02 Certifications and Standards

A. General abbreviations and acronyms

1. AGC: Automatic gain control
2. ABR: Average Bit Rate
3. AES: Advanced Encryption Standard
4. API: Application Programming Interface
5. Aspect ratio: A ratio of width to height in images
6. Bit Rate: The number of bits/time unit sent over a network
7. Bonjour: Enables automatic discovery of computers, devices, and services on IP networks.
8. DHCP: Dynamic Host Configuration Protocol
9. DNS: Domain Name System
10. EIS: Electronic Image Stabilization
11. FPS: Frames per Second
12. FTP: File Transfer Protocol
13. SFTP: Secure File Transfer Protocol
14. H.264 (Video Compression Format)
15. H.265 (Video Compression Format)
16. HSMS: Hosted Security Management System (SaaS PACS Application)
17. IEEE 802.1x: Authentication framework for network devices
18. IP: Internet Protocol
19. IR light: Infrared light
20. ISO: International Standards Organization
21. JPEG: Joint Photographic Experts Group (image format)
22. LAN: Local Area Network
23. LED: Light Emitting Diode
24. LPR: License Plate Recognition
25. Lux: A standard unit of illumination measurement
26. MBR: Maximum Bit Rate
27. MPEG: Moving Picture Experts Group
28. Multicast: Communication between a single sender and multiple receivers on a network
29. NTP: Network Time Protocol
30. NTSC: National Television System Committee – a color encoding system based on 60Hz
31. ONVIF: Global standard for the interface of IP-based physical security products
32. PACS: Physical Access Control System
33. PAL: Phase Alternating Line – a color encoding system based on 50Hz
34. PoE: Power over Ethernet (IEEE 802.3af/at/bt) standard for providing power over network cable
35. Progressive scan: An image scanning technology which scans the entire picture
36. PTZ: Pan/Tilt/Zoom
37. QoS: Quality of Service
38. RAID: Redundant Array of Independent Disks
39. RMD: Radar Motion Detection

- 40. RPC: Remote Procedure Call
- 41. SaaS: Software as a Service
- 42. SIP: Session Initiation Protocol
- 43. SMTP: Simple Mail Transfer Protocol
- 44. SMPTE: Society of Motion Picture and Television Engineers
- 45. SNMP: Simple Network Management Protocol
- 46. SSL: Secure Sockets Layer
- 47. TCP: Transmission Control Protocol
- 48. TLS: Transport Layer Security
- 49. Unicast: Communication between a single sender and single receiver on a network
- 50. UPnP: Universal Plug and Play
- 51. UPS: Uninterruptible Power Supply
- 52. VBR: Variable Bit Rate
- 53. VMS: Video Management System
- 54. WDR: Wide dynamic range

B. The specified unit shall carry the following EMC approvals:

- 1. EN 55032 Class A
- 2. EN 55035,
- 3. EN 61000-3-2
- 4. EN 61000-3-3
- 5. EN 61000-6-1
- 6. EN 61000-6-2
- 7. FCC Part 15 Subpart B Class A
- 8. ICES-3(A)/NMB-3(A)
- 9. VCCI Class A
- 10. RCM AS/NZS CISPR 32 Class A
- 11. CISPR 35, EAC
- 12. KC KN32 Class A
- 13. KC KN35

C. The specified unit shall meet the following product safety standards:

- 1. IEC/EN/UL 62368-1
- 2. CAN/CSA C22.2 No. 62368-1
- 3. IEC/EN/UL 60950-22
- 4. CAN/CSA-C22.2 No. 60950-22
- 5. IEC/EN 62471 risk group 2
- 6. IEC 60825-1 Class 1

D. The specified unit shall meet relevant parts of the following video standards:

- 1. SMPTE 296M (HDTV 720p)
- 2. SMPTE 274M (HDTV 1080p)

E. The specified unit shall meet the following standards

1. Video Compression:
 - a. ISO/IEC 14496-10 Advanced Video Coding (H.264)
 - b. ISO/IEC 23008-5 Advanced Video Coding (H.265)
2. Networking:
 - a. IEEE 802.3bt (Power over Ethernet Plus)
 - b. IEEE 802.1x (EAP-TLS) (Authentication)
 - c. IPv4 (RFC 791)
 - d. IPv6 (RFC 2460)
 - e. QoS – DiffServ (RFC 2475)
3. Mechanical Environment:
 - a. IEC/EN 62262 IK10,
 - b. IEC/EN 60529 IP66,
 - c. NEMA 250
 - d. Type 4X
 - e. NEMA TS 2 (2.2.7–2.2.9)
 - f. IEC 60068-2-1
 - g. IEC 60068-2-2
 - h. IEC 60068-2-6
 - i. IEC 60068-2-14
 - j. IEC 60068-2-27
 - k. IEC 60068-2-78
 - l. ISO 21207 (Method B)
4. Railway environment:
 - a. EN 50121-4
 - b. IEC 62236-4
5. Network:
 - a. NIST SP500-267

1.03 Quality Assurance

A. The contractor or security sub-contractor shall be a licensed security Contractor with a minimum of five (5) years' experience installing and servicing systems of similar scope and complexity and evidence that is completed at least three (3) projects of similar design and is currently engaged in the installation and maintenance of systems herein described.

B. All installation, configuration, setup, program and related work shall be performed by electronic technicians thoroughly trained by the manufacturer in the installation and service of the equipment provided.

C. The contractor or designated sub-contractor shall submit credentials of completed manufacturer certification, verified by a third-party organization, as proof of the knowledge.

D. The specified unit shall be manufactured in accordance with ISO9001.

1.04 Warranty

A. The manufacturer shall provide a five (5) year limited hardware warranty for product that is free from defects in design, workmanship and materials under substantiated normal use. Defective products under the warranty period will be either repaired or replaced by the manufacturer.

Part 2 – Products

2.01 General

A. The product shall be IP-based and comply with established network and video standards.

B. The product shall be powered by the switch utilizing the network cable. Power injectors (midspans) shall be provided by the contractor when required for proper operation.

C. The product shall be fully supported by an open and published API (Application Programmers Interface), which shall provide necessary information for integration of functionality into third-party applications.

2.02 Video Surveillance Schedule

A. The product or product types listed below describing various resolutions, form-factor and features shall be supplied by a single manufacturer for video surveillance system.

B. The product description will be as follows:

1. High-end outdoor-ready HDTV 1080p PTZ camera with quick-zoom, laser focus, 31x optical zoom, and full API support for software integration

2.03 Video Surveillance Cameras

Camera shall be a high-end outdoor-ready HDTV 1080p PTZ camera with quick-zoom and laser focus. The specified product shall meet or exceed the following design specifications:

A. The camera shall operate on an open source and Linux-based platform, and include a built-in Web server.

B. The camera shall provide a removable IR-cut filter, providing day/night functionality.

C. The camera shall be equipped with a motorized 31x optical zoom lens with P-Iris, providing a horizontal field of view between 60.6° and 2.0° and a vertical field of view between 36.5° and 1.1°.

D. The camera shall incorporate functionality for vibrate the dome in order to provide clear images in rainy weather and to simplify dome cleaning.

E. The camera shall be designed to provide an image up to 20° above the horizon without any loss of image quality.

F. The camera shall provide local video storage utilizing a SD/SDHC/SDXC memory card expansion.

G. The camera shall be manufactured with a repaintable metal (aluminum) casing.

H. The camera shall be manufactured with an IP66-, IP67- and NEMA 4X-rated, IK10 casing with a polycarbonate hard coated dome.

I. The camera shall incorporate a built-in laser that provides instant and correct focus.

The specified product shall meet or exceed the following performance specifications:

A. Illumination

1. The camera shall meet or exceed the following illumination specifications:
 - a. Color: 0.06 lux at 30 IRE, F1.36
 - b. B/W: 0.001 lux at 30 IRE, F1.36, 0 lux with IR illumination on
 - c. Color: 0.09 lux at 50 IRE, F1.36
 - d. B/W: 0.008 lux at 50 IRE, F1.36, 0 lux with IR illumination on

B. Resolution

1. The camera shall be designed to provide video streams in HDTV 1080p (1920x1080) at up to 60 frames per second (60Hz mode) or 50 frames per second (50Hz mode) using H.264 or Motion JPEG.
2. The camera shall support video resolutions including:
 - a. 1920x1080 (HDTV 1080p)
 - b. 1280x720 (HDTV 720p)

C. Encoding

1. The camera shall provide independently configured simultaneous H.264 and Motion JPEG streams.
2. The camera shall provide configurable compression levels.
3. The camera shall provide a video streaming indicator.
4. The camera shall support standard baseline profile with motion estimation.
5. The camera shall support motion estimation in H.264/MPEG-4 Part 10/AVC.
6. The camera shall support motion estimation in H.265 (MPEG-H Part 2/HEVC)
7. The camera shall support the following video encoding algorithms:
 - a. Motion JPEG encoding in a selectable range from 1 up to 50/60 frames per second.
 - b. Baseline Profile H.264 encoding with motion estimation in up to 50/60 frames per second.
 - c. Main Profile H.264 and H.265 encoding with motion estimation and context- adaptive binary arithmetic coding (CABAC) in up to 50/60 frames per second.
 - d. High Profile H.264 encoding with motion estimation up to 50/60 frames per second.

8. The camera shall in H.264 and H.265 support combining Variable Bit Rate (VBR), Average Bit Rate (ABR) and Maximum Bit Rate (MBR)
9. The camera shall be able to deliver predictable storage using Average Bit Rate (ABR) bitrate controlling algorithm based on a bitrate budget and selected retention time.
 - a. The camera shall be able to deliver predictable storage using Average Bit Rate (ABR) bitrate controlling algorithm based on a bitrate budget and the selected retention time.
 1. The ABR bitrate algorithm, depending on the bitrate budget and the selected retention time, shall adjust the bitrate to meet the bitrate budget over the whole retention time.
 2. The ABR algorithm shall have a method to keep the video quality even during busy periods by allowing the current bitrate to be significantly above the configured average bitrate during significant parts of the retention time.
 - b. The camera shall in H.264 and H.265 support flexible retention period for Average Bit Rate (ABR) algorithm up to 1 year.
 - c. When using Average Bit Rate (ABR) the camera shall keep bitrate history up to at least 30 days.
 - d. The camera shall in H.264 and H.265 support reuse of past Average Bit Rate (ABR) history if a stream is disconnected and the camera reconnects with the same basic stream parameters.
 - e. When using Average Bit Rate (ABR), the camera shall in H.264 and H.265 support multiple parallel stream with independent ABR-history.
 - f. The camera shall issue bitrate degradation events when using Average Bit Rate (ABR) if the configuration is predicted to be
 1. unrealistic
 2. not fulfilling basic quality requirements
 3. not fulfilling the bitrate budget.
10. The camera shall support scene adaptive bitrate control with one of the following capabilities to lower bandwidth and storage:
 - a. Automatic dynamic Region of Interest to reduce bitrate in unprioritized regions in order to lowering bandwidth and storage requirements.
 - b. Automatic dynamic Group of Pictures to lower bandwidth and storage requirements
 - c. Automatic dynamic Frames per Second to lower bandwidth and storage requirements
 - d. Transmission
 1. The camera shall allow for video to be transported over:
 - a. HTTP (Unicast)
 - b. HTTPS (Unicast)
 - c. RTP (Unicast & Multicast)
 - d. RTP over RTSP (Unicast)
 - e. RTP over RTSP over HTTP (Unicast)
 - f. SRTP (Unicast & Multicast)
 2. The camera shall support Quality of Service (QoS) to be able to prioritize traffic.

e. Image

1. The camera shall incorporate automatic and manual white balance.
2. The camera shall incorporate an electronic shutter operating in the range of 1/111000 to 1/2s.
3. The camera shall incorporate capture mode with the following settings:
 - a. HDTV 1080p (1920x1080) with WDR: Up to 50/60 fps (50/60 Hz)
4. The camera shall incorporate forensic wide dynamic range functionality providing up to 120 dB dynamic range.
5. The camera shall support manually defined values for:
 - a. Saturation
 - b. Brightness
 - c. Sharpness
 - d. Contrast
6. The camera shall allow for rotation of the image.
7. The camera shall incorporate a function for Electronic Image Stabilization (EIS) for real-time image stabilization.
8. The camera shall incorporate automatic defog functionality.

f. IR Illumination

1. The camera shall be equipped with built-in IR LEDs, with a range of up to 300 m (984 ft) with a wavelength of 850 nm.
2. The camera shall be equipped with built-in IR LEDs with automatic seamless adapting angle of illumination and intensity.

g. User Interface

1. Web server
 - a. The camera shall contain a built-in web server making video and configuration available to multiple clients in a standard operating system and browser environment using HTTP, without the need for additional software.
 - b. Optional components downloaded from the camera for specific tasks shall be signed by an organization providing digital trust services.
2. Language Specification
 - a. The camera shall provide a function for altering the language of the user interface, and shall include support for at least 10 different languages.
3. IP addresses
 - a. The camera shall support both fixed IP addresses and dynamically assigned IP addresses provided by a Dynamic Host Control Protocol (DHCP) server.
 - b. The camera shall allow for automatic detection of the camera based on UPnP and Bonjour when using a computer with an operating system supporting this feature.

- c. The camera shall provide support for both IPv4 and IPv6.
- d. The camera shall provide support for IPv6 USGv6.
- h. PTZ functionality
 - 1. The camera shall:
 - a. Provide preset positions functionality.
 - b. Provide On-screen directional indicator (OSDI) functionality.
 - c. Be equipped with accurate pan and tilt functionality with a range of:
 - 1. Pan: 360°
 - 2. Tilt +20° to -90°
 - d. Provide pan and tilt speed in a range of:
 - 1. Pan: 0.05° - 550°/sec
 - 2. Tilt: 0.05° - 500°/sec
 - e. Provide optical and digital zoom functionality:
 - 1. Optical zoom: 31x
 - 2. Digital zoom: 12x
 - f. Provide adjustable zoom speed.
 - g. Provide a guard tour functionality which allows the dome to automatically move between selected presets using an individual speed and viewing time for each preset.
- i. Event conditions
 - 1. The camera shall be equipped with an integrated event functionality:
 - a. Device status
 - 1. Above operating temperature
 - 2. Above or below operating temperature
 - 3. Below operating temperature
 - 4. Within operating temperature
 - 5. Fan
 - 6. IP address
 - 7. Network lost
 - 8. Shock detection
 - 9. Storage failure
 - 10. System ready
 - b. Edge storage
 - 1. Recording ongoing
 - 2. Storage disruption

- c. I/
 - O 1. Manual trigger
 - 2. Virtual inputs

- d. P 1. Malfunctioning
 - T 2. Movement
 - Z 3. Preset position reached
 - 4. Ready

- e. Scheduled and recurring
- f. Video
 - 1. Average bitrate degradation
 - 2. Day-night mode
 - 3. Live stream open
- 2. Response to triggers shall include event actions:
 - a. Record video: SD card and network share
 - b. Upload of images and video clips: FTP, SFTP, HTTP, HTTPS, email or network share
 - c. Send notification: email, HTTP, HTTPS, TCP and SNMP trap
 - d. Pre- and post-alarm video or image buffering for recording or upload
 - e. PTZ: PTZ preset, start/stop guard tour
 - f. Overlay text
 - g. Day and night mode
 - h. WDR mode
 - i. IR illumination
- 3. The camera shall provide memory for pre- and post-alarm recordings.

j. Storage

1. The camera shall support continuous and event controlled recording to:
 - a. Local memory added to the cameras SD-card slot
 - b. Network attached storage, located on the local network
2. The camera shall incorporate encryption functionality for the SD card (AES-XTS-Plain64 256bit).
3. The camera shall incorporate encryption functionality for the SD card.
4. The camera shall be able to detect and notify edge storage disruptions.

k. Protocol

1. The camera shall incorporate support for at least IPv4, IPv6
USGv6,

ICMPv4/ICMPv6, HTTP, HTTPS, HTTP/2, SSL/TLS, QoS Layer 3

DiffServ, FTP, SFTP, CIFS/SMB, SMTP, mDNS (Bonjour), UPnP®, SNMP v1/v2c/v3 (MIB-II), DNS/DNSv6, DDNS, NTP, RTSP, RTP, SRTP, TCP, UDP, IGMPv1/v2/v3, RTCP, DHCPv4/v6, SOCKS, SSH, LLDP, CDP, MQTT v3.1.1, Syslog, Link-Local address (ZeroConf).

2. The SMTP implementation shall include support for SMTP authentication.

I. Text overlay

1. The camera shall:

a. Provide embedded on-screen text with support for date & time, and a customer-specific text, camera name, of at least 45 ASCII characters.

b. Provide the possibility to choose different font sizes for embedded on-screentext, and to use white or black text on at least four different backgrounds.

c. Provide the ability to manually set up and configure privacy masks to the image.

d. Allow for the overlay of a graphical image, such as a logotype, into the image.

m. Security

1. The camera shall support the following:

a. Secure web browsing

1. The use of HTTPS and SSL/TLS, providing the ability to upload signed certificates to encrypt and secure authentication and communication of both administration data and video streams.

2. Restrict access to the built-in web server by usernames and passwords at three different levels.

b. Certificate management

1. Provide centralized certificate management, with both pre-installed CA certificates and the ability to upload additional CA certificates. The certificates shall be signed by an organization providing digital trust services.

c. Enhanced security features

1. The use of signed firmware validates the firmware's integrity before accepting to install it.

2. The use of a secure boot process, based on the use of signed firmware, ensures that the camera can boot only with authorized firmware.

3. The use of trusted platform module (TPM) provides a set of cryptographic features suitable for protecting private keys from unauthorized access.

4. TPM is certified according to FIPS 140-2 level 2.

- d. Authentication
 - 1. IEEE 802.1x (EAP-TLS) authentication.
 - 2. Restrict access to pre-defined IP addresses, commonly known as IP address filtering.
- e. Brute force delay protection
- 2. Firmware support
 - a. The manufacturer must provide firmware with long-term support that only contains corrections for critical bugs, security flaws and performance issues.
 - b. The device should maintain high-level cybersecurity without introducing any significant functional changes or affecting any existing integrations.
- n. System integration
 - 1. The camera shall be fully supported by an open and published API (Application Programmers Interface), which shall provide necessary information for integration of functionality into third-party applications.
 - 2. The camera shall conform to ONVIF profile G as defined by the ONVIF Organization.
 - 3. The camera shall conform to ONVIF profile S as defined by the ONVIF Organization.
 - 4. The camera shall conform to ONVIF profile T as defined by the ONVIF Organization.
 - 5. The camera shall conform to ONVIF profile M as defined by the ONVIF Organization.
- o. Analytics
 - 1. The camera shall provide a platform allowing the upload of third-party applications into the camera.
 - 2. The camera shall support advanced video analytics capabilities with a built-in hardware-accelerated object detect engine, capable of automatically detecting several simultaneously visible objects from a set of pre-trained object categories (such as vehicles, people and faces).
 - 3. The camera shall be supplied with preinstalled advanced video analytics capabilities, capable of detecting and classifying humans and vehicles in non-critical indoor and outdoor spaces.
- p. Installation and maintenance
 - 1. The camera shall be supplied with Windows-based management software which allows the assignment of IP addresses, upgrade of firmware and backup of the cameras' configuration.
 - 2. The camera shall support the use of SNMP-based management tools according to SNMP v1, 2c & 3 / MIB-II.
 - 3. The camera shall allow updates of the software (firmware) over the network, using FTP or HTTP.
 - 4. The camera shall store all customer-specific settings in a non-volatile memory that shall not be lost during power cuts or soft reset.

5. The camera shall accept external time synchronization from an NTP (Network Time Protocol) server.

6. The camera shall provide a software controlled function for network redundancy when both the SFP module and the RJ45 connector are connected. The SFP connection functions as the primary network link and connection via the fixed RJ45 connector as the fail-over link.

q. Access log

1. The camera shall provide a log file, containing information about the 250 latest connections and access attempts since the unit's latest restart. The file shall include information about the connecting IP addresses and the time of connecting.

2. The camera shall provide a connection list of all currently connected viewers. The file shall include information about connecting IP address, time of connecting and the type of stream accessed.

r. Camera diagnostics

1. The camera shall be equipped with LEDs, capable of providing visible status information. LEDs shall indicate the camera's operational status and provide information about power, communication with receiver, the network status and the camera status.

2. The camera shall be monitored by a Watchdog functionality, which shall automatically re-initiate processes or restart the unit if a malfunction is detected.

3. The camera shall send a notification when the unit has rebooted and all services are initialized.

s. Hardware interfaces

1. Network interface

a. The camera shall be equipped with one 10BASE-T/100BASE-TX/1000BASE-T Ethernet-port using a RJ45 connector and shall support auto negotiation of network speed and transfer mode (full and half duplex).

b. The camera shall be equipped with a SFP slot.

t. Enclosure

1. The camera shall:

a. Be manufactured with an IP66-, IP67, NEMA 4X- and IK10- rated aluminum enclosure.

u. Power

1. The camera shall provide power over Ethernet IEEE 802.3bt Type 3 Class 6

a. Max: 51 W

b. Typical: 17 W

2. The camera shall be connected to an included midspan and obtain power through a network cable. The midspan shall use 100-240 V AC/50-60 Hz, max 60 W, and provide the camera with a maximum of 51 W.

v. Environmental

1. The camera shall:

- a. Operate in a temperature range of –50 °C to 50 °C (–58 °F to 122 °F)
- b. Operate in a humidity range of 10–100% RH (condensing).

Part 3 – Execution

3.01 Installation

A. The contractor's or subcontractor's main resources within the project shall carry proper professional certification issued by the manufacturer and verified by a third-party organization to confirm sufficient product and technology knowledge.

B. The contractor shall carefully follow instructions in documentation provided by the manufacturer to ensure all steps have been taken to provide a reliable, easy-to-operate system. All equipment shall be tested and configured in accordance with instructions provided by the manufacturer prior to installation.

C. All firmware found in products shall be the latest and most up-to-date version as specified by the manufacturer, or by the product component provider.

D. All equipment requiring users to log on using a password shall be configured with user/site-specific password/passwords. No system/product default passwords shall be allowed.

E. A proper installation shall meet NEC (National Electrical Code – US only) per the guidelines of that year's revision. When properly installed equipment meets Low Voltage, Class 2 classification of the NEC.

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.

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 a Pole Mount Bracket with integral IDC wire termination inside the bracket for camera installation on CCTV camera poles and light 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 1-1/2 inch (38.1 mm) NPT pipe thread.

Connecting Cables

The Contractor shall furnish and install outdoor rated, shielded CAT 6 cable at the locations shown on the plan sheets. The cable shall be terminated using the terminal block inside the camera bracket and the IDC connector and pre-formed 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.

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, HD.

COMMUNICATIONS VAULT

Effective: March 1, 2010

DESCRIPTION.

Work under this item shall consist of constructing a composite concrete handhole a cover, in accordance with the details shown on the plans and as specified herein.

Materials. The composite concrete handhole and two piece vault lid shall be constructed of polymer concrete material, and shall be gray in color.

The composite concrete handhole shall be 48 inches x 48 inches and shall have an effective depth of 36 inches.

The composite concrete handhole and cover shall have a design/test loading of 22,500/33,750 lbs respectively. The cover shall have a permanently recessed logo that reads "IDOT COMMUNICATIONS", or as otherwise designated by the Engineer. The composite concrete handhole lid shall have two ½-in x 4-in pull slots. The lid surface shall have a coefficient of friction of 0.50 in accordance with ASTM C-1028.

The Contractor shall install manufacturer-approved gasketing between the lid and the handhole to prevent water from entering the composite concrete handhole.

The composite concrete handhole lid shall be secured to the vault with two 3/8-inch NC stainless steel penta-head bolts and washers to lock the lid. In addition, a "lock tool" shall be provided for composite concrete handhole entry.

A fiber optic cable support assembly shall be recommended by the manufacturer and approved by the Engineer for fiber optic cable and splice enclosures used in the vault. Each support assembly shall consist of multiple brackets, racks, and/or rails required to suspend the required surplus cabling and any splice enclosures required.

The support assembly shall be made from or coated with weather resistant material such that there is no corrosion of the supports. The support assemblies shall be anchored to the vault using stainless steel hardware.

The fiber optic cable support assemblies shall be included in the Contract unit price for the composite concrete handhole. Void areas between openings and conduit shall be filled with self-curing caulking consisting of a permanent, flexible rubber which is unaffected by sunlight, water, oils, mild acids or alkalis. The caulking shall be mildew resistant and non-flammable. The material shall provide a permanent bond between the conduit entering the vault and the polymer concrete. The caulking shall be gray in color.

CONSTRUCTION REQUIREMENTS

Composite concrete handholes shall be installed in accordance with applicable requirements of Section 800 of the Standard Specifications and as provided herein.

A manufacturer-approved knockout punch driver shall be used to provide openings in the vaults for conduit, or the required openings may be machined at the time of stackable vault fabrication. Voids between entering conduits and punch driven or machined openings shall not exceed 1/2-inch.

Any void areas shall be caulked from the interior and exterior of the composite concrete handhole. The caulk shall be allowed to fully cure per the manufacturer's specifications, prior to backfilling.

The composite concrete handhole shall be placed on 12 inches of coarse aggregate, CA-5 or CA 7 Class A, as specified in Section 1004 of the Standard Specifications. Seal and flash test the vault per the manufacturer's recommendations.

A minimum of 150 feet of excess cable per cable run shall be coiled in each composite concrete handhole containing splices to allow moving the splice enclosure to the splicing vehicle unless otherwise indicated in the plans.

Basis of Payment. This item will be paid for at the contract unit price each for **COMMUNICATIONS VAULT**, of the size indicated, which shall be payment in full for all material and work as specified herein.

CONTRACTOR COOPERATION

It is anticipated that this contract will be constructed concurrently with another project in the same area. The project that may be constructed concurrently with this project is as follows:

17th Ave from Madison to 23Rd St

1st Avenue Cutoff / Cermak Rd – DuPage County Line to IL 43/Harlem Ave; Cermak Rd to Gardner Rd, 1st Ave to Cermak Rd

IL 56/Butterfield Rd/22nd St from IL 59 to York Rd – Traffic Signal Modernization, Traffic Signal Timing/Progression, Changeable Message Signs, Surveillance and ADA Improvements DuPage County

It is anticipated that a potential source of conflict or inconvenience may result with the possible presence of another contractor working in the same general vicinity.

The Contractor shall schedule their work in order to minimize any conflicts that may arise between contracts as specified in Article 105.08 of the Standard Specifications. No additional compensation will be allowed for delays or inconveniences resulting from activities of other contractors.

DISCONNECT SWITCH

Description

This work shall consist of furnishing and installing a standalone non-fusible disconnect switch in a NEMA 4X housing mounted on steel support posts with concrete foundations for ITS sites as shown on the plans, as directed by the Engineer. See plans for details.

MATERIALS

The disconnect switch shall be non-fusible, 2 pole, 600 volt, 30 ampere, lockable, with a NEMA 4X rating, and shall have an external handle that is lockable in both the 'ON' and 'OFF' positions.

The disconnect switch shall be mounted on a steel W6x9 I-beam support as shown on the plans. Hardware used to attach the disconnect switch to the support shall be stainless steel.

Concrete used for the mounting post foundation shall conform to Section 1020 of the Standard Specifications.

CONSTRUCTION REQUIREMENTS

Installation of the concrete foundations shall conform to the applicable construction installation requirements of Section 836 of the Standard Specifications.

The disconnect switch enclosure and door shall be bonded to ground.

Warranty

The disconnect switch shall be warranted and guaranteed against defects and/or failure in design, materials, and workmanship within the warranty period. The Contractor shall submit the warranty terms as part of each material item's shop drawing submittal for approval.

The warranty shall provide that, in the event of a malfunction during the warranty period, the defective system component shall be replaced with a new component by the manufacturer or his/her representative.

METHOD OF MEASUREMENT

This work will be measured in units of each.

BASIS OF PAYMENT

This work will be paid for at the contract unit price per each for DISCONNECT SWITCH.

DYNAMIC MESSAGE SIGN, FULL MATRIX, COLOR, NTCIP 1203 V2

Description

This special provision shall govern the furnishing and installation of a Front Access, Full Matrix, Color, NTCIP 1203 V3 DMS and associated equipment cabinets as shown in the plans and as detailed in this special provision.

Before starting work, the Contractor shall submit an erection plan to the Engineer for acceptance detailing the proposed methods of erection and the amount, location(s), and type(s) of equipment to be used.

The Contractor or sub-Contractor performing the erection of the DMS is herein referred to as the Erection Contractor.

GENERAL REQUIREMENTS

The high resolution, full color displays shall be a full matrix configuration of 64 pixels high by 288 pixels wide. The pixel pitch shall be 20 millimeters (0.81"). The size of the sign shall be as shown in the plans. All display elements and modules shall be solid state. No mechanical or electromechanical elements or shutters shall be used.

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

The Central Controller resides at the Illinois Department of Transportation's Traffic Systems Center, located at 445 Harrison Street, Oak Park, Illinois 60304. The DMS Central Software was developed by 360 Surveillance, Inc. The successful sign vendor shall perform an on-site working sample demonstration test to prove their product is compatible with the 360 Cameleon Client/Server Software in accordance with the Working Sample demonstration test criteria described herein unless otherwise directed by the Department.

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

Each LED DMS shall be a full-matrix display capable of displaying three lines of characters. Each line shall consist of a string of 22 alphanumeric characters. Each character shall be composed from a luminous dot matrix system. The matrix system for a high resolution, full color display shall consist of a minimum 256 dots composed of a minimum of 16 columns and 16 rows. A luminous pixel shall consist of a LED pixel array. All display elements and modules shall be solid state.

All characters, symbols, and digits shall be 12-inch nominal character size and shall be clearly visible and legible at a distance of 600 feet within a 30-degree cone of vision centered on the optical axis of the pixel.

The signs shall be capable of displaying the following:

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

The changing from one message to another shall be instantaneous.

The total weight added to the sign structure for the Front Access, Full matrix, Color, NTCIP 1203 V3 DMS shall be no greater than 1300 pounds. The dimensions of the sign housing will not exceed 6'0" tall, 20'0" wide, and 1'4" deep and access to the electronics shall be achieved through the front display panels of the DMS. Larger signs may be submitted, but they will require additional review time to evaluate the structural adequacy of the Department's standard sign trusses.

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

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

Working Sample Demonstration (Dynamic Message Sign)

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

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

The sample demonstration will be for purposes of review and approval by the Engineer. The Engineer will issue review comments based on examination of each unit and its operation at the time of the demonstration, and the Engineer may require a subsequent revised sample demonstration if, in the Engineer's judgment, the comments warrant re-work of the sample unit. Delay in presenting the specified demonstration or delay in attaining "Approved" or "Approved as Noted" status will result in the assessment of liquidated damages in the amount of \$3,000 per calendar day until a satisfactory sample and demonstration are attained.

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

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

Handling, Storage, Shipment

The Contractor shall handle the DMS in such a manner as to prevent damage. Cracked or damaged materials shall be repaired or replaced at the Contractor's expense. Braces, trusses, chains, cables, or other devices used for handling, storing, and shipping shall be adequately padded at points in contact with the materials to prevent damage of the finished product. DMS shall be handled, stored, shipped with supports and devices that maintain the product in an upright position.

MATERIALS

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

Terminology

Due to the varying definitions used in Dynamic Message Sign technology, this section defines specific terms as they apply to this specification.

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

DMS Manufacture Requirements

The manufacturer of the full color/full matrix front access LED DMS shall be ISO 9001 certified or provide documentation and references, acceptable to the Engineer, to demonstrate the manufacturer has sufficient processes in place and produces a quality product.

The ISO 9001 certificate shall be provided with the bid. The name, phone number and address of both the Authorized ISO 9001 Registrar that certified this company and the Authorized ISO 9001 Accreditation Body that accredited this Registrar shall be provided with the bid. ISO 9002 and ISO 9003 certifications are not adequate and do not meet this requirement.

In lieu of ISO 9001 certification, the company shall submit documentation and references that will be reviewed and must be approved by the Engineer as an acceptable alternative. The documentation shall, at a minimum, include the following:

- Quality Control Procedures
- Manufacturing Process
- Location of the facility where the DMS signs are manufactured
- References from 3 transportation agencies that have used the product on Freeway applications within the last 5 years. Two of the references must be from other states.

Failure to fully comply with these requirements and to provide this information will cause this company's equipment and software to be rejected.

Experience Requirements

The full color/full matrix front access LED DMS Manufacturer shall submit a minimum of three references from other transportation agencies, two of which must be from other states that have been successfully operating a highway full color/full matrix front access LED dynamic message sign systems that completely meets these specifications, manufactured and supplied by this manufacturer for a period of no less than five (5) years.

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

- 10 years' experience, under the current corporate name, in the design and manufacturing of State Highway or Interstate Highway, permanently-mounted, overhead dynamic message signs and central control systems installed in freeway service. These 10 years of experience shall include the complete design and manufacturing of all aspects of the dynamic message signs, including the electronic hardware, software and sign housings.
- 100 State Highway or Interstate Highway, permanently-mounted, overhead dynamic message signs installed in freeway or toll road service, under the current corporate name.

- 50 State Highway or Interstate Highway, permanently-mounted, overhead LED dynamic message signs that completely meet this specification with three lines of 12-inch characters, and Front Access housings installed in freeway or toll road service, under the current corporate name.
- The manufacturer of the LED DMS Signs and System shall submit documentary evidence and reference data for the above requirements. Reference data shall include the name and address of the organization, and the name and telephone number of an individual from the organization who can be contacted to verify the above requirements. The name of the DMS manufacturer that meets these experience requirements shall have the same corporate name as the DMS manufacturer that meets the ISO 9001 requirements stated elsewhere in this specification. This information shall be provided prior to documentation submittal. Failure to furnish the above references will be sufficient reason for rejection of the supplier's equipment.
- The Contractor shall submit the information described in this section to the Engineer within 15 days of award of the contract. The Engineer will review the submitted information and provide comments and approval of the information to the Contractor within 15 calendar days after receipt. Review of the submittal information by the Engineer shall not relieve the Contractor of the contractor's obligation to furnish and install the work in accordance with the contract documents. No time extensions will be granted to the Contractor as a result of the need to resubmit various items to review.
- Shop drawings shall be submitted in accordance with Article 105.04 of the Standard Specifications and as specified in these special provisions.
- Prior to purchase or fabrication of any equipment or materials for use in this project, the Contractor shall submit, for review by the Engineer, appropriate catalog cuts sheets, and specifications for all standard, off-the-shelf items and shall submit shop drawings and other necessary data for all non-catalog or custom-made items.
- The Contractor shall furnish five sets of submittal data directly to the Engineer. Two copies of this information, with appropriate notations, will be returned to the Contractor after the review.
- If reprinted literature, such as catalog cut sheets, is used to satisfy the submittal data requirements, there shall be no statements on the literature which conflict with the requirements of the contract documents. Any such statements shall be crossed off and initialed by the Contractor. Explanation of how specifications shall be met pertaining to items changed from the literature shall be documented in writing and included with the submittal information.
- All items shall be submitted together.
- Each submittal shall contain sufficient information and details to permit full evaluation of each item, and its interrelationships among the various items shall be carefully addressed.

- The Contractor shall prepare and submit detailed shop drawings for each sign type indicating types of materials proposed for each component of each sign, parts lists, assembly techniques, layout of all display elements and wiring schematics. The shop drawings shall also illustrate in detail how the Contractor proposes to mount and connect the DMS sign case to the sign support structure (truss/cantilever). The DMS sign case shall include any support mechanism necessary for the installation of the DMS sign case that is not included in the truss. These drawings shall be submitted to the Engineer for review and approval prior to fabrication of any sign. Parts lists shall include circuit and board designation, part type and class, power rating, component manufacturer and mechanical part manufacturer.
- As part of the submittals for the DMS assembly, the Contractor shall submit an engineering drawing illustrating the DMS character set including 26 upper case letters, 10 numerals, a dash, a plus sign (+), and slash. The Contractor shall also submit complete technical information, shop drawings, photographs, graphs, circuit diagrams, instruction manuals, security provisions, and any other necessary documents to fully describe the Front Access DMS assembly and associated equipment.

Product Testing

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

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

(1) Third Party Testing

Third party test reports for the Front Access DMS shall be submitted for the following testing:

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

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

(2) Self Certification

The DMS manufacturer shall provide self-certification, including a statement of conformance and copies of test reports, indicating that the following tests have been performed and passed. Third party test reports shall be submitted for testing of the following National Transportation Communication for ITS Protocol (NTCIP) standards:

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

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

Physical Construction

(1) Wiring and Power Distribution

a. Power and Signal Entrances

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

b. Panel Board

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

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

c. Internal Wiring

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

(2) Earth Grounding

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

(3) DMS Enclosure

The LED DMS shall enable the display of text, consisting of a string of alphanumeric and other characters. The size of the sign shall be as shown in the plans, and elsewhere in the specification. Each character shall be formed by a matrix of luminous pixels. The matrix of a standard character shall consist of 150 pixels over 10 columns and 15 rows.

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

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

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

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

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

The complete sign housings shall be designed and manufactured in-house by the LED DMS Sign Manufacturer.

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

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

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

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

The sign housings shall be capable of withstanding a wind loading of 120 M.P.H. without permanent deformation or other damages.

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

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

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

All DMS structural hardware shall be stainless steel and appropriately sized for the application. The DMS Manufacturer shall provide a signed and sealed copy of these certifications by the registered Structural Engineer as part of the catalog cut submittal.

a. Electronic Components

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

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

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

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

b. Mechanical Components

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

c. Convenience Outlets

The Front Access DMS housing shall contain a utility outlet circuit consisting of a minimum of one (1) 15-A NEMA 15-R, 120 VAC duplex outlet, with ground-fault circuit interrupters. This outlet shall be located near the panel board.

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

(4) Front Face Construction

The DMS front face for the Front Access DMS shall be constructed with multiple vertically hinged rigid door panels, each of which contains a full-height section of the LED display matrix. The door panels shall be fabricated using aluminum sheeting on the exterior and polycarbonate sheeting on the interior of the panel.

a. Service Access

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

One (1) access door for Front Access DMS shall be provided for each 32 and 48 pixel wide section of the sign housing. These doors shall be vertically hinged and shall contain a section of the sign's front face. The doors shall swing out from the face to provide access to the cabinet interior. Each door shall extend the full height of the display matrix.

To prevent open doors from blowing in wind, they shall each have a retaining latch mechanism to hold the door open at a 90-degree angle.

Each door shall form the face panel for a section of the sign. The LED modules shall be mounted to the door and be removable from the door when in the open position. Other sign components, such as power supplies, wiring, etc. shall be located inside the sign cabinet and be accessible through the door opening. Each door shall cover an opening that is a minimum of 23-inches (584 mm) wide and the same height as the display pixel matrix.

Each door shall contain a minimum of two (2) screw-type latches to lock them in the closed position. These latches shall be captive to prevent them from falling off. They shall pull the door tight and compress a gasket located around the perimeter of each door. They shall also be capable of providing leverage to easily release the gasket seal when opening the doors. The gasket shall prevent water from entering the cabinet around the doors.

b. Face Panels

Front face panels shall provide a high-contrast background for the DMS display matrix. The aluminum mask of each door panel shall be painted black and shall contain an opening for each pixel. Openings shall be large enough to not block any portion of the viewing cones of the LEDs.

Each panel shall have a single polycarbonate sheet attached securely to the inside of the aluminum panel. The polycarbonate sheet shall cover all of the pixel openings. The polycarbonate shall be sealed to prevent water and other elements from entering the DMS. The polycarbonate shall contain UV inhibitors that protect the LED display matrix from the effects of ultraviolet light exposure and prevent premature aging of the polycarbonate itself. Polycarbonate sheets shall have the following characteristics:

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

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

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

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

c. Exterior Finish

DMS front face panels and front face border pieces shall be coated with semi-gloss black Kynar 500 resin or an equivalent brand of oven-fired fluoropolymer coating, which has an expected outdoor service life of 20 years. All other DMS housing surfaces, including the DMS mounting brackets, shall be natural mill-finish aluminum.

d. Heating

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

(5) Humidity Control

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

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

(6) Drain Holes

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

(7) Ventilation System

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

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

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

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

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

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

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

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

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

LED Display Modules

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

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

- Removal or failure of any LED module shall not affect the operation of any other LED module or sign component. Removal of one or more LED modules shall not affect the structural integrity of any part of the sign.
- It shall not be possible to mount an LED display module upside-down or in an otherwise incorrect position within the DMS display matrix.
- All LED display modules, as well as the LED pixel boards and driver circuit boards, shall be identical and interchangeable throughout the DMS.

(1) LED Pixels

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

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

(2) Discrete LEDs

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

- All LEDs shall have a nominal viewing cone of 30 degrees with a half-power angle of 15 degrees measured from the longitudinal axis of the LED. Viewing cone tolerances shall be as specified in the LED manufacturer's product specifications and shall not exceed +/- 3 degrees.
- Red LEDs shall utilize AlInGaP semiconductor technology and shall emit red light that has a peak wavelength of 615 – 650 nm.
- Green LEDs shall utilize InGaP semiconductor technology and shall emit green light that has a peak wavelength of 525 – 535 nm.
- Blue LEDs shall utilize InGaP semiconductor technology and shall emit blue light that has a peak wavelength of 464 – 470 nm.
- The LED lenses shall be fabricated from UV light resistant epoxy.
- The LED manufacturer shall perform color sorting of the bins. Each color of LEDs shall be obtained from no more than two (2) consecutive color "bins" as defined by the LED manufacturer.
- The LED manufacturer shall perform intensity sorting of the bins. LEDs shall be obtained from no more than two (2) consecutive luminous intensity "bins" as defined by the LED manufacturer.
- The various LED color and intensity bins shall be distributed evenly throughout the sign and shall be consistent from pixel to pixel. Random distribution of the LED bins shall not be accepted.
- LED package style shall be either through-hole flush-mount or surface-mount. Through-hole LEDs with standoffs will not be accepted.
- All LEDs used in all DMS provided for this contract shall be from the same manufacturer and of the same part number, except for the variations in the part number due to the intensity and color bins.
- The LEDs shall be rated by the LED manufacturer to have a minimum lifetime of 100,000 hours of continuous operation while maintaining a minimum of 70% of the original brightness.

(3) Pixel Drive Circuitry

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

- Each LED driver board shall be microprocessor-controlled and shall communicate with the sign controller on a wire or fiber optic communication network using an addressable network protocol. The microprocessor shall process commands from the sign controller to display data, perform diagnostic tests, and report pixel and diagnostic status.
- Constant current LED driver ICs shall be used to prevent LED forward current from exceeding the LED manufacturer's recommended forward current whenever a forward voltage is applied. To maximize LED service life, LED drive currents will not be allowed that exceed the manufacturer's recommendations for the 100,000-hour lifetime requirement.

- The LED pixels shall be directly driven using pulse width modulation (PWM) of the drive current to control the display intensity. This LED driver circuitry shall vary the current pulse width to achieve the proper display intensity levels for all ambient light conditions. The drive current pulse shall be modulated at a frequency high enough to provide flicker-free operation and a minimum of 200 brightness levels.
- The LED driver circuitry shall receive updated display data at a minimum rate of ten (10) frames per second from the sign controller.
- Each LED driver circuit shall be powered by 24 VDC from external regulated DC power supplies. Each driver circuit shall receive power from a minimum of two (2) independent power supplies. Indicator LEDs shall be provided to indicate the status of each power source.
- Each LED driver circuit shall contain a microprocessor-controlled power regulation circuit that controls the voltage applied to the LED strings. The power circuit shall automatically adjust the voltage supplied to the LEDs to optimize power consumption efficiency as the temperature changes.
- The voltage of each power input shall be measured to the nearest tenth of a volt and reported to the sign controller upon request. Each driver circuit shall also contain one status LED for each power source that indicates if the power source is present or not.
- The LED driver circuitry shall be able to detect that individual LED strings or pixels are stuck off and shall report the pixel status to the sign controller upon request.
- The LED driver board shall contain a seven segment numeric LED display that indicates the functional status of the driver and pixel boards. At a minimum, it shall indicate error states of the LED pixels and communication network. The indicator shall be positioned such that a maintenance technician can easily view the status code for diagnostic purposes. The status codes shall also be reported to the sign controller upon request.

(4) Characters Displayed

The signs shall be capable of displaying ASCII characters 32 through 126 (including all upper and lower case letters and digits from 0 to 9) at any location in a message line. The display area shall be 64 pixels high by 288 pixels wide.

The sign shall normally display 12-inch characters using double-stroke (15 x 10) characters with three-column spacing between characters. The operator shall be able to change the default spacing between characters. The spacing options shall be one, two or three pixel columns. Font access privileges shall be assigned by the system supervisor.

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

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

12-inch characters shall be legible under all light conditions at a distance of 600 feet within a 30 degree cone of vision centered on the optical axis of the pixel. The cone perimeter shall be defined by its 50% intensity points.

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

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

(5) Display of Graphic Images

The DMS control software shall support the inclusion of graphics in messages in full compliance with the NTCIP 1203 v3 standard in addition to supporting graphics using manufacturer-specific objects and MULTI tags.

Regulated DC Power Supplies

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

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

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

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

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

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

Regulated DC power supplies shall conform to the following specifications:

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

(1) Photoelectric Sensor Devices

Three (3) photocells shall be installed on the sign. These devices shall permit automatic light intensity measurement of light conditions at each sign location.

These photocells shall be mounted in a manner to measure front, rear and ambient light conditions.

(2) Brightness Control

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

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

(3) Pixel Status Feedback

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

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

Pixel Read: The pixel read shall be performed during both message downloads and during every sign poll from the central controller or laptop computer. The pixel read shall perform a real-time read of the displayed message and shall return the state of each pixel to the central controller as it is currently displayed to the motorist, including any errors. This shall allow the central controller operator to see what is visibly displayed to the motorist on an individual pixel basis. During a pixel read, the state of each pixel (full-on, half-on or off) in the sign shall be read by the sign controller to allow the central controller or laptop computer to show the actual message, including static flashing and alternating messages, that is visibly displayed on the sign in a WYSIWYG format. This pixel reading shall take place while a message is displayed on the sign without disturbing the message in any way. Any flashing, flickering, blinking, dimming, or other disturbance of the message during this pixel read shall be cause for rejection of the sign. The pixel read shall be an actual real-time read of the current flowing through each string of LEDs at the time of the associated sign poll or message download and shall not be accomplished by simulating errors based on the last pixel test.

Environmental Operating Parameters

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

Sign Controller

(1) General Requirements

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

The sign controller shall meet the following operational requirements:

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

(2) Controller Location

The sign controller and associated communication equipment shall be installed inside the nearby DMS ground mounted control cabinet upstream of the DMS, as shown in the plans, or as directed by the Engineer.

(3) Environmental

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

(4) Mechanical and Electrical

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

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

(5) Operational

Requirements Front

Panel User Interface

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

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

The front panel interface shall also include:

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

(6) Memory

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

(7) Internal Clock

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

(8) Communications

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

(9) Communication Modes

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

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

(10) Serial Communication Ports

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

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

(11) Ethernet Port

The DMS sign controller shall contain a minimum of one (1) 10/100Base-T Ethernet communication port. This port shall be available for use for communicating from the central control system to the DMS sign controller when an Ethernet network is available. The Ethernet port shall have a standard RJ45 connector.

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

(12) Controller Addressing

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

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

Transient Protection

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

(1) Sign AC Power

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

- Withstand a peak 100,000-ampere surge current, 50kA L-N, 50kA L-G
- Designed, manufactured, & tested consistent with: ANSI/IEEE C62.41.1-2002, C62.42.2- 2002, C62.45-2002, NEMA LS-1, NEC 285 and IEC 61643, CE
- Less than 1 nanosecond response time
- Temperature range of -15°F to +140°F (-26°C to +60°C)
- Approximate dimensions of 3-inches (76 mm) wide by 8-inches (203 mm) long by 3-inches (76 mm) high
- High Energy Parallel Design for Category C3 & C-High Application
- UL listed to: UL 1449 Third Edition 200kA & 100kA SCCR

(2) Control Equipment AC Power

- Withstand a peak 100,000-ampere surge current, 50kA L-N, 50kA L-G
- Designed, manufactured, & tested consistent with: ANSI/IEEE C62.41.1-2002, C62.42.2- 2002, C62.45-2002, NEMA LS-1, NEC 285 and IEC 61643, CE
- Less than 1 nanosecond response time
- Temperature range of -15°F to +140°F (-26°C to +60°C)
- Approximate dimensions of 3-inches (76 mm) wide by 8-inches (203 mm) long by 3-inches (76 mm) high
- High Energy Parallel Design for Category C3 & C-High Application
- UL listed to: UL 1449 Third Edition 200kA & 100kA SCCR

(3) Communication Signals

Transient voltage surge suppressors shall protect all communication signals connecting to the control equipment from off-site sources using copper cables.

Transient voltage surge suppressors shall protect all copper communication lines used to pass data between the sign controller and sign.

(4) Protection

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

Sign Controller Functions

The sign controller shall be capable of being controlled from the central controller or the laptop computer.

The controller software shall be capable of performing the following functions:

Display a message, including:

1. Static messages
2. Flashing messages
3. Alternating messages

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

It shall be possible to separately vary the flashing and alternating frequencies. Flashing messages shall have the following adjustable timing:

1. Message time on from 0.5 to 5.0 seconds in 0.1 second increments.
2. Message time off from 0.5 to 5.0 seconds in 0.1 second increments

It shall be possible to flash any character or set of characters in a static message. Alternating messages shall have the following adjustable timing:

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

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

Report errors and failures, including:

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

recovery Message and status

monitoring:

The sign controller shall respond to the central controller whenever it receives a polling request for status. The return message shall be capable of providing the following information:

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

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

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

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

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

The sign shall normally display double stroke (15 x 10) characters with three-column spacing between characters. The sign shall also be able to display single stroke (5 X 7), expanded (6 X 7) or double-stroke (7 X 7) nominal character fonts or change the default spacing between characters. The spacing options shall be one, two or three pixel columns. Each font may be edited and downloaded to the sign controller from the central controller or laptop computer at any time without any software or hardware modifications.

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

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

from the central controller and can be customized according to the requirements of the installation site. Each sign shall have its own, independent brightness table.

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

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

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

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

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

The operational status of the fans shall be automatically tested once a day and tested on command from the central controller or laptop computer. Any failure will cause an error message to be sent to the central controller or laptop when the sign controller is polled by the central controller or laptop computer.

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

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

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

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

In the event the central controller fails to communicate with the sign controller within a programmable time limit, the sign shall activate a programmable default message (which shall be a blank). This function shall apply only when the sign controller is in central control mode.

Failure of any sign shall not affect the operation of any other sign in the system.

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

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

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

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

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

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

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

Communication lines shall be protected by two stages of transient voltage suppression devices as required in the Sign Controller Communication Interface Section of this specification. Tripping of each stage (or both if tripped simultaneously) of the surge protection shall cause the sign controller to call central and report the error condition (for dial-up operation) or report the error condition to

central on the next poll (for multi-drop operation). There shall be an option that is either enabled or disabled and is selected and downloaded from the central controller to the sign controller. When this option is enabled, tripping of the second stage of surge protection shall disconnect the communication lines until the surge protection has been replaced. When this option is disabled, tripping of the second stage of surge protection shall disconnect the communication lines until the surge protection has been replaced. When this option is disabled, the sign will continue to function normally after the second stage of surge protection is tripped.

(1) Modes of Operation

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

- Central Mode: The local control panel switch is off and the central controller controls and monitors the sign
- Local Mode: The local control panel switch is on and the laptop computer is used to locally control the sign. The central controller only monitors the sign (i.e. status poll).
- Local Override: The local mode has been overridden by the central to allow the central to control the sign in case the local control panel switch was unintentionally left in local mode.

(2) AC Power

The signs and their sign controller shall be capable of operating with 120/240 VAC, 16 amp per leg, 60 hertz, single-phase power.

The signs shall have a 50 amp per leg, 120/240 VAC, two-pole load center with 16 circuit capability. Each circuit in the sign shall be powered from a separate circuit breaker.

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

(3) Transient Test Requirements

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

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

Electronic Materials and Construction Methods

(1) Printed Circuit Boards

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

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

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

(2) Components

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

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

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

DMS Controller Uninterruptible Power Supply

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

The UPS shall meet the following minimum specifications:

1. Line Transient Protection: Passes ANSI/IEEE C62.41 Category A testing
2. Safety Compliance: UL listed to UA1778
3. EMC Compliance: FCC Class B
4. Efficiency: >95% on line
5. Capacity VA/Watts @ 0.67P.F.: 425VA/285W
6. Voltage Nominal: 120 VAC
7. Voltage Range: 100-142 VAC
8. Typical run time (minutes): Full load: 3 minutes. Typical load: 5 minutes
9. Transfer time: 4 ms typical
10. Battery: Sealed, maintenance-free, valve regulated, UL 924 recognized.
11. Battery recharge time (to 95% of capacity): 8 hours with output fully loaded
12. Over current protection (on line): circuit breaker
13. Input fault current (maximum): 15A
14. Operating temperature: Range minimum -10°F -140°F (-23°C to 60°C)
15. Humidity: 5% - 95% RH (non-condensing)
16. Network Interface

module IP Relay

An IP relay and associated 12-28 VDC power supply shall be provided and installed within the DMS cabinet to allow the sign controller and the Ethernet switch to be rebooted remotely. The IP relay shall be capable of interfacing with the Ethernet switch in the DMS cabinet using Ethernet protocol. The IP relay shall meet the following minimum specifications:

1. Input voltage: 12-28 VDC
2. Power Dissipation: 5.8W Max (relays on) <2W idle
3. Power Fail Hold-Over: 150ms min. (24V, all relays on)
4. Max Switched Power: 8 x 10A at 125 VAC, Fused at 12A
5. Dry Contact relays: 8 min.
6. Operating temperature: -10°F -140°F (-23°C to 60°C)
7. Ethernet Interface: 10/100 autosensing, static IP, TCP port selectable, RJ-45 w/internal FCC filters
8. Switches and Controls: Relay select/on/off/cycle,

defaults Ethernet Switch

A Layer II Ethernet switch shall be installed in the DMS cabinet. The Ethernet switch shall be measured and paid for separately as LAYER II (DATALINK) SWITCH.

Fiber Patch Panel

A fiber patch panel shall be provided and installed within the sign housing. The fiber patch panel shall be paid for separately as FIBER OPTIC PATCH PANEL, 24 PORT, CABINET MOUNT. Termination of fiber optic cables and all required appurtenances and fiber work as required by the DMS manufacturer for communication between the DMS controller, sign control board, and other sign components shall be included with this pay item, DYNAMIC MESSAGE SIGN, FULL MATRIX, COLOR, NTCIP 1203 V2.

CONSTRUCTION

Technical Assistance

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

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

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

Installation

The Contractor shall install the DMS on the mounting structure, as noted on the Plans or as per the manufacturer's recommendations, including the rotation away from the mounting structure for DMS legibility.

- The material for attaching the DMS to the mounting structure shall include all mounting hardware, conduit, and cable from the DMS Controller cabinet up to the DMS.
- The DMS shall be aligned such that the DMS message can be legible from a minimum of 600 feet.
- All associated conduit, wire, circuit breakers, brackets, etc. as shown on the Plans, and all items and workmanship required to successfully pass the Site Test stated within this specification, shall be the sole responsibility of the Contractor.

The Contractor shall have the DMS manufacturer commission the DMS per manufacturer's recommendation.

Erection Plan

The Erection Contractor shall retain the services of an Illinois Licensed Structural Engineer, experienced in the analysis and preparation of erection plans, for the completion of a project-specific erection plan. The Structural Engineer shall sign and seal the erection plan, drawings, and calculations for the proposed erection.

The erection plan shall be complete in detail for all phases, stages, and conditions anticipated during erection. The erection plan shall include structural calculations and supporting documentation necessary to completely describe and document the means, methods, temporary support positions, and loads necessary to safely erect the structure in conformance with the contract documents and as outlined herein.

(1) The erection plan and procedure shall provide complete details of the erection process including:

- A. Falsework, struts, bracing, tie cables and other devices, material properties and specifications for temporary works, requirements prior to releasing the DMS from the cranes (if required), connection details and attachments to other structure components or objects;
- B. Procedure and sequence of operations, including a schedule with completion times for work items that comply with the working hour limitations;
- C. Minimum load chart lift capacity, outrigger size and reactions for each crane;
- D. Locations of cranes, trucks delivering the DMS, and the location of cranes and outriggers relative to other structures, including retaining walls, wingwalls and utilities.
- E. Calculated loads, lift points, lifting devices, spreaders, and angle of lifting cables.
- F. Drawings, notes, catalog data showing the manufacturer's recommendations or performance tests, and calculations clearly showing the above listed details, assumptions, and dimensions.
- G. Contingency plans detailing what measures the Contractor will take in case of inclement weather (forecast or actual), equipment failure, delivery interruption, and slower than planned production.

(2) The erection plans and procedures shall be submitted to the Engineer for review and acceptance two (2) weeks prior to starting the work. Review and acceptance by the Engineer shall not be construed to guarantee the safety and acceptability of the work.

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

(4) Pre-Erection Conference

- A. A Pre-Erection meeting shall be held at least one week prior to the commencement of erection. The Engineer, Contractor, Erection Contractor, and the Contractor's Engineer shall attend the meeting. The intent of the meeting is to develop a mutual understanding of the proposed implementation of the Contractor's erection plan. Revisions or adjustments to the plan, and potential revisions or adjustment to the implementation of the erection plan shall be discussed.
- B. Additional Pre-Erection meetings may be required for subsequent phases of construction, or for phases that differ from the original construction plan, as directed by the Engineer. Additional meetings may also be requested by the Contractor, and approved by the Engineer.

Testing Requirements

The equipment covered by this specification shall be subjected to design approval tests (DAT), factory demonstration tests (FDT), stand-alone tests, systems tests and 72 hour and 90 day test periods to determine conformance with all the specification requirements. The Engineer may accept certification by an independent testing lab in lieu of the design approval tests to verify that the design approval tests have previously been satisfactorily completed. The DMS vendor shall arrange for and conduct the tests in accordance with the testing requirements stated herein. Unless otherwise specified, the DMS vendor is responsible for satisfying all inspection requirements prior to submission for the Engineer's inspection and acceptance. The contract periods will not be extended for time lost or delays caused by testing prior to final Department approval of any items. The Engineer reserves the right to have his representative witness any and all tests. The results of each test shall be compared with the requirements specified herein. Failure to conform to the requirements of any test shall be counted as a defect, and the equipment shall be subject to rejection by the Engineer. Rejected equipment may be offered again for a retest provided that all non-compliances have been corrected and retest by the DMS vendor and evidence thereof submitted to the Engineer.

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

(1) Test Procedures

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

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

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

(2) Design Approval Tests

Design approval tests shall be conducted by the DMS vendor on one or more samples of equipment of each type, as approved by the Engineer, to determine if the design of the equipment meets the requirements of this Specification. The test shall be conducted in accordance with the approved test procedures.

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

(3) Temperature and Condensation

The DMS sign system equipment shall successfully perform all the functionality requirements listed in this specification under the following conditions in the order specified below:

- A. The equipment shall be stabilized at -40°F (-40°C). After stabilization at this temperature, the equipment shall be operated without degradation for two (2) hours.
- B. Moisture shall be caused to condense on the equipment by allowing it to warm up to room temperature in an atmosphere having relative humidity of at least 40% and the equipment shall be satisfactorily operated for two (2) hours while wet.
- C. The equipment shall be stabilized at 149°F (65°C). After stabilization, the equipment shall be satisfactorily operated for two (2) hours without degradation or failure.

(4) Primary Power Variation

The equipment shall meet the specified performance requirements when the nominal input voltage is 115 V ± 15 V. The equipment shall be operated at the extreme limits for at least 15 minutes during which the operational test of the FDT shall be successfully performed.

(5) Power Service Transients

The equipment shall meet the performance requirements, specified in the parent specification, when subjected to the power service transient specified in 2.1.6 "Transient, Power Service", of the NEMA standard TS1. The equipment shall meet the performance requirements specified in the parent specification.

(6) Relative Humidity

The equipment shall meet its performance requirements when subjected to a temperature of 149°F (65°C) and a relative humidity of 90%. The equipment shall be maintained at the above condition for 48 hours. At the conclusion of the 48 hour soak, the equipment shall meet the requirements of the operational test of the FDT within 30 minutes of beginning the test.

(7) Vibration

The equipment (excluding cabinets) shall show no degradation of mechanical structure, soldered components, or plug-in components and shall operate in accordance with the manufacturer's equipment specifications after being subjected to the vibration tests as described in Section 2.2.5, "Vibration Test", of the NEMA standard TS1.

(8) Consequences of Design Approval Test Failure

If the unit fails the design approval test, the design fault shall be corrected and the entire design approval test shall be repeated. All deliverable units shall be modified without additional costs to the Department, to include design changes required to pass the design approval tests.

Factory Demonstration Tests

The DMS vendor shall be responsible for conducting Factory Demonstration Tests on all units at the DMS Vendor's Manufacturing Facility. These tests shall be performed on each unit supplied.

The Engineer shall be notified a minimum of sixty (60) calendar days before the start of tests. The DMS Vendor shall pay for all travel expenses, including airfare, rental car, hotel, meals, etc., for up to three (3) department personnel or designated representatives for the Engineer to witness the Factory Demonstration Tests on the first unit at the vendor's manufacturing facility. All tests shall be conducted in accordance with the approved test procedures. All equipment shall pass the following individual tests:

Examination Tests

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

Continuity Tests

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

(1) Operational Test

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

(2) Consequences of Factory Test Failure

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

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

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

Stand-Alone Tests

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

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

(1) Consequences of Stand-Alone Test Failure

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

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

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

System Test

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

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

(1) Consequence of System Test Failure

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

72 Hours and 90 Days Test Failure

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

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

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

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

Final System Acceptance

Final system acceptance shall be defined as when all work and materials provided for in this item have been furnished and completely installed, and all parts of the work have been approved and accepted by the Engineer and the Dynamic Message Sign System has been operated continuously

and successfully for ninety (90) calendar days with no more than five (5) working days downtime due to mechanical, electrical and/or other malfunctions.

(1) Center to Field Communications NTCIP Requirements

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

References

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

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

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

Table 1: NTCIP Document References

(1) Subnetwork Profiles

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

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

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

(2) Transport Profiles

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

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

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

(3) Application Profiles

Each NTCIP device shall comply with NTCIP 2301 and shall meet the requirements for Conformance Level 1. An NTCIP device may support additional application profiles at the manufacturer's option. Responses shall use the same application profile used by the request. Each NTCIP device shall support the receipt of application data packets at any time allowed by the subject standards.

(4) Object Support

Each NTCIP device shall support all mandatory objects of all mandatory conformance groups as defined in NTCIP 1201 and NTCIP 1203. Each NTCIP device shall support all mandatory objects in all optional conformance groups required herein. All optional objects listed in these specifications shall be supported. The NTCIP device(s) shall be required to support the following optional conformance groups.

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

Table 2: Required Optional Conformance Groups

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

Object	Reference	Project Requirement
moduleTable	NTCIP 1201 Clause 2.2.3	Shall contain at least one row with moduleType equal to 3 (software).
maxTimeBaseScheduleEntries	NTCIP 1201 Clause 2.4.3.1	Shall be at least 28
maxDayPlans	NTCIP 1201 Clause 2.4.4.1	Shall be at least 20
maxDayPlanEvents	NTCIP 1201 Clause 2.4.4.2	Shall be at least 12
maxEventLogConfig	NTCIP 1201 Clause 2.5.1	Shall be at least 50

eventConfigMode	NTCIP 1201 Clause 2.4.3.1	The NTCIP Component shall Support the following Event Configuration: onChange, greaterThanValue, smallerThanValue
eventConfigLogOID	NTCIP 1201 Clause 2.5.2.8	FSORS
eventConfigAction	NTCIP 1201 Clause 2.5.2.8	FSORS
maxEventLogSize	NTCIP 1201 Clause 2.5.3	Shall be at lease 200
maxEventClasses	NTCIP 1201 Clause 2.5.5	Shall be at least 16
eventClassDescription	NTCIP 1201 Clasue 2.5.6.4	FSORS
maxGroupAddresses	NTCIP 1201 Clause 2.7.1	Shall be at least 1
communityNamesMax	NTCIP 1201 Clause 2.8.2	Shall be at least 3
NumFonts	NTCIP 1203 Clause 2.1.1.1.1	Shall be at least 12
maxFontCharacters	NTCIP 1203 Clause 2.4.1.1.3	Shall be at least 255
defaultFlashOn	NTCIP 1203 Clause 2.5.1.1.1.3	The DMS shall support flash "on" times ranging from 0.1 to 9.9 seconds in 0.1 second increments
defaultFlashOff	NTCIP 1203 Clause 2.5.1.1.1.4	The DMS shall support flash "off" times ranging from 0.1 to 9.9 seconds in 0.1 second increments
defaultBackgroundColor	NTCIP 1203 Clause 2.5.1.1.1.1	The DMS shall support the black background color
defaultForegroundColor	NTCIP 1203 Clause 2.5.1.1.1.2	The DMS shall support the amber foreground color
defaultJustificationLine	NTCIP 1203 Clause 2.5.1.1.1.6	The DMS shall support the following forms of line justification: left, center, and right
defaultJustificationPage	NTCIP 1203 Clause 2.5.1.1.1.7	The DMS shall support the following forms of page justification: top, middle, and bottom
defaultPageOnTime	NTCIP 1203 Clause 2.5.1.1.1.8	The DMS shall support page "on" times ranging from 0.1 to 25.5 seconds in 0.1 second increments
defaultPageOffTime	NTCIP 1203 Clause 2.5.1.1.1.9	The DMS shall support page "off" times ranging from 0.1 to 25.5

		seconds in 0.1 second increments
defaultCharacterSet	NTCIP Clause 2.5.1.1.1.10 1203	The DMS shall support the eight bit character set
dmsMaxChangeableMsg	NTCIP Clause 2.6.1.1.1.4 1203	Shall be at least 100
dmsMessageMultiString	NTCIP Clause 2.6.1.1.1.8.3 1203	The DMS shall support any valid MULTI string containing any subset of those MULTI tags listed in Table 3 (below)
dmsControlMode	NTCIP Clause 2.7.1.1.1.1 1203	Shall support at least the following modes: local, central, and centralOverride
dmsSWReset	NTCIP Clause 2.7.1.1.1.2 1203	FSORS
dmsMessageTimeRemaining	NTCIP Clause 2.7.1.1.1.4 1203	FSORS
dmsShortPowerRecoveryMessage	NTCIP Clause 2.7.1.1.1.8 1203	FSORS
dmsLongPowerRecoveryMessage	NTCIP Clause 2.7.1.1.1.19 1203	FSORS
dmsShortPowerLossTime	NTCIP Clause 2.7.1.1.1.10 1203	FSORS
dmsResetMessage	NTCIP Clause 2.7.1.1.1.12 1203	FSORS
dmsCommunicationsLossMessage	NTCIP Clause 2.7.1.1.1.12 1203	FSORS
dmsTimeCommLoss	NTCIP Clause 2.7.1.1.1.12 1203	FSORS
dmsEndDurationMessage	NTCIP Clause 2.7.1.1.1.15 1203	FSORS
dmsMemoryMgmt	NTCIP Clause 2.7.1.1.1.16 1203	The DMS shall support the following Memory management Modes: normal and clearChangeableMessages
dmsMultiOtherErrorDescription	NTCIP Clause 2.7.1.1.1.20 1203	If the vender implements any vendor-specific MULTI tags, the DMS shall provide meaningful error messages within the object whenever one of these tags generates an error

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

Table 3: Modified Object Ranges and Required Optional Objects

(5) Multi Tags

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

MULTI Tag	DESCRIPTION
f1	Field 1-time (12 hr)
f2	Field 1-time (24 hr)
f8	Field 8- day of month
f9	Field 9-month
f10	Field 10-2 digit year
f11	Field 11-4 digit year
fl (and /fl)	Flashing text on a line-by-line basis with flash rates controllable in 0.1-second increments.
Fo	Font
jl2	Justification- line-left
jl3	Justification- line-center
jl4	Justification- line- right
jp2	Justification- page- top
jp3	Justification- page- middle
jp4	Justification- page- bottom
mv	Moving text
nl	New line
np	New page up to 5 instances in a message (i.e. up to 6 pages/frame in a message counting first page)
pt	Page times controllable in 0.1-second increments

Table 4: Required MULTI Tags

(6) Documentation

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

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

(7) Acceptance Testing

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

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

(8) Interpretation Resolution

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

As-Built Documentation

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

A. Operator’s Manuals:

A manual containing a general description and detailed operating and installation instructions shall be provided for each different type or model of equipment. Five hard copies and one electronic copy of the manual shall include the following information:

1. A general description of the equipment including all information necessary to describe the basic use or function of the system components. This shall include a general block diagram presentation of the equipment. Where auxiliary equipment is required, tabular charts shall be included, list such equipment. These charts shall include the nomenclature physical and electrical characteristics and functions of the auxiliary equipment, unless such information is contained elsewhere in an associated manual. In the latter case, a reference shall be made to the location of the information pertaining to the auxiliary equipment.
2. The theory of operation of the system components in a clear, concise manner supported by simplified schematics, logic, data flow diagrams, one-function diagrams, etc. Timing and waveform diagrams and voltage levels shall be shown as required. A logical development shall be used starting with a system block level and proceeding to a circuit analysis. Circuit analysis shall be detailed whenever circuits are not normally found in standard textbooks. This application of new theoretical concepts shall be fully described. Where the design allows operation in a number of different modes, an operational description of each mode shall be included.
3. In simple, clear language, the routine of operation, from necessary preparations for placing the equipment into operation, to securing the equipment after operation. This section shall contain appropriate illustrations, with the sequence of operations presented in tabular form wherever feasible.
4. The manufacturer’s recommended procedures and checks necessary for preventive maintenance. This shall be specified for pre-operation, weekly, monthly, quarterly, semi-annual, annual and “as required” checks as necessary to assure reliable equipment operation. Specification, including tolerances, for all electrical, mechanical, and other applicable measurement, adjustments, or both, shall be listed.
5. Data necessary for isolation and repair of failure or malfunctions, assuming the maintenance technicians to be capable of analytical reasoning using the information provided in the submittal information. Accuracies, limits, and tolerances for all electrical, physical or other applicable measurements shall be described. General instructions shall be included for disassembly, overhaul and reassembly, including shop specifications or performance requirements.

6. Detailed instructions shall be given only where failure to follow special procedures would result in damage to the equipment, improper operation, danger to operating or maintenance personnel. Consumption of excessive person hours, etc. Such instructions and specifications shall be included only for such maintenance as maybe accomplished by specialized technicians and engineers in a modern electromechanical shop. The instructions shall describe special test set-up, components fabrication, the use of special tools, jigs and test equipment.
7. A detailed physical description of size, weight, special mounting requirements, electrical connections, and all other pertinent information necessary for proper installation and use of the equipment shall be provided.
8. The parts list shall contain all information required to describe the characteristics of the individual parts, as required for identification. It shall include a list of all equipment within a group and list all assemblies, sub-assemblies and replacement parts of units. The tabular arrangement shall be an alphanumeric order of the schematic reference symbols and shall give the associated description, manufacturer's name and part number. A table of contents or some other convenient means shall be provided for the purpose of identifying major components, assemblies, etc.
9. Schematic diagrams shall be complete and accurate as required to supplement the text material and to allow the books to be a self-contained technical information source. Maximum size of these diagrams shall be limited to allow their use at the equipment sites, in the classroom, etc., part reference symbols, test voltages, waveforms and other aids to understanding of the circuits function shall be included on the diagrams. Test voltages, waveforms and other aids to understanding of the circuits function may be shown on either simplified schematics or other drawings (as required in the above sections) on theory of operation or maintenance or on the schematic diagrams required for this section. The overall scope of information shall not be less, however, than that stated for the schematic diagrams.

B. Software Manuals

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

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

C. Final Documentation

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

Spare Parts Requirements

The Contractor shall provide the following spare parts:

1. Additional parts to create two (2) additional character matrixes.
2. Two (2) load modules to drive a character module.
3. One (1) LED power supply.
4. One complete sign controller unit.
5. One fan for every 5 installed in sign.
6. One photoeye
7. One humidity sensor
8. One RPM sensor
9. One relay for every 10 of each type installed.
10. One fuse and circuit breaker for every size installed.

The cost of additional parts/equipment shall be considered incidental to the price for each DMS.

DMS Training

Operational and maintenance training for the entire system shall be provided to designated personnel during installation, testing and debugging. This training shall be provided through practical

demonstrations and other related technical procedures. Training shall be limited to a maximum of 15 people and shall be provided at a time and location approved by the Engineer. The training shall include, but not be limited to, the following:

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

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

The DMS vendor shall digitally record the entire training and shall provide the video recording files to the Engineer for later use. The video files shall be industry standard MP4 or H.264 format and readily viewable by the Department. The training shall be conducted at District One Traffic Systems Center building, after the completion of all system integration tests. The schedule of training sessions shall be established by the DMS vendor, with the approval of the Engineer.

Warranty

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

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

The Engineer shall be furnished with a certification stating that the equipment, parts and material furnished for the DMS and DMS control system complies with all the requirements of this special provision. If there are any items which do not comply with this special provision, then a list of those exceptions shall be detailed on the certification. All manufacturer's warranties and guarantees for the dynamic message sign system shall be transferred to the Department on the date of final acceptance.

METHOD OF MEASUREMENT

The DMS FRONT ACCESS, FULL MATRIX, NTCIP 1203 V2-COLOR shall be paid for at the contract unit price as each which cost shall include the cost of furnishing all labor, materials, documentation, warranties, tools and equipment to install, test, and make the DMS site fully operational.

BASIS OF PAYMENT

This work shall be paid for at the contract unit price each for DMS FRONT ACCESS, FULL MATRIX, NTCIP 1203 V2-COLOR which price shall include furnishing and installing the DMS sign, documentation, warranties, spare parts, training, and diagnostic software as directed by the Engineer.

ELECTRIC SERVICE INSTALLATION

Effective: January 1, 2012

DESCRIPTION

This item shall consist of all material and labor required to extend, connect or modify the electric services, as indicated or specified, which is over and above the work performed by the utility. Unless otherwise indicated, the cost for the utility work, if any, will be reimbursed to the Contractor separately under ELECTRIC UTILITY SERVICE CONNECTION. This item may apply to the work at more than one service location and each will be paid separately.

MATERIALS

Materials shall be in accordance with the Standard Specifications.

CONSTRUCTION REQUIREMENTS

General

The Contractor shall ascertain the work being provided by the electric utility and shall provide all additional material and work not included by other contract pay items required to complete the electric service work in complete compliance with the requirements of the utility. No additional compensation will be allowed for work required for the electric service, even though not explicitly shown on the Drawings or specified herein.

METHOD OF MEASUREMENT

Electric Service Installation shall be counted, each.

BASIS OF PAYMENT

This work will be paid for at the contract unit price each for ELECTRIC SERVICE INSTALLATION which shall be payment in full for the work specified herein.

ELECTRIC UTILITY SERVICE CONNECTION (COMED)

Effective: January 1, 2012

DESCRIPTION

This item shall consist of payment for work performed by ComEd in providing or modifying electric service as indicated. THIS MAY INVOLVE WORK AT MORE THAN ONE ELECTRIC SERVICE.

For summary of the Electrical Service Drop Locations see the schedule contained elsewhere herein.

CONSTRUCTION REQUIREMENTS

General

It shall be the Contractor's responsibility to contact ComEd. The Contractor shall coordinate his work fully with the ComEd both as to the work required and the timing of the installation. No additional compensation will be granted under this or any other item for extra work caused by failure to meet this requirement. **Please contact ComEd, New Business Center Call Center, at 866 NEW ELECTRIC (1-866-639-3532) to begin the service connection process. The Call Center Representatives will create a work order for the service connection. The representative will ask the requestor for information specific to the request. The representative will assign the request based upon the location of project.**

The Contractor should make particular note of the need for the earliest attention to arrangements with ComEd for service. In the event of delay by ComEd, no extension of time will be considered applicable for the delay unless the Contractor can produce written evidence of a request for electric service within 30 days of execution.

METHOD OF MEASUREMENT

The Contractor will be reimbursed to the exact amount of money as billed by ComEd for its services. Work provided by the Contractor for electric service will be paid separately as described under ELECTRIC SERVICE INSTALLATION. No extra compensation shall be paid to the Contractor for any incidental materials and labor required to fulfill the requirements as shown on the plans and specified herein. For bidding purposes, this item shall be estimated as \$5,000.00.

BASIS OF PAYMENT

This work will be paid for at the contract lump sum price for ELECTRIC UTILITY SERVICE CONNECTION which shall be reimbursement in full for electric utility service charges.

FIBER OPTIC PATCH PANEL, 24 PORT, CABINET MOUNT

Description

This work shall consist of furnishing and installing a 24-port fiber optic distribution enclosure with number of ports specified in the plans and splice tray in a cabinet as indicated in the plans and/or as directed by the Engineer.

GENERAL

This work shall be performed according to Section 871 of the "Standard Specifications" and the following:

This work shall consist of furnishing and installing the distribution enclosure and splice tray at the location in the cabinet as directed by the Engineer.

MATERIALS

The distribution enclosure shall be wall-mountable with capacity for 24 fiber ports using at least two closet connector housing panels per enclosure and at least eight 0.2-inch or four 0.4-inch reduced length splice trays. The enclosure dimensions for a 24 port enclosure shall not exceed 13.5" x 15.5" x 4.5". The enclosure shall include LC connectors capable of accommodating the required number of singlemode fibers. When the plans indicate multimode fibers are to be used, at least one CCH connector panel shall include multimode LC connectors to facilitate communications.

The splice trays shall be aluminum and capable of accommodating the required number of fusion splices, including necessary splice holders and a compatible splice tray cover. The individual tray dimensions shall not exceed 7.5" x 4.1" x 0.45" and each shall be mounted within the enclosure using suitable hardware that allows removal for maintenance purposes without the use of tools. Each individual splice tray shall be labelled.

BASIS OF PAYMENT

The work shall be paid for at the contract unit price per each for FIBER OPTIC PACTH PANEL, 24 PORT, CABINET MOUNT. The unit price shall include distribution enclosure, splice trays, jumpers, connectors, and mounting hardware required for installation within the indicated cabinet or other secure location.

FIBER OPTIC SPLICE

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 splices are identified. A mainline splice includes all fibers in the cable sheath. 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 38 mm (1.5 in.).

Factory Testing.

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 temperatures of –18 and 38 degrees Celsius (0 and 100 degrees Fahrenheit). 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 –18 and 38 degrees Celsius (0 and 100 degrees Fahrenheit). 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 9 kg (20 lb) cylindrical steel impacting head with a 50 mm (2 in.) spherical radius at the point where it contacts the closure. It shall be dropped from a height of 305 mm (12 in.). 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 @ 1550 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 1. 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 3 m (10 ft) water head from intruding into the splice compartment for a period of 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 3 m (10 ft) 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 mainline splices, the cables shall be fusion spliced. 45 days prior to start of the fiber optic cabling installation, the Contractor shall submit the proposed locations of the mainline splice points for review by the Department.

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, from connector to connector, using an optical power meter and source. This loss shall be measured at from both directions and shall not exceed 0.5 dB per installed kilometer of single mode cable. Measurements shall be made at both 1300 and 1550 nm for single mode cable. For multimode cable, power meter measurements shall be made at 850 and 1300 nm. The end-to-end attenuation shall not exceed 3.8 dB/installed kilometers at 850nm or 1.8 dB per installed kilometer at 1300nm 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 manhole. No cables or splice closures 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.

METHOD OF MEASUREMENT

Fiber optic splice of the type specified will be measured as each, completely installed and tested with all necessary splices completed within the splice closure, and the splice closure secured to the wall of the splice facility.

BASIS OF PAYMENT

This item shall be paid at the contract unit price each for FIBER OPTIC SPLICE - LATERAL or FIBER OPTIC SPLICE - MAINLINE of the type specified, which shall be payment in full for the work, complete, as specified herein.

FIBER OPTIC TERMINATION PANEL

Description

This specification shall govern the furnishing and installing of termination panels for fiber optic cable in designated field locations and associated equipment cabinets as shown in the Plans and as detailed in this specification.

MATERIALS

The fiber optic termination panel shall comply with the following requirements:

- The 12 fiber optic termination panel shall be rack mountable.
- The fiber patch panel shall terminate pigtail fibers as called out on the Plans.
- The fiber optic termination panel shall allow termination of a fiber patch cord to interconnect outside plant fibers to fiber optic communication equipment.
- The approved type optical connectors on the end of each pigtail shall connect to a coupler securely mounted to a patch panel within the controller cabinet. The maximum optical loss across the connection shall not exceed 0.25 dB.
- The fibers with the optical connectors on the pigtail cable shall be routed through and secured in the fiber optic termination panel as directed by and to the satisfaction of the Engineer.
- The bulkheads or single-mode adapter types shall be single-mode LC compatible, ceramic, unless a substitute is approved by the Engineer.

CONSTRUCTION REQUIREMENTS

General

The Contractor shall label all cables and ports using permanent cable tags. These labels shall identify the function of the cables and the ports the cables are connected to.

Installation

The fiber optic termination panel shall be installed in the equipment cabinets or IDOT facilities as specified on the Plans. The panels shall come with cable strain relief hardware and pull out label for administrative documentation. All work shall be neat and in a workmanlike manner. Particular care shall be taken as to not crush or kink the fiber optic cable. If, in the opinion of the Engineer, the cable has been damaged, the entire cable span shall be removed and replaced at the Contractor's expense.

METHOD OF MEASUREMENT

The FIBER OPTIC TERMINATION PANEL bid item will be measured for payment by the actual number of FIBER OPTIC TERMINATION PANEL assemblies furnished, installed, activated, tested, and accepted, and shall be counted, each.

BASIS OF PAYMENT

This work shall be paid for at the contract unit price each for FIBER OPTIC TERMINATION PANEL of the number of fiber optic cable terminations specified, which shall be payment in full for the material and work described herein.

KEEPING ARTERIAL ROADWAYS OPEN TO TRAFFIC (LANE CLOSURES ONLY)

Effective: January 22, 2003

Revised: August 10, 2017

The Contractor shall provide the necessary traffic control devices to warn the public and to delineate the work zone as required in these Special Provisions, the Standard Specifications, the State Standards, and the District Details.

Arterial lane closures shall be in accordance with the Standard Specifications, Highway Standards, District Details, and the direction of the Engineer. The Contractor shall request and gain approval from the Engineer seventy-two (72) hours in advance of all long-term (24 hrs. or longer) lane closures.

Arterial lane closures not shown in the staging plans will not be permitted during **peak traffic volume hours**.

Peak traffic volume hours are defined as weekdays (Monday through Friday) from **6:00 AM to 8:30 AM and 4:30 PM to 6:00 PM**.

Private vehicles shall not be parked in the work zone. Contractor's equipment and/or vehicles shall not be parked on the shoulders or in the median during non-working hours. The parking of equipment and/or vehicles on State right-of-way will only be permitted at locations approved by the Engineer in accordance with Articles 701.08 and 701.11 of the Standard Specifications.

Should the Contractor fail to completely open and keep open all the traffic lanes to traffic in accordance with the limitations specified above, the Contractor shall be liable to the Department for the amount of:

One lane or ramp blocked = \$1,000

Two lanes blocked = \$2,500

Not as a penalty but as liquidated and ascertained damages for each and every 15 minute interval or a portion thereof that a lane is blocked outside the allowable time limitations. Such damages may be deducted by the Department from any monies due the Contractor. These damages shall apply during the contract time and during any extensions of the contract time.

REBUILD EXISTING HANDHOLE TO DOUBLE HANDHOLE, SPECIAL

This item shall consist of partial removal of an existing concrete traffic signal handhole, reconstruction to the specifications of double handhole including new frame and cover and bringing it to grade at location(s) shown in the plans or as directed by the Engineer. This work shall consist of removing the existing handhole frame and cover and the walls of the handhole.

Upon completion of the above work, four (4) holes, four (4) inches in depth, and one-half (1/2) inch in diameter shall be drilled into the top of the remaining concrete; one hole centered into each of the four handhole walls. Four (4) #3 steel dowels eight inches in length, shall be furnished and installed in the drilled holes with a masonry epoxy.

All concrete debris shall be disposed of outside the right-of-way.

Any pavement or asphalt surface removal required to install the new concrete shall have straight and neat edges using a method approved by the Engineer. Care shall be taken to protect the existing traffic signal cable. Any cable damage shall be reported immediately and repaired as directed by the Area Traffic Signal Engineer.

All steel hooks, handhole frame, cover, and concrete shall be provided to construct a rebuilt heavy duty handhole according to applicable portions of Section 814 of the Standard Specification and as modified in 814.01TS HANDHOLES Special Provision.

Basis of Payment.

This work shall be paid for at the contract unit price each for REBUILD EXISTING HANDHOLE TO DOUBLE HANDHOLE.

REMOVAL AND DISPOSAL OF REGULATED SUBSTANCES (PROJECT SPECIFIC)

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

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

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

Intersection of 22nd Street (Cermak Road) and Windsor Drive, Oak Brook, DuPage County

- All excavation planned at the northwest quadrant, northeast quadrant, southwest quadrant, and southeast quadrant at the intersection of 22nd Street (Cermak Road) and Windsor Drive. The Engineer has determined this material meets the criteria of and shall be managed in accordance with Article 669.05(a)(1). Potential contaminants of concern sampling parameters: VOCs, SVOCs and Metals.

Intersection of 22nd Street (Cermak Road) and I-294 southbound ramp, Oak Brook, DuPage County

- All excavation planned at the northeast quadrant at the intersection of 22nd Street (Cermak Road) and I-294 southbound ramp. The Engineer has determined this material meets the criteria of and shall be managed in accordance with Article 669.05(a)(1). Potential contaminants of concern sampling parameters: VOCs, SVOCs and Metals.

Intersection of 22nd Street (Cermak Road) and Enterprise Drive, Westchester, Cook County

- All excavation planned at the northwest quadrant, northeast quadrant, and southeast quadrant at the intersection of 22nd Street (Cermak Road) and Enterprise Drive. The Engineer has determined this material meets the criteria of and shall be managed in accordance with Article 669.05(a)(1). Potential contaminants of concern sampling parameters: VOCs, SVOCs and Metals.

Intersection of 22nd Street (Cermak Road) and Westbrook Corporate Drive, Westchester, Cook County

- All excavation planned at the northwest quadrant, northeast quadrant, southwest quadrant, and southeast quadrant at the intersection of 22nd Street (Cermak Road) and Westbrook Corporate Drive. The Engineer has determined this material meets the criteria of and shall be managed in accordance with Article 669.05(a)(1). Potential contaminants of concern sampling parameters: VOCs, SVOCs and Metals.

Intersection of 22nd Street (Cermak Road) and S. Wolf Road, Hillside, Cook County

- All excavation planned at the northwest quadrant, and southwest quadrant at the intersection of 22nd Street (Cermak Road) and S. Wolf Road. The Engineer has determined this material meets the criteria of and shall be managed in accordance with Article 669.05(a)(5). Potential contaminants of concern sampling parameters: VOCs, SVOCs and Metals.
- All excavation planned at the northeast quadrant, and southeast quadrant at the intersection of 22nd Street (Cermak Road) and S. Wolf Road. The Engineer has determined this material meets the criteria of and shall be managed in accordance with Article 669.05(a)(1). Potential contaminants of concern sampling parameters: VOCs, SVOCs and Metals.

Intersection of 22nd Street (Cermak Road) and Mayfair Avenue, Westchester, Cook County

- All excavation planned at the northeast quadrant at the intersection of 22nd Street (Cermak Road) and Mayfair Avenue. The Engineer has determined this material meets the criteria of and shall be managed in accordance with Article 669.05(a)(5). Potential contaminants of concern sampling parameters: VOCs, SVOCs and Metals.
- All excavation planned at the northwest quadrant, southwest quadrant, and southeast quadrant at the intersection of 22nd Street (Cermak Road) and Mayfair Avenue. The Engineer has determined this material meets the criteria of and shall be managed in accordance with Article 669.05(a)(1). Potential contaminants of concern sampling parameters: VOCs, SVOCs and Metals.

Intersection of 22nd Street (Cermak Road) and Mannheim Road, Westchester, Cook County

- All excavation planned at the northwest quadrant, northeast quadrant, southwest quadrant, and southeast quadrant at the intersection of 22nd Street (Cermak Road) and Mannheim Road. The Engineer has determined this material meets the criteria of and shall be managed in accordance with Article 669.05(a)(1). Potential contaminants of concern sampling parameters: VOCs, SVOCs and Metals.

Intersection of 22nd Street (Cermak Road) and 17th Avenue, North Riverside, Cook County

- All excavation planned at the northwest quadrant, northeast quadrant, southwest quadrant, and southeast quadrant at the intersection of 22nd Street (Cermak Road) and 17th Avenue. The Engineer has determined this material meets the criteria of and shall be managed in accordance with Article 669.05(a)(1). Potential contaminants of concern sampling parameters: VOCs, SVOCs and Metals.

Intersection of 22nd Street (Cermak Road) and 14th Avenue, North Riverside, Cook County

- All excavation planned at the northwest quadrant, northeast quadrant, southwest quadrant, and southeast quadrant at the intersection of 22nd Street (Cermak Road) and 14th Avenue. The Engineer has determined this material meets the criteria of and shall be managed in accordance with Article 669.05(a)(1). Potential contaminants of concern sampling parameters: VOCs, SVOCs and Metals.

Intersection of 22nd Street (Cermak Road) and 12th Avenue, North Riverside, Cook County

- All excavation planned at the northwest quadrant, northeast quadrant, southwest quadrant, and southeast quadrant at the intersection of 22nd Street (Cermak Road) and 12th Avenue. The Engineer has determined this material meets the criteria of and shall be managed in accordance with Article 669.05(a)(1). Potential contaminants of concern sampling parameters: VOCs, SVOCs and Metals.

Intersection of 22nd Street (Cermak Road) and 1st Avenue, North Riverside, Cook County

- All excavation planned at the northwest quadrant, northwest island, north median, northeast quadrant, southwest quadrant, southwest island, southeast quadrant, and southeast island at the intersection of 22nd Street (Cermak Road) and 1st Avenue. The Engineer has determined this material meets the criteria of and shall be managed in accordance with Article 669.05(a)(1). Potential contaminants of concern sampling parameters: VOCs, SVOCs and Metals.

Intersection of 22nd Street (Cermak Road) and 1st Avenue Cutoff, North Riverside, Cook County

- All excavation planned at the intersection of 22nd Street (Cermak Road) and 1st Avenue Cutoff. The Engineer has determined this material meets the criteria of and shall be managed in accordance with Article 669.05(a)(1). Potential contaminants of concern sampling parameters: VOCs, SVOCs and Metals.

Intersection of 22nd Street (Cermak Road) and Des Plaines Avenue, Forest Park, Cook County

- All excavation planned at the northwest quadrant, northeast quadrant, southwest quadrant, and southeast quadrant at the intersection of 22nd Street (Cermak Road) and Des Plaines Avenue. The Engineer has determined this material meets the criteria of and shall be managed in accordance with Article 669.05(a)(1). Potential contaminants of concern sampling parameters: VOCs, SVOCs and Metals.

Intersection of 22nd Street (Cermak Road) and Riverside Mall west entrance, North Riverside, Cook County

- All excavation planned at the southwest quadrant, and southeast quadrant at the intersection of 22nd Street (Cermak Road) and Riverside Mall west entrance. The Engineer has determined this material meets the criteria of and shall be managed in accordance with Article 669.05(a)(1). Potential contaminants of concern sampling parameters: VOCs, SVOCs and Metals.

Intersection of 22nd Street (Cermak Road) and Riverside Mall east entrance, North Riverside, Cook County

- All excavation planned at the southwest quadrant, and southeast quadrant at the intersection of 22nd Street (Cermak Road) and Riverside Mall east entrance. The Engineer has determined this material meets the criteria of and shall be managed in accordance with Article 669.05(a)(1). Potential contaminants of concern sampling parameters: VOCs, SVOCs and Metals.

Intersection of 22nd Street (Cermak Road) and Mid City National Bank entrance, North Riverside, Cook County

- All excavation planned at the northwest quadrant, northwest island, northeast quadrant, southwest quadrant, and southeast quadrant at the intersection of 22nd Street (Cermak Road) and Mid City National Bank entrance. The Engineer has determined this material meets the criteria of and shall be managed in accordance with Article 669.05(a)(1). Potential contaminants of concern sampling parameters: VOCs, SVOCs and Metals.

Intersection of 22nd Street (Cermak Road) and Harlem Avenue, Berwyn, Cook County

- All excavation planned at the northwest quadrant, northeast quadrant, southwest quadrant, and southeast quadrant at the intersection of 22nd Street (Cermak Road) and Harlem Avenue. The Engineer has determined this material meets the criteria of and shall be managed in accordance with Article 669.05(a)(1). Potential contaminants of concern sampling parameters: VOCs, SVOCs and Metals.

Intersection of 22nd Street (Cermak Road) and Wenonah Avenue, Berwyn, Cook County

- All excavation planned at the northwest quadrant, southwest quadrant, and southeast quadrant at the intersection of 22nd Street (Cermak Road) and Wenonah Avenue. The Engineer has determined this material meets the criteria of and shall be managed in accordance with Article 669.05(a)(1). Potential contaminants of concern sampling parameters: VOCs, SVOCs and Metals.

Intersection of 22nd Street (Cermak Road) and Home Avenue, Berwyn, Cook County

- All excavation planned at the northwest quadrant, northeast quadrant, southwest quadrant, and southeast quadrant at the intersection of 22nd Street (Cermak Road) and Home Avenue. The Engineer has determined this material meets the criteria of and shall be managed in accordance with Article 669.05(a)(1). Potential contaminants of concern sampling parameters: VOCs, SVOCs and Metals.

Intersection of 22nd Street (Cermak Road) and S. Oak Park Avenue, Berwyn, Cook County

- All excavation planned at the northwest quadrant, northeast quadrant, southwest quadrant, and southeast quadrant at the intersection of 22nd Street (Cermak Road) and S. Oak Park Avenue. The Engineer has determined this material meets the criteria of and shall be managed in accordance with Article 669.05(a)(1). Potential contaminants of concern sampling parameters: VOCs, SVOCs and Metals.

Intersection of 22nd Street (Cermak Road) and Riverside Drive, Berwyn, Cook County

- All excavation planned at the northwest quadrant, northeast quadrant, southwest quadrant, and southeast quadrant at the intersection of 22nd Street (Cermak Road) and Riverside Drive. The Engineer has determined this material meets the criteria of and shall be managed in accordance with Article 669.05(a)(1). Potential contaminants of concern sampling parameters: VOCs, SVOCs and Metals.

Intersection of 22nd Street (Cermak Road) and East Avenue, Berwyn, Cook County

- All excavation planned at the northwest quadrant, northeast quadrant, southwest quadrant, and southeast quadrant at the intersection of 22nd Street (Cermak Road) and East Avenue. The Engineer has determined this material meets the criteria of and shall be managed in accordance with Article 669.05(a)(1). Potential contaminants of concern sampling parameters: VOCs, SVOCs and Metals.

Intersection of 22nd Street (Cermak Road) and Ridgeland Avenue, Berwyn, Cook County

- All excavation planned at the northwest quadrant, northeast quadrant, southwest quadrant, and southeast quadrant at the intersection of 22nd Street (Cermak Road) and Ridgeland Avenue. The Engineer has determined this material meets the criteria of and shall be managed in accordance with Article 669.05(a)(1). Potential contaminants of concern sampling parameters: VOCs, SVOCs and Metals.

Intersection of 22nd Street (Cermak Road) and Lombard Avenue, Cicero, Cook County

- All excavation planned at the northwest quadrant, northeast quadrant, southwest quadrant, and southeast quadrant at the intersection of 22nd Street (Cermak Road) and Lombard Avenue. The Engineer has determined this material meets the criteria of and shall be managed in accordance with Article 669.05(a)(1). Potential contaminants of concern sampling parameters: VOCs, SVOCs and Metals.

Intersection of 22nd Street (Cermak Road) and S. Austin Boulevard, Cicero, Cook County

- All excavation planned at the northwest quadrant, northeast quadrant, southwest quadrant, and southeast quadrant at the intersection of 22nd Street (Cermak Road) and S. Austin Boulevard. The Engineer has determined this material meets the criteria of and shall be managed in accordance with Article 669.05(a)(1). Potential contaminants of concern sampling parameters: VOCs, SVOCs and Metals.

Intersection of 22nd Street (Cermak Road) and S. 58th Avenue, Cicero, Cook County

- All excavation planned at the northwest quadrant at the intersection of 22nd Street (Cermak Road) and S. 58th Avenue. The Engineer has determined this material meets the criteria of and shall be managed in accordance with Article 669.05(a)(5). Potential contaminants of concern sampling parameters: VOCs, SVOCs and Metals.
- All excavation planned at northeast quadrant, southwest quadrant, and southeast quadrant at the intersection of 22nd Street (Cermak Road) and S. 58th Avenue. The Engineer has determined this material meets the criteria of and shall be managed in accordance with Article 669.05(a)(1). Potential contaminants of concern sampling parameters: VOCs, SVOCs and Metals.

Intersection of 22nd Street (Cermak Road) and S. 57th Avenue, Cicero, Cook County

- All excavation planned at the northwest quadrant, northeast quadrant, southwest quadrant, and southeast quadrant at the intersection of 22nd Street (Cermak Road) and S. 57th Avenue. The Engineer has determined this material meets the criteria of and shall be managed in accordance with Article 669.05(a)(1). Potential contaminants of concern sampling parameters: VOCs, SVOCs and Metals.

Intersection of 22nd Street (Cermak Road) and S. Central Avenue, Cicero, Cook County

- All excavation planned at the southwest quadrant at the intersection of 22nd Street (Cermak Road) and S. Central Avenue. The Engineer has determined this material meets the criteria of and shall be managed in accordance with Article 669.05(a)(5). Potential contaminants of concern sampling parameters: VOCs, SVOCs and Metals.
- All excavation planned at the northwest quadrant, northeast quadrant, and southeast quadrant at the intersection of 22nd Street (Cermak Road) and S. Central Avenue. The Engineer has determined this material meets the criteria of and shall be managed in accordance with Article 669.05(a)(1). Potential contaminants of concern sampling parameters: VOCs, SVOCs and Metals.

Intersection of 22nd Street (Cermak Road) and S. 54th Avenue, Cicero, Cook County

- All excavation planned at the northwest quadrant, northeast quadrant, and southwest quadrant at the intersection of 22nd Street (Cermak Road) and S. 54th Avenue. The Engineer has determined this material meets the criteria of and shall be managed in accordance with Article 669.05(a)(5). Potential contaminants of concern sampling parameters: VOCs, SVOCs and Metals.
- All excavation planned at the southeast quadrant at the intersection of 22nd Street (Cermak Road) and S. 54th Avenue. The Engineer has determined this material meets the criteria of and shall be managed in accordance with Article 669.05(a)(1). Potential contaminants of concern sampling parameters: VOCs, SVOCs and Metals.

Intersection of 22nd Street (Cermak Road) and S. Laramie Avenue, Cicero, Cook County

- All excavation planned at the southwest quadrant at the intersection of 22nd Street (Cermak Road) and S. Laramie Avenue. The Engineer has determined this material meets the criteria of and shall be managed in accordance with Article 669.05(a)(5). Potential contaminants of concern sampling parameters: VOCs, SVOCs and Metals.
- All excavation planned at the northwest quadrant, northeast quadrant, and southeast quadrant at the intersection of 22nd Street (Cermak Road) and S. Laramie Avenue. The Engineer has determined this material meets the criteria of and shall be managed in accordance with Article 669.05(a)(1). Potential contaminants of concern sampling parameters: VOCs, SVOCs and Metals.

Intersection of 22nd Street (Cermak Road) and S. 50th Avenue, Cicero, Cook County

- All excavation planned at the northwest quadrant at the intersection of 22nd Street (Cermak Road) and S. 50th Avenue. The Engineer has determined this material meets the criteria of and shall be managed in accordance with Article 669.05(a)(5). Potential contaminants of concern sampling parameters: VOCs, SVOCs and Metals.
- All excavation planned at the northeast quadrant, southwest quadrant, and southeast quadrant at the intersection of 22nd Street (Cermak Road) and S. 50th Avenue. The Engineer has determined this material meets the criteria of and shall be managed in accordance with Article 669.05(a)(1). Potential contaminants of concern sampling parameters: VOCs, SVOCs and Metals.

Intersection of 22nd Street (Cermak Road) and S. 49th Avenue, Cicero, Cook County

- All excavation planned at the northwest quadrant, northeast quadrant, southwest quadrant, and southeast quadrant at the intersection of 22nd Street (Cermak Road) and S. 49th Avenue. The Engineer has determined this material meets the criteria of and shall be managed in accordance with Article 669.05(a)(1). Potential contaminants of concern sampling parameters: VOCs, SVOCs and Metals.

Intersection of 22nd Street (Cermak Road) and Cicero Avenue, Cicero, Cook County

- All excavation planned at the northwest quadrant, northeast quadrant, southwest quadrant, and southeast quadrant at the intersection of 22nd Street (Cermak Road) and Cicero Avenue. The Engineer has determined this material meets the criteria of and shall be managed in accordance with Article 669.05(a)(1). Potential contaminants of concern sampling parameters: VOCs, SVOCs and Metals.

Work Zones

Three distinct OSHA HAZWOPER work zones (exclusion, decontamination, and support) shall apply to projects adjacent to or within sites with documented leaking underground storage tank (LUST) incidents, or sites under management in accordance with the requirements of the Site Remediation Program (SRP), Resource Conservation and Recovery Act (RCRA), or Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), or as deemed necessary. For this project, the work zones apply for the following ISGS PESA Sites:

None

H:\Special Waste - Phase II\RMP\1955-0000sp 62N39.docx

REMOVE EXISTING BUS SHELTER

Description. This work shall be in conformance with Sections 201, 801 and 842 of the Standard Specifications for Road and Bridge Construction except as modified herein. This work shall consist of the removal and salvage of existing bus shelters, seating, electrical items, and appurtenances at locations shown on the plans and as directed by the Engineer.

General.

The Contractor shall coordinate with the Engineer the removal and salvage of existing bus shelters, seating, electrical items, and appurtenances. The Contractor shall submit a plan to the Engineer for approval to remove and salvage the existing bus shelter. Salvaged materials shall be carefully removed in transportable sections and delivered to a location designated by the Engineer. The Contractor shall disconnect electrical items and abandon the electric service in accordance with Section 801.

Method of Measurement.

Remove Of Existing Structures – Bus Shelter will be measured for payment as each per shelter.

Basis of Payment.

Removal Of Existing Structures – Bus Shelter will be paid for at the contract unit price per each for REMOVE EXISTING BUS SHELTER.

UNDERGROUND CONDUIT, MULTI-DUCT, 18MM MICRODUCTS

Effective: May 1, 2023

Description.

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

Materials

The conduit and fittings shall meet the requirements of Article 1088.01(c) of the Standard Specifications, except as modified herein. The conduit system shall consist of four or seven 18mm O.D. (14mm I.D.) micro-ducts contained inside a HDPE protective outer sheath with a minimum thickness of 0.07" inch as specified. The conduit system shall be designed for direct burial.

For four micro ducts, the overall conduit shall have a nominal 1.9" inches outside diameter with a supported bend radius of 19" inches, an unsupported bend radius of 37" inches, and a safe working load of 2,200 lbs.

For seven micro ducts, the overall conduit shall have a nominal 2.25" inches outside diameter with a supported bend radius of 31" inches, an unsupported bend radius of 52" inches, and a safe working load of 3,500 lbs.

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

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

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

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

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

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

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

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

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

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

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

Installation

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

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

Conduit shall be buried 30" inches ($\pm 3"$) below final grade throughout its entire length. Conduit shall be installed in straight runs as much as possible with a minimum number of bends according to Section 816 of the Standard Specifications. Any bend in the conduit shall be limited to the bend radius specified herein.

The microduct system shall be sealed at all times during construction to eliminate the ingress of dirt and moisture. The Contractor shall utilize caps that are approved for use by the duct manufacturer.

The Contractor shall perform post installation testing on all micro ducts prior to installing fiber optic cable. As a minimum, tests shall include: an air test, a foam sponge test, a plastic sphere test and a pressure test.

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

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

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

A cable marking tape shall be installed above the conduit system according to Article 819.05 of the Standard Specifications. The color of the tape shall be red with large black lettering which reads "WARNING – FIBER OPTIC CABLE BELOW" or similar.

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

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

Method of Measurement

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

Vertical measurement of the duct shall be as follows:

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

Basis of Payment

This work will be paid for at the contract unit price per foot for **UNDERGROUND CONDUIT, MULTI-DUCT**, of the number specified, **18MM MICRODUCTS**.

TRAFFIC CONTROL AT AT-GRADE RR CROSSINGS

When a grade crossing exists either within or in the vicinity of a temporary traffic control zone, lane restrictions, flagging or other operations shall not be performed in a manner that would cause highway vehicles to stop on the railroad or LRT tracks, unless a roadway flagger or uniformed law enforcement officer is provided at the grade crossing to minimize the possibility of highway vehicles stopping on the tracks, even if automatic warning devices are in place. If the queuing of vehicles across active rail tracks cannot be avoided, a uniformed law enforcement officer or roadway flagger shall be provided at the grade crossing to prevent vehicles from stopping within the grade crossing (defined as being 15 feet on either side of the closest and farthest rail), even if automatic warning devices are in place. A "DO NOT STOP ON TRACKS" sign shall be used on all approaches to a grade crossing. When used, a BE PREPARED TO STOP sign should be located before the Flagger symbol sign.

Basis of Payment:

Traffic Control At-Grade RR Crossings will not be measured separately for payment but the costs shall be considered as included in the contract unit prices for applicable standards of "Traffic Control and Protection" or "Traffic Control and Protection Special", and no additional compensation will be allowed.

FIBER OPTIC CABLE INNERDUCT

Effective: October 1, 2014

1. Description.

This item shall consist of furnishing, installing, splicing, connecting and demonstrating continuity of fiber optic cable innerduct of sizes specified herein and as shown on the contract drawings. The innerduct shall be High Density Polyethylene.

3. Materials.

3.1 General:

The duct shall be a spiral ribbed plastic duct which is intended for underground use and which can be manufactured and coiled or reeled in continuous transportable lengths and uncoiled for further processing and/or installation without adversely affecting its properties of performance. The ribbed duct shall have internally designed longitudinal ribs for reduced pulling frictions and increased lubrication effectiveness

The duct shall be made of high density polyethylene which shall meet the requirements of ASTM D 3035. The innerduct material shall be composed of high density polyethylene meeting the requirements of PE334470E/C as defined in ASTM D3350.

Submittal information shall demonstrate compliance with the details of these requirements.

3.2 Dimensions:

Duct dimensions shall conform to the standards listed in ASTM D3035, SDR-11. Submittal information shall demonstrate compliance with these requirements.

Nominal Size (Diameter)	Inside Diameter (minimum)	Outside Diameter (Average)	Wall Thickness (Min.)	Bend Radius (minimum)	Pull Strength	Weight Average (lbs/100ft.)
1"	1.030"	1.315"	0.120"	14"	500	19
1.25"	1.313"	1.660"	0.151"	17"	750	31
1.5"	1.506"	1.900"	0.173"	19"	1000	40
2"	1.885"	2.375"	0.216"	24"	1600	60

3.3 Marking:

As specified in NEMA Standard Publication No. TC-7, the duct shall be clearly and durably marked at least every 10 feet with the material designation (HDPE for high density polyethylene), nominal size of the duct, and the name and/or trademark of the manufacturer.

3.4 Color:

Innerduct shall be colored as follows or as directed by the Engineer.

Usage Designation	Color
Fiber Optic Trunk Cable (Ducts containing cables of 96 fibers)	Orange
Fiber Optic Distribution Cable (Ducts containing cables of 12, 6 or 4 fibers and 96 fiber ducts designated as distribution fibers)	Blue

4. Installation.

4.1 Pulling Tension.

Pulling tension of the duct shall be monitored throughout the pull and pulling tension shall not exceed those listed in the table or the specific manufacturer maximum pulling tensions as indicated in the catalog cut submittals. Failure to monitor the pulling tension will result in non-payment of that particular duct span and the span may be reinstalled with new duct at no additional cost to the State. Lubricants used shall be compatible with the duct.

4.2 Junction boxes.

Where duct passes through junction and/or pull boxes, the duct shall remain continuous unless a break is specifically indicated in the plans or as directed by the Engineer.

4.3 Handholes and Communications Vaults.

Where duct passes through handholes or vaults, the duct shall be looped uncut within the handhole unless otherwise indicated on the Plans or directed by the Engineer.

Bends.

Minimum bending radius shall be in accordance with the above table or the manufacturer's recommended radius, whichever is larger. Bends shall be made so that the duct will not be damaged and the internal diameter of the duct will not be effectively reduced. The degrees of bend in one duct run shall not exceed 360° between termination points.

4.4 In Trench

Where duct is installed in trench, it shall be placed in the bottom of the trench after all loose stones have been removed and all protruding stones have been removed or covered with backfill material as directed by the Engineer.

Where duct is shown to be installed in trench, it shall be installed at a depth not less than 30 inches unless otherwise indicated or specifically directed by the Engineer.

The inner duct may be plowed into place. Unless otherwise indicated or specifically approved by the Engineer, plowing of inner duct shall lay the duct in place and shall not pull the duct through the length of the cut behind a bullet-nose mandrel or similar apparatus. In all cases, plowing operations shall be non-injurious to the duct.

4.5 In Raceway

Where duct is installed in raceways, lubricating compounds shall be used where necessary to assure smooth installation.

4.6 Encased in Concrete

Concrete shall be class SI complying with Section 720 of the Standard Specifications.

Steel Reinforcement Bars. Steel reinforcement bars shall comply with Section 706.10 of the Standard Specifications.

Underground concrete-encased conduit shall be supported on interlocking plastic spacers specifically designed for the purpose spaced along the length of the run as recommended by the manufacturer. Spacing between raceways within a common duct bank shall be not less than 2 inches. The interlocking spacers shall be used at a minimum interval of 8 ft.

Concrete cover overall shall not be less than 3 inches all around the encased run. Space below the conduit, and concrete fill shall be assured. Care shall be exercised during concrete placement to assure that there are no voids, so that spacers are undisturbed, and so that conduit joints stay secure and unbroken. Concrete shall be deflected during placement to minimize the possible damage to or movement of the conduits.

Conduit encased in concrete shall have steel reinforcing where installed below roadway or other paved vehicle areas (including shoulder) and the reinforcement shall extend not less than 5 feet additional from the edge of pavement unless otherwise indicated. Steel reinforcement shall not be less than No. 4 bars at corners and otherwise spaced on 12-inch centers, tied with No. 4 bars on 12-inch centers.

The Engineer shall examine all conduit joints for compliance with section 5 of this specification before concrete is poured.

4.7 Embedded

Conduit embedded in structure shall be supported on interlocking plastic spacers specifically designed for the purpose spaced along the length of the run as recommended by the manufacturer. Spacing between raceways within a common structure shall be not less than 2 inches. The interlocking spacers shall be used at a minimum interval of 8 ft.

Concrete cover overall shall not be less than 3 inches all around the embedded run. Space below the conduit, and concrete fill shall be assured. Care shall be exercised during concrete placement to assure that there are no voids, so that spacers are undisturbed, and so that conduit joints stay secure and unbroken. Concrete shall be deflected during placement to minimize the possible damage to or movement of the conduits.

The Engineer shall examine all conduit joints for compliance with section 5 of this specification before concrete is poured.

5. Joints

- 5.1 All HDPE duct to HDPE duct joints shall be made with an approved duct fusion splicing device.

- 5.2 HDPE coilable non-metallic conduit to non-HDPE coilable non-metallic conduit joints shall be either made with an approved mechanical connector or with a chemical compound. Both methods must be specifically designed for joining HDPE coilable non-metallic conduit. Minimum pullout force for the chemical compound shall be as listed in the following table.

Nominal Size		Pullout Force	
mm	in	N	Lbs
31.75	1.25	2400	540
38.1	1.50	2535	570
50.8	2.0	3335	750
63.5	2.5	4445	1,000
76.2	3.0	6225	1,400
101.6	4.0	8890	2,000

7. Measurement.

The duct shall be measured for payment in linear feet in place as described herein. Measurements shall be made in straight lines between horizontal changes in direction between the centers of the terminating points (poles, cabinets, junction boxes). Vertical measurement of the duct shall be as follows:

For runs terminating at junction boxes and/or control cabinets, the vertical measurement shall be taken from the bottom of the trench, or horizontal raceway, to a point 18-inches beyond the center of the junction box or control cabinet.

For runs terminating at poles, the vertical measure shall be taken from the bottom of the trench, or horizontal raceway, to a point 18-inch beyond the center of the light pole handhole regardless of light pole mounting method

Innerduct installed in excess of the limits describes herein shall not be paid for.

8. Basis of Payment.

This item will be paid for at the contract unit price per foot installed for **INNERDUCT**, of the size of duct as indicated, which shall be payment in full for all material and work as specified herein.

WORK ZONE TRAFFIC CONTROL AND PROTECTION (ILLINOIS TOLLWAY)

Description

This work shall consist of furnishing, installation, maintenance, relocation, and removal of work zone traffic control devices systemwide for maintenance of traffic in accordance with Section 701 of the Illinois Tollway Supplemental Specifications, plans, details, and as further defined and prescribed herein.

General Requirements

Special attention is called to Sections 701 of the Illinois Tollway Supplemental Specifications and the following Highway Standard related to traffic control:

The governing factor in the execution and staging of work for this project is to provide the motoring public with the safest possible travel conditions through the construction zone. The Contractor shall arrange his/her operations to keep the closing of lanes and/or load to a minimum.

Possible Lane Closures

Temporary lane closures within the contract limits will be permitted only with the Tollway's approval. All temporary lane and shoulder closures must be approved by the Tollway and shall be submitted by the Contractor to the Engineer by 7:00 AM weekdays at least one business day before the closure. The lane closure coordination must be routed through the Engineer and no contact should be made directly with the Illinois Tollway. Closures within Illinois Tollway jurisdiction shall be in accordance with the Tollway's Standard E2, Lane Closure Details.

Permitted hours for shoulder closures will only be between the hours of 9:00 AM and 3:00 PM.

All closures require approval by the Illinois Tollway Incident Manager, in conjunction with approved work orders. The lane closure request and approval process timelines must be factored into the Contractor's completion of Work Orders. Late submittals of Lane Closure requests will not relinquish the Contractor's responsibilities for meeting the requirements of SP 103.4 and thus will not be considered justification for not enforcing liquidated damages.

Construction Sequencing and Traffic Staging

For the work proposed under this Contract, the Contractor will need to set up various arrangements of moving operations in addition to shoulder, single-lane, two-lane and three-lane closures pursuant to the work specified herein.

The Contractor shall employ the required maintenance of traffic arrangement(s), stage operations so that all ramps will remain open to traffic, and ensure that all work areas are properly restored to safe conditions before continuing the moving operations and/or removing the traffic control devices in order to allow re-opening the roadway to traffic.

The Contractor will be required to submit a separate written request to the Illinois Tollway should a non-moving / extended work time (in excess of one hour) be needed to complete work at a specific site. Should this request be granted, the Contractor will be required to set up and maintain the appropriate closure(s), as provided herein. However, any closure and all attentive signing must be completely removed and roadway fully opened within the time frames as given below.

THE HOURS OF PERMITTED LANE CLOSURES SHALL BE AS

follows: Permitted I-294 Lane Closure Times

DAY	ALLOWABLE 1-LANE CLOSURE TIMES I-294	
	Northbound	Southbound
Monday	7:00 p.m. - 6:00 a.m. Tues.	7:00 p.m. - 6:00 a.m. Tues.
Tuesday	7:00 p.m. - 6:00 a.m. Weds.	7:00 p.m. - 6:00 a.m. Weds.
Wednesday	7:00 p.m. - 6:00 a.m. Thurs.	7:00 p.m. - 6:00 a.m. Thurs.
Thursday	7:00 p.m. - 6:00 a.m. Fri.	7:00 p.m. - 6:00 a.m. Fri.
Friday	7:00 p.m. - 9:00 a.m. Sat.	7:00 p.m. - 10:00 a.m. Sat.
Saturday	6:00 p.m. - 11:59 a.m. Sun.	6:00 p.m. - 11:59 a.m. Sun.
Sunday	1:00 p.m. - 6:00 a.m. Mon.	4:00 p.m. - 6:00 a.m. Mon.

DAY	ALLOWABLE 2-LANE CLOSURE TIMES I-294	
	Northbound	Southbound
Monday	10:00 p.m. - 5:00 a.m. Tues.	10:00 p.m. - 5:00 a.m. Tues.
Tuesday	10:00 p.m. - 5:00 a.m. Weds.	10:00 p.m. - 5:00 a.m. Weds.
Wednesday	10:00 p.m. - 5:00 a.m. Thurs.	10:00 p.m. - 5:00 a.m. Thurs.
Thursday	10:00 p.m. - 5:00 a.m. Fri.	10:00 p.m. - 5:00 a.m. Fri.
Friday	10:00 p.m. - 6:00 a.m. Sat.	10:00 p.m. - 6:00 a.m. Sat.
Saturday	10:00 p.m. - 7:00 a.m. Sun.	10:00 p.m. - 7:00 a.m. Sun.
Sunday	9:00 p.m. - 5:00 a.m. Mon.	9:00 p.m. - 5:00 a.m. Mon.

The Contractor shall strictly adhere to the temporary lane closure hours set out above throughout the duration of the contract. Temporary lane closures will not be allowed, or must be removed, if so directed by the Engineer, due to inclement weather or heavy traffic, in accordance with the Standard Specifications.

No lane closure signs shall be erected any earlier than one-half (1/2) hour before the starting hours listed above. Also, these signs should be taken down within one-half (1/2) hour after the closure is removed.

In all cases, the Contractor is expected to be working in the areas closed due to the temporary lane closures. The Contractor shall remove the temporary lane closure when the scheduled work shift is over or when so required by the Contract Documents, whichever occurs first.

Contractor Vehicular and Pedestrian Movement

Per Article 701.06(i) of the Illinois Tollway Supplemental Specifications with the following modifications to the third sentence of the first paragraph.

U-turns will not be permitted at the existing crossovers within the Contract Limits.

Should the Contractor fail to re-open the shoulders or lanes of traffic, in accordance with any of the above time limits, the Contractor shall be considered Non-Compliant with the Maintenance of Traffic Specifications, per articles 701.08(a) & (e) of the Illinois Tollway Supplemental Specifications. For this Contract, it is understood "incident" is defined as every 10 minute interval, or portion thereof, where the Contractor fails to re-open the lanes of traffic by the time limit specified.

Allowable Plaza Lane Closures:

Toll Plaza Cash lanes can be closed weekdays from 10:00 PM to 6:00 AM. A minimum of one (1) cash lane must always remain open. Cash lane closures are not allowed on weekends except for the closures detailed in this special provision. Open Road Tolling lanes can be closed during allowable lane closure hours and during a special weekend event, if approved by Illinois Tollway Incident Manager, on case-by-case basis. The Contractor must notify the Illinois Tollway Plaza Manager in advance regarding any toll plaza lane closures.

Traffic Staging on Ramps:

Maintenance of traffic shall be set up on ramp when work is in progress. When no work is in progress on a ramp, all traffic control devices and equipment shall be removed from the ramp.

Holiday Periods:

Holiday periods shall be per Tollway Supplemental Specifications Article 701.07 with the following additions.

Christmas Day - 2021

12:00 Noon Friday December 24, 2021 through 9:00 A.M. Tuesday December 28, 2021

New Years Day – 2021/2022

12:00 Noon Friday December 31, 2021 through 9:00 A.M. Tuesday January 4, 2022

Independence Day - 2022

12:00 Noon Friday July 1, 2022 through 9:00 A.M. Tuesday July 5, 2022

Christmas Day - 2022

12:00 Noon Friday December 23, 2022 through 9:00 A.M. Tuesday December 27, 2022

New Years Day – 2022/2023

12:00 Noon Friday December 30, 2022 through 9:00 A.M. Tuesday January 3, 2023

Independence Day - 2023

12:00 Noon Friday June 30, 2023 through 9:00 A.M. Wednesday July 5, 2023

Method of Measurement.

This work will be measured as a Lump Sum.

Basis of Payment

This work will be paid for at the contract lump sum price for MAINTENANCE OF TRAFFIC (ILLINOIS TOLLWAY).

RAILROAD PROTECTIVE LIABILITY INSURANCE (IHB)

Effective: December 1, 1986

Revised: January 1, 2022

Description. Railroad Protective Liability and Property Damage Liability Insurance shall be carried according to Article 107.11 of the Standard Specifications. A separate policy is required for each railroad unless otherwise noted.

NAMED INSURED & ADDRESS	NUMBER & SPEED OF PASSENGER TRAINS	NUMBER & SPEED OF FREIGHT TRAINS
Indiana Harbor Belt RR Co 2721 161st Street Hammond, IN 46323	0	47 trains/day @ 30 mph

Class 1 RR (Y or N): Y
DOT/AAR No.: 326 860Y

RR Mile Post: 32.44
281

RR Division: NA

RR Sub-Division: NA

For Freight/Passenger Information Contact: Eduardo Garcia
For Insurance Information Contact: Eduardo Garcia

Phone: (219) 989 4910
Phone: (219) 989 4910

Basis of Payment. Providing Railroad Protective Liability and Property Damage Liability Insurance will be paid for at the contract unit price per Lump Sum for RAILROAD PROTECTIVE LIABILITY INSURANCE.

62N39 CC&P AT CERMAK ROAD E/O IL 171 IN NORTH RIVERSIDE, COOK COUNTY, 2023.07.10

IHB RIGHT OF ENTRY AGREEMENT



INDIANA HARBOR BELT RAILROAD COMPANY (IHB)

THIS RIGHT OF ENTRY AGREEMENT, made this _____ day of _____ 20____, by and between INDIANA HARBOR BELT RAILROAD COMPANY, a corporation organized and existing under the laws of the State of Indiana and authorized to do business in the State of Illinois, hereinafter called the IHB, and **HBK Engineering LLC** hereinafter called the Vendor

WITNESSETH: That, in consideration of being granted permission and authority to enter upon the property of INDIANA HARBOR BELT RAILROAD COMPANY, for the purpose of **survey work only** it is mutually agreed as follows:

1. TERMS OF EMPLOYMENT. The IHB reserves no control whatsoever over the employment, discharge, compensation of or services rendered by the Vendor's employees, and it is the intention of the parties to this Agreement that the Vendor shall be and remain an independent contractor, and that nothing in the Agreement contained shall be construed as inconsistent with that status. The vendor agrees to pay the contributions measured by the wages of his (its) employees required to be made under the Unemployment Compensation Insurance, Social Security and Retirement Laws or similar laws, State and Federal, applicable to the work hereunder undertaken by the Vendor or his (its) subcontractors, and to accept exclusive liability for said contributions: the Vendor further promises and agrees to indemnify and hold harmless the IHB, its successors and assigns, from any all liability arising therefrom.

2. CONSENT TO TRANSFER. The Vendor shall not let, transfer or assign this Agreement as whole, without the consent in writing from the IHB.

3. WAIVER. It is expressly understood and agreed that any waiver on the part of the IHB, of any term, provision or covenant of this Right of Entry Agreement, shall not constitute a precedent, nor bind the IHB, to a waiver of any succeeding breach of the same or any other of the terms, provision or covenants of this Agreement.

4. PERMITS AND INSURANCE. A Vendor shall maintain the following insurance coverage which has been so designated. (☒).

- (☒) I. Statutory Workmen's Compensation and Occupational Disease Insurance and/or FELA coverage, if applicable.
- (☒) a. To the extent permitted by law, all Workers' Compensation policies shall be endorsed to provide Waiver of subrogation in favor of owner.

- (x) II. Commercial General Liability Insurance which shall be no less comprehensive and nor more restrictive than the coverage provided by a standard form Commercial General Liability Policy with a minimum combined single limit of \$2,000,000 per occurrence for Bodily Injury and Property Damage and \$3,000,000 each for the General Aggregate and the Products/Completed Aggregate. This insurance must include the following features:
 - (x) a. Railroad Protective Liability Insurance naming the IHB as Named Insured with a limit for bodily injury and property damage liability of \$5,000,000 per occurrence, \$10,000,000 aggregate, the original of said policy shall be furnished to IHB prior to any entry upon IHB property by Vendor (if required).
 - () b. Contractual Liability, insuring the liabilities and indemnification assumed under the provisions of the Agreement inclusive of XCU exposure (d below) if applicable with any restrictions for work within 50 feet of a railroad removed (if required).
 - () c. Products and completed operations.
 - () d. Coverage for demolition of any building or structure, collapse, explosion, blasting, excavation and damage to property below the surface of the ground.
 - (x) e. Coverage will include appropriate endorsements naming IHB as additional insured. (ISO Form CG 2010)
 - () f. The coverage afforded the additional insureds shall be primary and noncontributory to any additional insureds.
- (x) III. Employers, liability coverage with limits of not less than \$1,000,000 each accident, \$1,000,000. policy limit for disease, and \$1,000,000 each employee disease, such policies shall contain a waiver of subrogation.
- (x) IV. Umbrella Liability/Excess coverages over primary insurance with a limit of not less than \$10,000,000. each occurrence and shall follow form of the underlying general liability coverages for employers liability, and auto liability and general liability (including products/completed operations). In addition, said policy shall have endorsement naming The Indiana Harbor Belt Railroad Company as additional insured.
- (x) V. Automobile Liability Insurance, covering all owned, non-owned and hired vehicles with a minimum combined single limit for Bodily Injury and Property Damage of \$2,000,000. per occurrence. This insurance will include contractual liability insuring the indemnification provisions contained in this Agreement.

- A. The insurance policies to be maintained under this Agreement must be issued by companies authorized to do business in Illinois and Indiana and shall include a requirement that the insurer provide IHB with thirty (30) days written notice prior to the effective date of any cancellation or material change of the insurance. The policies required herein shall name IHB as additional insured with respect to operations performed under this Right of Entry Agreement and shall be primary to and not in excess of or contributory with any other insurance available to IHB. Vendor shall, before commencing work, provide IHB with a certificate satisfactory to IHB of the Insurance coverages and endorsements set forth herein. Vendor shall provide IHB with certified copies of certificates. The obligation to carry the insurance required herein shall not limit or modify in any way any other obligations assumed by the Vendor under this Agreement. Vendor shall be held accountable for all insurance coverages, including those of subcontractors.
- B. Original of certificates shall be mailed to Director of Risk Management and Attention: Insurance, at the address set forth below IHB's signature to this Agreement. IHB shall not be under any duty to advise Vendor in the event that Vendor's insurance is not in compliance with this Agreement.

5. WAIVER OF SUBROGATION. Vendor on behalf of its insureds waives any right of subrogation that such insurers may have against IHB arising out of this Agreement. The insurance specified in Section 3 hereof shall contain a waiver of the right of subrogation against the IHB and an assignment of statutory lien, if applicable. Any physical damage insurance carried by Vendor on construction equipment, tools, temporary structures and supplies owned or used by Vendor shall provide a waiver of the right of subrogation against the IHB.

6. INDEMNITY. The Vendor hereby agrees to protect, indemnify and hold harmless said IHB, its officers, agents and employees against any and all liability or loss, damage or injury of every kind, nature and description, fatal or otherwise, which Vendor may sustain in any manner whatsoever to IHB and/or Vendor, arising either directly or indirectly, out of or in connection with the authority and permission herein granted or while Vendor is upon or about any of the property of the IHB, or upon any property of any of the tenants, lessees or licensees of the IHB, in connection with such permission.

7. PERSONAL SAFETY EQUIPMENT. All employees entering or remaining on IHB property under this right of entry must wear safety shoes, reflective vest, hardhats and eye protection while anywhere on IHB company property.

Vehicles must be marked with your company's name, or advance information must be provided as to whose vehicles will be on IHB property.

8. FLAG PROTECTION AND CONTACT. Under no circumstance may ANY work be carried out within twenty five (25) feet of any railroad right-of- way without a

IHB employee providing flag protection paid for by you. To obtain flag protection, call Manager Engineering Services at 219-989-4910, and provide information he requests at least 36 hours ahead of time. Vendor must include a name and telephone number for a designated employee contact who will be at the work site until work authorized herein is complete.

9. NATURE OF JOB. Prior to order of flag protection for the first day, Contractor shall provide in addition to the executed Right of Entry Agreement, a written summary of the job to be done, detailing the number of employees scheduled to be upon IHB property, the kind of equipment they will use, and particularly the kind of vehicle and fixed objects such as scaffolding, etc. Specific detailed information on the location of the equipment, and whether or not it will be placed within 25 feet of the right-of-way must be submitted. This information may be sent in letter form and preferably with a diagram of sketch plan. IHB must be updated daily by vendor designated employee contact as to nature and location of work for following day before close of business day. This Right of Entry will not be valid until this requirement is met and the nature of the work is clearly understood.

10. EXTENSION. The Right of Entry is good only for the project described and for the duration of the insurance coverage provided, whichever comes first. If the project expands or takes longer, you must re-contact IHB to assure insurance and other provisions are in order. Under no circumstances shall this Right of Entry be construed as granting any right, title or interest of any kind or character in or about the land or premises of the IHB.

11. RESTORATION OF PREMISES. Upon completion of the Project, IHB's property shall be left in a condition satisfactory to the said Office of the Chief Engineer or his Designee. This, includes, without limitation restoration of any fences removed.

12. HAZARDOUS MATERIALS. Prohibition of Certain Potentially Environmentally Damaging Operations on IHB Property: Electronics, electrical transformer repair or reconditioning, asbestos manufacturing, blast furnaces, steel works, rolling and finishing mills, smelting and/or refining, wood treatment or tie plants, salvage operations, junk yards, scrap dealers, drum or barrel reconditioners, battery recycling, tire storage or recycling, waste disposal operations of any kind including landfills, surface impoundments and waste piles, incinerators, sewage systems, electroplating operations, fuel blending, waste or used oil recycling or reclamation, explosives disposal, manufacturing or detonation, bulk oil storage or any facility requiring a TSD hazardous waste permit or any hazardous waste transloading facility.

The foregoing list of prohibited activities on IHB property is not exclusive. all proposed leases, licenses and permits will be carefully evaluated to determine if the proposed activities pose an unreasonable environmental risk.

13. NOTICE – HOW SERVED. Any notice to be given by the IHB to the Vendor under this Agreement except Section 7, 8, and 9, shall be deemed to be served if

the same be delivered to the person in charge of the office used by the Vendor, or to his representative at or near the work, deposited in the post office postpaid, addressed to the Vendor at his last known place of business. Notice under Sections 7,.8, and 9 shall be deemed served to the Vendor's designated employee contact by any means appropriate.

14. MISCELLANEOUS.

- A. The construction of this Agreement and the rights and obligations of the parties hereunder shall be governed by the laws of the State of Illinois.
- B. This Agreement and any amendments to it or them may be executed in several counterparts and such counterparts may be delivered by facsimile or in PDF form as an email attachment, and each Agreement so executed shall constitute one agreement, binding on the parties thereto, even though such parties are not signatories to the original or the same counterpart. Any counterpart of this Agreement that has attached to it separate signature pages, which altogether contain the signatures of the parties thereto, shall for all purposes be deemed a fully executed instrument. Each party agrees that it will be bound by its own telecopied or otherwise electronically transmitted signature to this Agreement and that it accepts the telecopied or otherwise electronically transmitted signatures of the other party to this Agreement.
- C. The prevailing party in any litigation or suit involving or arising out of this Agreement shall be entitled to recover from the non-prevailing party all of its attorneys' fees and costs.
- D. For any suit, proceeding or cause of action between them arising out of or relating to this Agreement, each party hereto consents and agrees to exclusive jurisdiction and venue in the federal courts sitting for the Northern District of Illinois, or if there is no federal jurisdiction, to the state courts located in Cook County, Illinois.

THIS AGREEMENT shall inure to the benefit of and be binding upon the legal representatives and successors of the parties respectively.

INDIANA HARBOR BELTRAILROAD COMPANY
2721 161ST STREET – HAMMOND, INDIANA 46323

Attest: _____ By: _____

Title

Date

Telephone

VENDOR

Attest: _____ By: _____

Title

Date

Company Name

Address

City, State

Telephone

Facsimile/Fax

IHB RIGHT OF ENTRY APPLICATION PACKAGE

IHB Right of Entry Application Package

Instructions for Preparing Application Drawings

For uniformity in the preparation of prints and/or sketches to accompany applications, and in order to facilitate prompt processing, the following instructions will apply to all projects applications drawings and/or sketches. Failure to include all pertinent information (either on the application or drawing) may result in the delay of processing or return of the application.

The size of the project application drawing shall be 8-1/2" x 11". Larger drawings or construction plans may be submitted if necessary for clarification but cannot be used in lieu of the project application drawing.

The project application drawing and/or sketch shall be to scale, or show adequate dimensional information and must include:

- North arrow.
- Nearest road crossing showing milepost and DOT/AAR number as outlined below.
- Plan view clearly showing the proposed project, including stationing and legends if applicable.
- Centerline of all railroad tracks.
- Property and/or right-of-way lines if known.
- Location of all proposed work and routes of access.
- A statement indicating whether or not it will be necessary to: 1) physically cross any railroad track (with vehicles or on foot) and: 2) come within 25 feet of any railroad track at any point along the access route or while conducting work.
- Draw number and date.

Instructions for Preparing Application Form

- "Project Owner Information" and "Project Information" sections must be filled out completely.
- The agreement will be prepared in the name of the Project Owner. It is important to provide the Complete Legal Name of the entity as well as its state of incorporation.
- Check the appropriate space to designate where the agreement should be mailed. If none or both are check, the agreement will be mailed only to the Project Owner.
- **REQUIRED:** Provide the estimated distance to/from the nearest road crossing or milepost. Identify the road crossing by its IHB Railroad Milepost number (including prefix, i.e. QC 292.83) and/or DOT/AAR number. The DOT/AAR number is a specific number assigned to each road crossing IHB tracks and should be posted at or near the crossing (usually on a pole or signal mast). It is usually a rectangular white sign with black numbers/letters and will consist of 6 numbers followed by one letter (Example: 630543 P). In lieu of the DOT number, an exact

IHB Right of Entry Package

Latitude and Longitude may be provided to aid in finding the project location in the railroad's maps and files.

- Please remember to date and sign the application form.

Instruction for preparing Proposed Work Description

Prepare a brief description of the proposed work (not to exceed three pages), providing sufficient information to justify the need to access IHB property. The information shall include:

- the proposed start date and expected duration of the project;
- a description of the proposed work identify the nature and location of any item or structure to be installed on IHB property (e.g. culverts, monuments, ditches);
- types of equipment to be used onsite (drill rigs, backhoe, excavator, etc.).
- methods of restoring right-of-way disturbed by work.

Please be aware that the Agreement will be strictly limited to the scope of services as defined in your work description. If, at any time, it becomes necessary to modify the scope of service, you must request a modification in writing and obtain a supplemental Agreement prior to performing the work.

Application Fee

The application fee is non-refundable and must be submitted with the application. Failure to do so may result in the application being returned. All checks should be made payable to IHB Railroad.

Application Fee:

- | | |
|--|------------|
| • Initial Application Review/Processing | \$1,000.00 |
| • Emergency Application | \$3,000.00 |
| • Per site Surcharge for more than one site* | \$50.00 |
| • Renewal of Existing Agreement (within 12 months Of Agreement Expiration Date)^ | \$150.00 |

*Site is defined as follows:

- a) Each contiguous work site or work site segment along the Railroad track that is 500 feet or less in length, on a single subdivision, branch, or spur, such that protection can be provided by a single Railroad employee; or
- b) In areas such as yards and other facilities, each contiguous work site or portion thereof, consisting of ½ acre or less.

^ Renewal becomes effective upon receipt of written approval by IHB.

Please do not combine the amount for the application fee and risk fee (if applicable) into one check. Separate checks are needed to facilitate processing.

IHB Right of Entry Package

Flagging Requirements

If required for your work, an IHB flagman will be provided at the entire cost and expense of the work's owner and/or the applicant for the duration of the project. This protection cannot be provided by any personnel other than an authorized IHB employee. The IHB will make the sole determination as to whether flagging protection is required based on the work to be performed.

Roadway Worker Qualifications

All project workers including those of sub contractors must be Roadway Worker Qualified. Workers shall carry a Qualification card at all times and show on demand of any IHB employee.

Insurance

Each tenant/license shall be required to obtain, at its sole cost and expense, various type of insurance coverage with various limits. These insurance coverages must be of a form and be underwritten by insurance companies that meet with the IHB approval. In addition, the tenant/licensee may be required to pay IHB a risk-financing fee in certain instances. The types of insurance typically required by IHB include:

Commercial General Liability Insurance	Automobile Liability Insurance
Worker's Compensation Insurance	Railroad Protective Liability Insurance (during construction or maintenance only)

Indiana Harbor Belt generally requires a policy of Commercial General Liability Insurance with a combined single limit of not less than \$2,000,000 per occurrence for injury to or death of persons and damage to or loss or destruction of property. **Specific insurance requirements will be provided to you in the agreement covering your request when it is approved by the IHB.**

Railroad Valuation Maps

Railroad Valuation Maps are provided for information purposes only. There is a charge of \$50 per Valuation Map and \$25 for each copy of the same map. Shipping charges is \$2 per map for regular and \$12 for overnight delivery. To obtain a copy of the Valuation Map Reproduction Request form, please contact Manager Engineering Services at (219) 989-4909, Fax # (219) 989 4813 or email at IHBRR.com. In order to process the request for Valuation Map, the county and state must be provided along with one of the following: GIS#, Valuation Section and sheet, milepost with prefix, DOT crossing number, nearest street and distance from that street, or an attached map of the area.

Please do not address questions regarding obtaining Valuation Maps to the right of entry section.

IHB

Form: ROE 200405

Application for Public Improvements/ Right-of-Entry

Project Owner Information: ____ Check here if agreement should be mailed to this address.

1. Complete Legal Name of Applicant: _____
2. Company Contact Name: _____ Title: _____
3. Telephone: () _____ Fax: () _____ Emergency () _____
4. Address: _____
5. City: _____ State: _____ Zip Code: _____
6. Type of Business: _____
Corporation (State of Incorporation: __ Individual __ Developer
Partnership (Type & State _____)
____ Municipality or Government

Engineer/Consultant Information: ____ Check here if agreement should be mailed to this address

7. Company Name: _____
8. Company Contact Name: _____ Title _____
9. Telephone: () _____ Fax: () _____
10. Address: _____
11. City: _____ State: _____ Zip Code: _____

Project Information : 12: Date of Application _____ Application Ref. # _____

12. Description of Location: _____
13. City: _____ County: _____ State: _____
14. Est. Distance _____ feet _____ (direction) from Road Xing _____ DOT# _____
15. Project Description: _____

16. Latitude: _____ Longitude: _____ (WGS84)
17. How close will project be to nearest track _____ ft.
18. Does the work on IHB R/W include _____ Soil Boring _____ Excavation
_____ Construction/Demolition
19. How did applicant verify that property and/or track is owned by IHB _____
20. Expected beginning date of occupancy _____ Completion Date: _____
21. Requested contract expiration date: _____
22. Signature of Applicant: _____ Date: _____

For Railroad Use Only: 22 Agreement Number: _____

22. Region: _____ Division _____ Subdivision _____
23. Milepost: _____ Val Section: _____ Val Map # _____
24. File review date: _____ Fees Attached Y N _____
25. Comments: _____
26. Distribution: _____
27. Approved: ____ Yes ____ No By: _____ Date: _____

IHB APPLICATION FOR PUBLIC IMPROVEMENT/ RIGHT OF ENTRY

IHB

Application for Public Improvements/ Right-of-Entry

Project Owner Information: ☒ Check here if agreement should be mailed to this address.

1. Complete Legal Name of Applicant: Illinois Department of Transportation
2. Company Contact Name: Andy Rabadi Title:
3. Telephone: (847) 705-4256 Fax: () Emergency (847) 705-4241
4. Address: 201 W. Center Court
5. City: Schaumburg State: IL Zip Code: 60196
6. Type of Business:
Corporation (State of Incorporation: Individual Developer
Partnership (Type & State)
☒ Municipality or Government

Engineer/Consultant Information: ☐ Check here if agreement should be mailed to this address

7. Company Name: AMES Engineering, Inc.
8. Company Contact Name: Joseph Regis, P.E., PTOE, CFM Title: Sr. Project Engineer
9. Telephone: (630) 737-1987 Fax: ()
10. Address: 6330 Belmont Rd, Suite 4B
11. City: Downers Grove State: IL Zip Code: 60516

Project Information : 12: Date of Application 09/29/2023 Application Ref. #

12. Description of Location: 62N39 Cermak Road over IHB
13. City: Broadview County: Cook State: IL
14. Est. Distance 25' feet above(direction) from Road Xing DOT# 326 860Y
15. Project Description: Install 2" microduct with fiber optic cable within a 4" galvanized steel conduit attached to structure
16. Latitude: 41°50'56.71" N Longitude: 87°51'56.04" W (WGS84)
17. How close will project be to nearest track ft.
18. Does the work on IHB R/W include Soil Boring Excavation
☒ Construction/Demolition
19. How did applicant verify that property and/or track is owned by IHB: appears to be on RR easement
20. Expected beginning date of occupancy 04/01/2025 Completion Date: 10/31/2025
21. Requested contract expiration date: 12/31/2025
22. Signature of Applicant Joseph A. Regis Date: 09/28/2023

- For Railroad Use Only: 22 Agreement Number:
22. Region: Division Subdivision
 23. Milepost: Val Section: Val Map #
 24. File review date: Fees Attached Y N
 25. Comments:
 26. Distribution:
 27. Approved: ☐ Yes ☐ No By: Date:

Exhibit 1-1

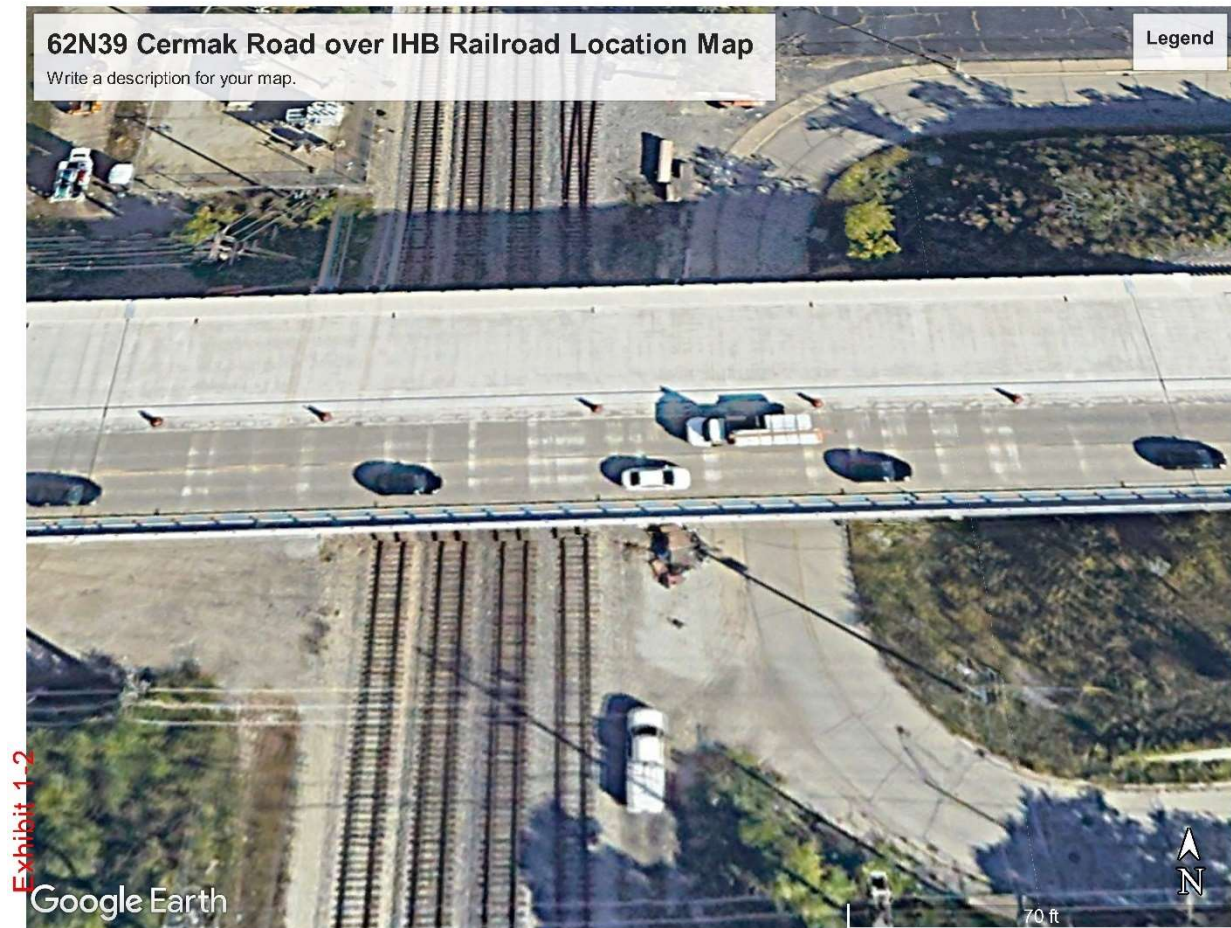


Exhibit 1-3



RAILROAD PROTECTIVE LIABILITY INSURANCE (CC&P)

Effective: December 1, 1986

Revised: January 1, 2022

Description. Railroad Protective Liability and Property Damage Liability Insurance shall be carried according to Article 107.11 of the Standard Specifications. A separate policy is required for each railroad unless otherwise noted.

NAMED INSURED & ADDRESS	NUMBER & SPEED OF PASSENGER TRAINS	NUMBER & SPEED OF FREIGHT TRAINS
Chicago, Central & Pacific Railroad and its Parents 17641 S. Ashland Avenue Homewood, IL 60430	6 trains/day @ 30 mph	6 trains/day @ 30 mph
Class 1 RR (Y or N): Y DOT/AAR No.: 289 832T RR Division: IOWA	RR Mile Post: 13.20 RR Sub-Division: FREEPORT	
For Freight/Passenger Information Contact:	Thomas Brasseur	Phone: 248-452-4854
For Insurance Information Contact:	Rob Glass	Phone: 708-332-6673

Basis of Payment. Providing Railroad Protective Liability and Property Damage Liability Insurance will be paid for at the contract unit price per Lump Sum for RAILROAD PROTECTIVE LIABILITY INSURANCE.

CN RIGHT OF ENTRY LICENSE AGREEMENT INFORMATION



Manager Public Works

Nicholas Burwell
17641 Ashland Avenue
Homewood, IL 60430

Office: 319.236.9205

Fax : 319.236.9207

Email : Nicholas.Burwell@cn.ca

Right of Entry (ROE) License Agreement Information

Railroad Company requires everyone (contractor, consultants, etc.) working on Railroad Company property to have a Right-of-Entry (ROE) License Agreement. No work may occur on Railroad Company property nor will flagging protection be provided until ROE License Agreement has been fully executed by both parties and returned.

Follow these steps to obtain a ROE:

1. Applicant will **Email** this completed application to Nicholas.Burwell@cn.ca
2. Applicant will **mail** a check for the application fee \$1000.00* to the address listed at the end of this document
3. Applicant will **Email** a COI (Certificate of Insurance) meeting the requirements outlined in the Insurance requirements section of this document
4. Once steps 1-3 are completed, the Railroad Company will begin processing the ROE application
5. If approved, the Applicant will receive an electronic copy of the ROE agreement by email
6. Applicant will have the ROE agreement executed by Applicant's VP or president of Applicant's company
7. Applicant will return a **HARD COPY** of the partially executed ROE agreement by mail to the Railroad Company address listed at the end of this document
8. The Railroad Company will return a fully executed digital copy of the ROE License Agreement by email for the Applicants records.

Please use this form and return by email to submit application request for a Right of Entry agreement.

Contact name and Email address –

Name of Applicant/contractor and email address -

Street Address –

City, State, Zip –

Telephone –

Detailed Purpose for ROE –

Start and Completion Date of ROE –

Public Agency's Project No. –

Public Agency Easement No. (if known) –

Location of project –

Subdivision and Milepost –

FRA/AAR/DOT Crossing No. and Name –
(Nearest to jobsite)

If unable to locate this number at jobsite, please use following links to obtain:

<http://safetydata.fra.dot.gov/officeofsafety/publicsite/crossing/xingqrv/loc.aspx>

In Illinois

<http://www.icc.illinois.gov/railroad/advanced.aspx?>

Please attach an aerial snapshot and a Google Earth kmz file to help identify specific location.

FAQ

What time frame can I expect to begin work and have flagging protection for my work?

A **Right of Entry License Agreement usually takes 4 to 6 weeks to obtain**. Once you have a fully executed ROE agreement, you will receive a flagging request form. This flagging request form along with prepayment for flagging fees will need to be *mailed to the physical address listed on the flagging request form*. Once this flagging request form is received, it is usually about **10 days until a flagger can be scheduled**. These are normal time frames. **Time frames can vary substantially** based on many factors. Expedited time frames may be able to be requested at an additional fee.

A brief summary of time frame for each step toward obtaining flagging protection...

1. Right of Entry License Agreement usually takes **4 to 6 weeks to obtain**.
2. Send in flagging check and flagging request form... about **1 week**
3. Once this flagging request form is received, it is usually about **10 days** until a flagger can be scheduled

What are the insurance requirements?

Railroad Company allows outside parties to come onto Railroad Company property to perform work, such as survey or inspection work, installation of pipelines and wirelines, and other work for projects necessitating the occupancy of Railroad Company. Before commencing work, and until the license of allowing such occupancy ends or is terminated, outside parties shall provide and maintain the following insurance in form and amount with companies satisfactory to and as approved by Railroad Company.

1. Minimum insurance required of outside party:
 - A. Statutory Workers Compensation and Employer's Liability Insurance.
 - B. Automobile Liability Insurance in an amount not less than \$1,000,000 combined single limit.
 - C. Commercial General Liability Insurance (Occurrence Form) in an amount not less than **\$5,000,000 per occurrence, with an aggregate limit of not less than \$10,000,000**. The policy must name Railroad Company and its Parents as additional insureds in the following form:

Chicago, Central & Pacific Railroad Company and its Parents
Attn: Nick Burwell
17641 Ashland Avenue
Homewood, IL 60430
(319) 236-9205 (office)
Nicholas.Burwell@cn.ca

The policy must remove any provisions excluding coverage for injury, loss or damage arising out of or resulting from doing business or undertaking construction or demolition on, near, or adjacent to railroad track or facilities using endorsement CG 2417 10 01 or equivalent approved by Railroad Company.

- D. When outside party is required by Railroad Company or Governing Authority to purchase Railroad Protective Liability Insurance to cover work on, near or adjacent to railroad track or facilities, and outside party is not being hired for this project by Railroad Company, outside party must procure Railroad Protective Liability Insurance in the following form;

This coverage shall be written on an Occurrence Form with limits of not less than \$5,000,000 per occurrence for Bodily Injury, Personal Injury and Physical Damage to Property, with an aggregate limit of not less than \$10,000,000. The policy must name:

Chicago, Central & Pacific Railroad Company and its Parents

FAP Route 771/FAU Route 1453 (22nd Street/Cermak Road)
Project STP-XVU6(771)
Section 2020-266-SUR, SW & TS
DuPage & Cook County
Contract No. 62N39

Attn: Nick Burwell
17641 Ashland Avenue
Homewood, IL 60430
(319) 236-9205 (office)
Nicholas.Burwell@cn.ca

- E. In the event the privileges provided herein to Applicant involve any work that could result in the discharge, spillage, disposal, release or escape of any Hazardous Material or petroleum product onto the Railroad Company's property, Applicant shall purchase and maintain in effect at all times during the term of this License a Contractor's Pollution Liability policy in an amount not less than two million dollars (\$2,000,000) combined single limit (and with a deductible not to exceed \$50,000) insuring Railroad against any and all damages, costs, liabilities and expenses resulting from on- or off-site bodily injury (including death to any person), on or off-site loss, damage or destruction of property (including that belonging to the parties hereto), and on-or off-site cleanup costs (including expenses incurred in the investigation, removal, remediation, neutralization, or immobilization of contaminated soils, surface water, groundwater or any other contamination) growing out of or incidental to any discharge, spillage, disposal, release, or escape of any Hazardous Material or petroleum product arising therefrom. For purposes of this Agreement, the term "Hazardous Material" shall include, without limit, any flammable explosives, radioactive materials, hazardous materials, hazardous wastes, hazardous or toxic substances, or related materials defined in the Comprehensive Environmental Response, Compensation and Liability Act of 1980, as amended (42 U.S.C. §§ 9601, et seq.), the Hazardous Material Transportation Act, as amended (49 U.S.C. §§ 1801, et seq.), the Resource Conservation and Recovery Act, as amended (42 U.S.C. §§ 6901 et seq.), the Toxic Substances Control Act, as amended (15 U.S.C. §§ 2601, et seq.), similar laws or ordinances enacted by any state, county or municipality in which the Property is located, or in the regulations adopted and publications promulgated pursuant to any of the above, as such laws or regulations now exist or may exist in the future.
- Applicant is required to advise Railroad Company by thirty (30) day advance written notice when any work to be performed under this License may require Pollution Liability Insurance pursuant to the previous paragraph.
- F. All policies described above must include description of operations, Railroad Company milepost, highway or street name, city and state of location, project number, and Railroad Company contact person on the certificate.
2. Before commencing work, outside party shall deliver to Railroad Company a certificate of insurance evidencing the foregoing coverages and, if requested by Railroad Company, true and complete copies of the policies described above. If the policy is being issued in conjunction with, or as a result of, a city, county or state contract, the policy should be initially submitted to the respective city, county or state agency that will review it first and then forward it to Railroad Company.
3. Common Policy Provisions. Each policy described in paragraph 1, parts A through E above, must include the following provisions:
- A. Each policy shall include a waiver by the insurer of any right of subrogation against any recovery by or on behalf of any insured.
- B. Each policy shall provide for not less than thirty (30) days prior written notice to Railroad Company at the address listed above of cancellation of or any material change in that policy.
4. It is understood and agreed that the foregoing insurance coverage requirements, and outside party's compliance with those requirements, is not intended to, and shall not, relieve outside party from, or serve to limit, outside party's liability and indemnity obligations under the provisions herein.
5. Railroad Company shall have the right, from time to time, to revise the amount or form of insurance coverage required as circumstances or changing economic conditions may require. Railroad Company shall give outside party written notice of any such requested change at least thirty (30) days before the date of expiration of the then-existing policy or policies, outside party agrees to, and shall, thereupon provide Railroad Company with such revised policy or policies.
6. Insurance required of SUBCONTRACTOR:

- A. If a SUBCONTRACTOR is to be employed by outside party to perform work on Railroad Company under or by the permission for occupancy granted to outside party by Railroad Company, before commencing work, the SUBCONTRACTOR shall provide and thereafter maintain all of the insurance described in paragraph 1, parts A through E, above, in the same forms and amounts as provided for above and subject to the other terms and conditions provided for in paragraphs 2 through 4 above.
- B. In the alternative, before the SUBCONTRACTOR commences work for outside party on Railroad Company, outside party may provide and thereafter maintain all of the insurance described in paragraph 1, parts A through E, above, in the same forms and amounts as provided for above and subject to the other terms and conditions provided for in paragraphs 2 through 5 above, provided that all such insurance names SUBCONTRACTOR as an additional insured and all such insurance provides coverage to all additional insureds, including Railroad Company, for any liability arising out of work performed by all other additional insureds, including SUBCONTRACTOR.

Is safety training required?

Prior to any entry onto Railroad Company's property, the employees and/or subcontractors of a Contractor, Grantee, Licensee, or Permittee shall determine by the guidelines hereinafter provided and by the work to be performed the level of safety training to be required.

All employees and/or subcontractors of a Contractor, Grantee, Licensee, or Permittee not hired by Railroad Company that will work on CN property are required to have minimum www.contractororientation.com.

- a. EXCEPTION: Railroad Company has exempted those it classifies as "Delivery Persons" from this training. This will include contractors such as UPS, FedEx, trucking companies, etc. who merely access the property to supply materials or equipment.

All employees and/or subcontractors of a Contractor, Grantee, Licensee, or Permittee hired by Railroad Company which will work on Railroad Company property are required to have minimum CN Safety and Security Awareness training, in addition to undergoing a background check. This training and background check must be obtained through the eRailSafe.com website. If not done before, the contractor must contact e-RailSafe at 855-383-7434 to be issued either a vendor number or issued instructions on obtaining a non-railroad contractor vendor number prior to accessing the noted website. Minimum information required of a Contractor, Grantee, Licensee, or Permittee and/or their subcontractor when contacting e-RailSafe is Name, Address, Telephone, Contact Person for State Projects, DOT Contract Number, and the AAR/DOT Number. This training is good for a period of two years.

- a. EXCEPTION: Railroad Company has exempted those employees of contractors providing paving services at a road crossing under construction or repair from this requirement.
- b. EXCEPTION: Railroad Company has exempted those it classifies as "Delivery Persons" from this training. This will include contractors such as UPS, FedEx, trucking companies, etc. who merely access the property to supply materials or equipment.

All employees and/or subcontractors of a Contractor, Grantee, Licensee, or Permittee hired by Railroad Company, whose duties include and who are engaged in the inspection, construction, maintenance, or repair of railroad track, bridges, roadway, signal and communication systems, roadway facilities, or roadway machinery that will work foul of or have the potential to foul a live track are considered Roadway Workers under FRA regulations and CN Policy. They must complete the On-Track Safety Training course approved by Railroad Company and provided by R.R. Safety – AMR, P.O. Box 75, Lomira, WI 53048, telephone (920) 517-1677, email rrsafetytraining@yahoo.com. This training must be repeated at least once each calendar year.

- a. EXCEPTION: Railroad Company has exempted those employees of contractors providing paving services at a road crossing under construction or repair from this requirement.
- b. EXCEPTION: Railroad Company has exempted those it classifies as "Delivery Persons" from this training. This will include contractors such as UPS, FedEx, trucking companies, etc. who merely access the property to supply materials or equipment.
- c. All the employees and/or subcontractors of a Contractor, Grantee, Licensee, or Permittee who will operate on-track machinery or those who will provide protection for other employees and/or subcontractors of a Contractor, Grantee, Licensee, or Permittee must also be trained on CN US

FAP Route 771/FAU Route 1453 (22nd Street/Cermak Road)
Project STP-XVU6(771)
Section 2020-266-SUR, SW & TS
DuPage & Cook County
Contract No. 62N39

Operating Rules pertaining to their duties. They must take and pass the required examination. This training is good for a period of two years.

- d. "Potential to foul a live track" is considered, at a minimum, to be working within twenty-five (25) feet of the track; or as otherwise to be determined by CN Design & Construction Department.

The employees, subcontractors, and/or agents of the Licensee and/or its contractor shall qualify for, and make available for inspection to Railroad Company's employees or other authorized personnel at all times while on Railroad Company property, a photo identification issued by www.e-railsafe.com, along with at least one other government-issued form of identification. Licensee and/or their contractor shall bear all costs of compliance with the requirements of this Section. Railroad Company reserves the right to bar any of employees or agents of a Contractor, Grantee, Licensee, or Permittee and/or their contractor from Railroad Company's property at any time for any reason.

What are the costs and address to mail documents and ROE application fee check?

Application Fee Information:

Cost is \$1000.00* for application

*Fee may be increased for special handling, expedited handling, or multiple reviews.

Check Payable To: Chicago, Central & Pacific Railroad Company
Mail To: Chicago, Central & Pacific Railroad Company
Attn: Nick Burwell
17641 Ashland Avenue
Homewood, IL 60430

Mailing Address Information:

Mail To: Chicago, Central & Pacific Railroad Company
Attn: Nick Burwell
17641 Ashland Avenue
Homewood, IL 60430

Flagging Protection Rates:

Basic daily rate – = \$1,300.00 per day
Monday thru Friday regular business hours
Includes 8 standard rate hours and 2 OT hours to set flags
Overtime rate – = \$150.00 per hour
hours in excess of 8 hours or outside of regular business hours
Weekend or holiday rate – = \$1,500.00 per day
\$150.00 per hour with a 10 hour minimum

Email the completed first page above to: Nicholas.Burwell@cn.ca

Revised: 7.2.20

CN UTILITY CROSSING/ENCROACHMENT APPLICATION PACKET



Utility Crossing/Encroachment Application Packet

Revised: 12/04/2018

Table of Contents

1. Initial Notification of Intent to Construct Utility Crossing/Encroachment
 - a. Requirements and Instructions
 - b. Forms
2. CN Insurance Requirements
3. Example Certificate of Insurance
4. Flagging/Cable Locate Specifications and Form

**INITIAL NOTIFICATION OF INTENT TO CONSTRUCT UTILITY CROSSING/ENCROACHMENT
REQUIREMENTS AND INSTRUCTIONS**

The Applicant shall submit a completed application for utility crossing engineering review to the appropriate contact shown in the "Pipeline/Wireline Crossing Contacts" Section (Section I). The application can be downloaded from Railroad's website but the application and all supporting documentation must be submitted to the Railroad via certified mail to the address shown on the application. Any application transmitted to Railroad other than by certified mail, or that does not include all requested information or required documentation will be considered incomplete. Railroad shall notify the applicant when Railroad receives an incomplete application but under no circumstances shall Railroad review an incomplete application. Repeat: no application will be reviewed until the application is complete. Unless otherwise advised by Railroad, all submittals necessary to complete a previously submitted incomplete application must also be submitted via certified mail. Any application which remains incomplete one (1) year after the date of the first notification of an incomplete submittal from Railroad will be discarded and a new application must be submitted, including a new application fee. All information and documentation contained in any application must meet the approval of the Railroad, in its sole discretion. Unless otherwise required by law, Railroad will respond to all applications in the order in which they are received. In no event shall any construction related activities be scheduled or conducted on Railroad's property until Railroad has issued its final approval of the application, a written agreement outlining the legal terms of the installation has been signed and flaggers have been secured.

An application shall include the following documents:

- ☐ A completed and signed application form also known as Initial Notification of Intent Form.
- ☐ A map with an aerial image of the location of where work will be performed, showing the work site as well as nearby streets or other landmarks close to the work location(s).
- ☐ A certificate of insurance meeting the requirements set forth in this packet (unless lower coverage requirements are prescribed by local law and signed off by CN Legal Department).
- ☐ Six (6) copies of complete **stamped** engineering plans which shall conform to the guidelines established by the American Railway Engineering and Maintenance of Way Association (AREMA), all applicable federal, state and local legal and professional requirements, CN standards and any additional requirements set forth in this packet. In the event of any conflict or inconsistency between the aforesaid guidelines, requirements and standards, the most stringent shall apply.
- ☐ The non-refundable application fee. Unless otherwise specified by law, the non-refundable application fee shall be **\$1,350.00, which is intended** to cover the cost of Railroad's review of the application and all required documentation and information. The Applicant will be charged an additional fee of **\$200** for each review after the initial review of the completed application due to inadequate or missing information or other failure by the Applicant to meet the requirements of Railroad. This fee shall be included with any revision sent. Any revision sent without the accompanying fee will be considered incomplete and will not be reviewed.

**INITIAL NOTIFICATION OF INTENT TO CONSTRUCT UTILITY CROSSING/ENCROACHMENT
REQUIREMENTS AND INSTRUCTIONS**

I. Pipeline/Wireline Utility Contacts

Utilities

Name: Joseph Wojcik
Address: CN
17641 S. Ashland Avenue
Homewood, IL 60430
Phone: (708) 332-4739
Email: Josephs.Wojcik@cn.ca

FLAGGING AND/OR CABLE LOCATES

Address: CN Flagging - US
17641 South Ashland Avenue
Homewood, IL 60430
Email: Flagging_US@cn.ca

**INITIAL NOTIFICATION OF INTENT TO CONSTRUCT UTILITY CROSSING/ENCROACHMENT
REQUIREMENTS AND INSTRUCTIONS**

II. Scope

1. These specifications cover minimum requirements for utilities installed within or adjacent to railway rights-of-way. Railroad reserves the right to increase the specifications based on physical conditions or other factors specific to the installation point, including but not limited to:
 - a. Track speed
 - b. Traffic density
 - c. Traffic sensitivity
 - d. Terrain conditions
 - e. Curvature and grade
 - f. Bridges and other structures
 - g. Pipe size, capacity and material carried
 - h. Environmental risks/damages

INITIAL NOTIFICATION OF INTENT TO CONSTRUCT UTILITY CROSSING/ENCROACHMENT
REQUIREMENTS AND INSTRUCTIONS

III. Engineering Plan Requirements

1. A cover page including:
 - a. Include caption stating "Construction and maintenance to be in accordance with all applicable regulatory requirements and standards"
 - b. Contact name, address and phone number of Utility Owner
 - c. Professional Engineer's stamp, signature, and date
2. A plan view or site plan displaying:
 - a. A north arrow
 - b. Any tracks and railroad facilities
 - c. Railroad/roadway crossings
 - d. Railroad mileposts
 - e. Proposed utility crossing location
 - f. Location of proposed utility crossing in relation to a legal description or road allowance
 - g. Public Land Survey System (PLSS) Information (sections, quarter sections, etc.)
 - h. Right of way lines of railroad and labeled street or highway, if involved
 - i. Warning, utility markers that are proposed for the site in accordance with this document.
 - j. Indicate direction of flow and location of nearest shut off valves, if shutoff valves are required.
 - k. Indicate location and distance of nearest excavation from centerline of nearest track.
 - l. Location and methods of storage and disposal of excavated material. Excavated material should be stored to the back side of excavation with respect to the tracks unless this position creates an unsafe condition or a better location can be justified. All excavated material should be treated as contaminated with details provided for review unless known otherwise.
 - m. Excavation protection methods shall be shown for review. All excavations must be protected at all times and fenced in with reflective material or illuminated if left unattended.
3. A profile along the proposed crossing of actual situations showing:
 - a. Any tracks
 - b. The existing ground surface
 - c. The proposed utility
 - d. Exact depth of burial below base of rail, roadway surface, ditch bottom, and other points of interest to the top of utility (depth measured to casing pipe, if used)
 - e. Method of installation (i.e. boring, dry jack and bore, dry directional bore, etc.)
 - f. Indicate type and details of utility protection.
4. Show a detailed spec and cross-section of the pipe including:
 - a. Note and show if carrier pipe will be held clear of the casing pipe by supports. CN requires carrier & casing to be designed for cooper E-80 loading.
 - b. The type, wall thickness, and maximum test pressures of carrier and casing pipes must be listed on the plans. CN requires the AREMA standard listed in *Table 1-5-1*. Minimum Wall Thickness for Steel Casing Pipe for E80 Loading also found in Section A-2 of this document.
 - c. Indicate type of cathodic protection, if required for the type of construction. (See AREMA Section 5.2.3.3 *Cathodic Protection* for more information)
 - d. The ends of the casing shall be suitably sealed to the outside of the carrier pipe or casing vents shall be required.
 - e. Provide hoop stress calculation. See AREMA Sections 5.2.3 *Carrier Pipe* for more information.
 - f. Cross sections of the utility shall be perpendicular to the center line of the railroads tracks.

**INITIAL NOTIFICATION OF INTENT TO CONSTRUCT UTILITY CROSSING/ENCROACHMENT
REQUIREMENTS AND INSTRUCTIONS**

- g. The location of the cross sections will be at:
 - i. Bore pit
 - ii. Receiving pit
 - iii. Intersection of utility and center line of any tracks
 - iv. Any other points of interest along the utility line
- 5. A detail of the proposed utility marker to be used on site showing all information to be displayed as well as all dimensions and materials.
- 6. Drawings must be to scale and have all dimensions shown. This includes but is not limited to:
 - a. Distance from each utility (encroachment) to the centerline of track, nearest road, crossing, bridge or other Railroad structures
 - b. Dimension width of CN right-of-way
 - c. Number of tracks proposed utility crossing will cross
 - d. Angle of proposed utility crossing
 - e. All existing and proposed signals and facilities with dimensions showing horizontal distance and depth to the proposed utility
- 7. All information regarding all seeding/surface restoration work shall be provided with the plans and conform to the local DOT specs.
- 8. Revised drawings shall be marked as revised (with revision date included) and state reason for revision. Each individual revision shall be called out in this manner. In addition, each page shall have a section near the title block with a list of revisions, where the revision version and date shall be marked in for any revision to that page.
- 9. **Professional Engineer's stamp, signature and date is required on all plans and submittals.**
- 10. Attachments to the plans as required in the following sections of this document may include but are not limited to:
 - a. Soil Boring Logs
 - b. Geotechnical Report
 - c. De-Watering Plan
 - d. Induction Interference Study
 - e. Vibration Monitoring Plan
 - f. Shoring Plan
 - g. Site Safety Action Plan
 - h. Emergency Action Plan
 - i. An estimated construction schedule and Gantt chart with field contact name and phone number.
 - j. Detailed Work Plan
 - k. Settlement Monitoring Plan
 - l. Construction Monitoring Plan

INITIAL NOTIFICATION OF INTENT TO CONSTRUCT UTILITY CROSSING/ENCROACHMENT
REQUIREMENTS AND INSTRUCTIONS

IV. Above Ground Utility Requirements

1. General Above Ground Utility Requirements

- a. CN's operations are not to be impaired or affected by any utility work.
 - i. Flagging protection during construction will be required and may be expanded by local supervisors to include any work on, under, over, or near Railroad property.
- b. All employees of contractors not hired by CN that will work on, over, under or near CN property are required to have, at a minimum, safety certification with www.contractororientation.com and the railroad representative will be responsible for verifying and documenting said certifications.
 - i. Applicant must compile an Emergency Action Plan per OSHA which incorporates the proper Railroad contact information. Identify and list an adequate amount of properly trained employees to be able to enter CN property to respond to an emergency situation.
- c. On projects which have the potential to encroach or effect the operations to CN's property, it is required of the contractor to post informational documents at the jobsite for the benefit of the construction workers, CN personal, and the general public. The following required information is to be posted on a bulletin board. The bulletin board shall be weatherproof and watertight and be located in an area readily accessible to both CN and the general public.
 - i. Project overview: Including a general work description, job site location address, and approximate duration of the project
 - ii. Owner / Applicants Information
 - iii. Contractor's Designated points of contact: Including the Safety Officer, Superintendent, and 24 hour contact number
 - iv. Copies of reviewed drawings by CN
 - v. Copies of the Safety Action Plan
 - vi. Copies of approved permits
- d. All utilities must be a minimum of 15 ft horizontally away from any existing or planned CN signals and facilities, when practicable. Minimum distance in any direction from a vertical road crossing gate shall be no less than 4 ft.
- e. Utilities shall not be placed within a culvert, under railroad bridges, nor closer than 300 feet to any portion of any railroad bridge, building, or other structure, except in special cases and be of special design as approved by the CN Chief Engineer or the designated representative.
- f. Must not be attached to a CN pole line or pole lines licensed to others except where specifically authorized.
- g. All poles extending in height above ground equal to or greater than the distance from pole to the edge of ties on the nearest track will be anchored and guyed against tipping toward track.
 - i. Guys will be guarded to a distance of 8' above ground line and the guards shall be orange in color.
- h. All clearances and safety provisions are subject to the National Electric Safety Code (American National Standard Institute) as well as any applicable National, State, and local codes, whichever is more restrictive.
- i. All overhead electrical utilities will require an induction interference study.
- j. During construction, the Applicant shall maintain positive drainage of Railroad property. After construction is completed, the Railroad's right-of-way shall be restored to its original condition

**INITIAL NOTIFICATION OF INTENT TO CONSTRUCT UTILITY CROSSING/ENCROACHMENT
REQUIREMENTS AND INSTRUCTIONS**

and to the satisfaction of the Railroad. Any fencing removed to facilitate construction shall be restored.

- k. All piers or poles shall be located off of CN right-of-way.
- l. Warning, utility markers shall be installed at any intersection of any utility and CN right-of-way, and on any pole on CN right-of-way.

2. Above Ground Utility Crossing Requirements

- a. Utilities crossing over any railroad track must have a minimum height measured at the lowest point of the utility to the top of rail:
 - i. Pipe/Pipe Bridge = 25 ft Min
 - a. Cable Supported Pipe Bridge = 50 ft
 - ii. Conveyors = 25 ft Min
 - iii. Fiber/Coaxial Cable = See Section A-3
 - iv. Electric Wire = See Section A-3
- b. Utilities shall be located, where practicable, to cross tracks at approximately right angles but must not cross at an angle less than 45 degrees.
 - i. Any utility crossing that is less than 45 degrees will be considered a longitudinal utility and may be subject to higher requirements as required by the CN Chief Engineer or the designated representative.
- c. If any new utilities are attached onto an existing structure, the existing structure must be analyzed to ensure it can withstand the new loading. If a re-design of the existing structure is required, this must be included with the plans.

3. Above Ground Longitudinal Utility Requirements

- a. All longitudinal utilities shall be placed towards the outer edge of the railroad right-of-way, except in special cases and be of special design as approved by the CN Chief Engineer or the designated representative.

INITIAL NOTIFICATION OF INTENT TO CONSTRUCT UTILITY CROSSING/ENCROACHMENT
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V. Underground Utility Requirements

If underground utility is greater in diameter than 10" including any casing protection, the requirements in the Section VI (immediately following this section) are required.

1. General Underground Utilities Requirements

- a. CN's operations are not to be impaired or affected by any utility work.
 - i. Flagging protection during construction will be required and may be expanded by local supervisors to include any work on, under, over, or near Railroad property.
- b. All employees of contractors not hired by CN that will work on, over, under or near CN property are required to have, at a minimum, safety certification with www.contractororientation.com and the railroad representative will be responsible for verifying and documenting said certifications.
 - i. Applicant must compile an Emergency Action Plan per OSHA which incorporates the proper Railroad contact information. Identify and list an adequate amount of properly trained employees to be able to enter CN property to respond to an emergency situation.
- c. On projects which have the potential to encroach or effect the operations to CN's property, it is required of the contractor to post informational documents at the jobsite for the benefit of the construction workers, CN personal, and the general public. The following required information is to be posted on a bulletin board. The bulletin board shall be weatherproof and watertight and be located in an area readily accessible to both CN and the general public.
 - i. Project overview: Including a general work description, job site location address, and approximate duration of the project
 - ii. Owner / Applicants Information
 - iii. Contractor's Designated points of contact: Including the Safety Officer, Superintendent, and 24 hour contact number
 - iv. Copies of reviewed drawings by CN
 - v. Copies of the Safety Action Plan
 - vi. Copies of approved permits
- d. Jacking or boring of corrugated metal pipe, cast iron pipe or pipe with flanges, bells or couplings will not be permitted.
- e. Casing may need to be extended to accommodate any proposed projects for Railroad as required by CN Chief Engineer or the designated representative.
- f. Soils investigation and a geotechnical report may be required.
- g. All underground utilities shall have an adequate casing for protection.
- h. Utilities shall not be placed within a culvert, under railroad bridges, nor closer than 100 feet to any portion of any railroad bridge, building, or other structure, except in special cases and be of special design as approved by the CN Chief Engineer or the designated representative.
- i. Restoration and backfill compaction should conform to a 95% Proctor test suitable for the soil type at the site and commence in lifts specified by the CN Chief Engineer or the designated representative.
- j. No excavation can be closer than 25' from the centerline of the nearest track.
- k. All utilities must be a minimum of 15 ft horizontally away from any existing or planned CN signals and facilities, when practicable.
- l. The zone of influence is as follows: Starting 15 feet from the centerline of nearest track at the base of rail, measured perpendicular to the track centerline, calculate a slope to the bottom of the proposed pipe at a 2H:1V slope. (See Section A-6)

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- i. If a 2H: 1V slope cannot be maintained or more restrictive conditions occur, approved shoring will be required. (See Section A-7)
- ii. If shoring is required as stated above, a shoring plan designed to withstand E-80 loading shall be created, **stamped by a Professional Engineer**, and submitted to CN.
- iii. If the excavation is outside the zone of influence, then the excavation shall follow OSHA requirements.
- m. A dewatering plan shall be created, **stamped by a Professional Engineer**, and submitted to CN as required by the CN Chief Engineer or the designated representative.
- n. Dry Horizontal Directional Drilling (HDD) is only allowed.
 - i. Mud slurry directional bore will be allowed only with the use of vents.
 - ii. No wet directional drilling is allowed.
- o. Vibrations Requirements
 - i. If there are fiber optic cables buried within the ROW, the Contractor shall submit details on the type of equipment to be used for pile driving, and estimate the vibrations that will be induced at ground level during operation.
 - ii. The Contractor may be required to monitor vibrations levels during pile driving operations, for which the Contractor shall submit a procedure and the type of monitoring equipment to be used.
 - Induced vibrations shall be limited to a maximum peak particle velocity (PPV) of less than 3.5"/sec (measured in 3 mutually perpendicular directions taken at tie level / ground surface). And induced amplitude of movement shall be less than 1/128"
 - Vibrations undertaken within 150 ft of fiber optic cables, induced vibrations shall be limited to a maximum of PPV of less than 1.5"/sec
- p. During construction, the Applicant shall maintain positive drainage of Railroad property. After construction is completed, the Railroad's right-of-way shall be restored to its original condition and to the satisfaction of the Railroad. Any fencing removed to facilitate construction shall be restored.
- q. Additional Resources for Underground Utilities:

<http://www.undergroundfocus.com/onecalldir.php>
<http://www.ntdpc.com/>
<http://www.commongroundalliance.com>

Provides links and information on state calls for cable locates
National Telecommunications Damage Prevention Council
Common Ground Alliance

2. Underground Utility Crossing Requirements

- a. Utilities shall be located, where practicable, to cross tracks at approximately right angles but must not cross at an angle less than 45 degrees.
 - i. Any utility crossing that is less than 45 degrees will be considered a longitudinal utility and may be subject to higher requirements as required by the CN Chief Engineer or the designated representative.
- b. For all utility crossings the utility must be protected by a casing for the full width of CN's right-of-way or 50 ft whichever is greater.
 - i. All casing pipes shall be sloped not less than 0.3%.

**INITIAL NOTIFICATION OF INTENT TO CONSTRUCT UTILITY CROSSING/ENCROACHMENT
REQUIREMENTS AND INSTRUCTIONS**

- ii. Pipelines carrying commodities in a gaseous state are not required to have a steel casing as long as the top of the utility is at least 10 ft below base of rail.
 - iii. Fiber optic utilities do not need a steel casing if the depth is 15 ft or greater below the base of rail.
 - c. Directional boring will be allowed at the discretion of the Railroad.
 - i. If practicable, boring excavation must not exceed the outside diameter of the pipe.
 - Bore shall not be greater than 1" larger than the utility diameter
 - d. Minimum depth of burial below:
 - i. Dry jack and Bore
 - Main Tracks Base of Rail = 6 ft
 - Industrial Tracks Base of Rail = 6 ft
 - Road Surface = 4 ft
 - Ditch Bottom = 5 ft
 - ii. Uncased Utility
 - Main Tracks Base of Rail = 10 ft
 - Industrial Tracks Base of Rail = 10 ft
 - Road Surface = 6 ft
 - Ditch Bottom = 6 ft
 - iii. Directional Bore
 - Main Tracks Base of Rail = 15 ft
 - Industrial Tracks Base of Rail = 15 ft
 - Road Surface = 5 ft
 - Ditch Bottom = 6 ft
 - e. Any excavation must not be located on CN right-of-way or within a minimum of 50 ft from the centerline of track, whichever is greater.
 - f. Warning, utility markers shall be installed at any intersection of any utility and CN right-of-way.
 - i. Marker should show accurate owner, contact, and CN Agreement Number.
- 3. Longitudinal Underground Utility Requirements**
- a. Underground utilities laid longitudinally in railroad right-of-way shall be located as far as practicable from any tracks or other important structures.
 - b. Longitudinal lines must be a minimum of 25 ft from the center line of track, or outside the track embankment section, whichever is greater.
 - c. Uncased steel carrier pipe utilities laid longitudinally on the railroad right-of-way, 25 ft to 50 ft from the center line of the nearest rail shall be buried not less than 6 ft from the natural ground surface to the top of pipe. If distance is more than 50 ft from centerline of track, minimum cover shall be 5 ft.
 - i. At all locations on the right-of-way farther than 25 ft away from the centerline of the nearest track, the minimum natural ground cover for uncased steel natural gas pipes must be 6 ft.
 - d. Plastic carrier pipes are not allowed for longitudinal utilities on CN right-of-way.
 - e. Longitudinal underground utilities must be marked by a sign approved by the CN Chief Engineer or the designated representative every 500 ft, at every road crossing, streambed, other utility crossing, and at locations of major change in direction of the line.
 - i. Marker should show accurate owner, contact, and CN Agreement Number.

**INITIAL NOTIFICATION OF INTENT TO CONSTRUCT UTILITY CROSSING/ENCROACHMENT
REQUIREMENTS AND INSTRUCTIONS**

VI. Additional Requirements for Underground Utilities with Diameter of 10 Inches or Greater (Including Casing)

1. Drawings shall be **stamped, signed, and dated** by a Professional Engineer licensed in the State where the work is being performed. CN reserves the right to prohibit a certain construction methodology, at its own discretion; however, CN shall not assume any responsibility for the suitability of the accepted method. Open cut methodology shall only be considered where other installation techniques are deemed impractical and where rail traffic volumes are low. Installations using water jet methods shall not be permitted.
2. Complete Subsurface Investigation
 - a. Boreholes are required at each end of the crossing and at each entry/exit pit with a maximum spacing between boreholes of 150 ft.
 - b. The boreholes shall be drilled to a depth of 20 ft below the proposed crossing depth or to 20 ft below the maximum feasible crossing depth if the proposed crossing depth has not yet been determined.
 - c. Soils samples shall be obtained at 3 ft intervals to a depth of 15 ft and also within the proposed utility horizon (i.e., from at least 7 ft or one pipe/casing diameter above the proposed utility invert to at least 7 ft or one pipe/casing diameter below the proposed utility invert). At other depths, soil samples may be obtained at 5 ft intervals; No boreholes will be completed between ties or tracks in double track territory.
 - d. If bedrock is encountered at the proposed location, the bedrock will be cored to establish the competency and engineering characteristics of the bedrock. The bedrock shall be cored to at least 5 ft below the invert of the proposed crossing.
 - e. Soil classification testing (i.e., water content determination, Atterberg Limits testing and grain size distributions) shall be carried out on soil samples obtained from all major soil strata and on soil samples obtained from every layer that the proposed tunnel would intersect.
 - f. The stabilized groundwater elevation must be established by installation of piezometer/monitoring well(s); at least one piezometer/monitoring well must be maintained in operation and checked prior to construction to confirm the groundwater elevation.
3. Submit a **stamped** Geotechnical Report prepared by a Licensed Geotechnical Engineer with experience in trenchless technology. The Report shall include:
 - a. Comments and recommendations with respect to construction methodology
 - b. An estimate of the expected extent and magnitude of ground movement over time
 - c. Measures to be undertaken to preserve the safety of rail operations and the structural integrity of the track structure
 - d. A detailed proposal for ground surface and subsurface monitoring
 - e. Factual subsurface information with all field and laboratory test data
 - f. A description of the site and soil stratigraphy including results of soil classification testing
 - g. A plan of the proposed crossing with borehole/testing/installation locations
 - h. A summary of groundwater conditions encountered during the investigation including the observed groundwater levels within the boreholes and the presence of any perched water levels at the borehole locations
 - i. Anticipated settlements as well as an assessment of the anticipated settlement through configurations

**INITIAL NOTIFICATION OF INTENT TO CONSTRUCT UTILITY CROSSING/ENCROACHMENT
REQUIREMENTS AND INSTRUCTIONS**

- j. A detailed monitoring plan to monitor any ground surface and subsurface movements during construction shall be provided. The Review and Alert (work stoppage) levels shall be provided
 - k. Submit a contingency plan and notification procedure to be implemented in the event of excessive/unexpected settlement or heave, and unforeseen changes in subsurface conditions, i.e. cobbles and boulders, raveling /flowing ground
4. Submit a Detailed Work Plan
- a. Details of the proposed methodology - the installation operations, methods of maintaining and adjusting line and grade, drilled/bored diameter, drill hole stabilization procedures, temporary dewatering measures and any mitigation procedures if sinkholes/settlement above the pipe occurs or excessive movement of the settlement monitors is observed.
 - b. The design of the crossing - length, diameter and thickness of the casing, elevations of the crossing invert at both ends, excavation shoring details and methods of dealing with cobbles/boulders and obstructions.
 - c. Provide additional details for specific installation methodologies as follows:
 - i. Jack and Bore: size and location of the auger head relative to the casing, estimated jacking thrust required, method of monitoring casing elevation, thrust block design calculations, record keeping system to document casing advance and jacking pressures, bulk heading, and grouting procedures. Bore head should not extend more than 1" ahead of the casing.
 - d. Pipe Ramming: length, diameter and thickness of the casing, details of the reinforcing ring used at the leading edge of the pipe
 - e. HDD: slurry pressure and mitigation measures for frac out if applicable. Vents shall be installed on each side of the track(s) to prevent frac-outs.
 - f. TBM: type of machine, methods of primary ground support, grouting between the casing, ribs and lagging (primary support) and the surrounding soil/rock
5. Submit a Settlement Monitoring Plan including:
- a. Summary of Proposed Settlement Monitoring
 - i. Geographical Location
 - ii. Number of Settlement Monitoring Probes
 - iii. Type of Probe & installation Method
 - iv. Expected Amount of Settlement (in)
 - v. Frequency of Monitoring
 - vi. Duration of Monitoring
 - b. Site Plan:
 - i. Site Plan
 - ii. Identify Probe Locations and Offset Distances to Nearest Rails
 - iii. Elevation of Top-of-Probes
 - c. Probe Detail Drawing:
 - i. Show section through Railroad Track Road Bed
 - ii. Existing Ground Line
 - iii. Depth of Bore
 - iv. Distance to Bottom-of-Probe to Top of Casing Pipe
 - v. Submit a dewatering plan.

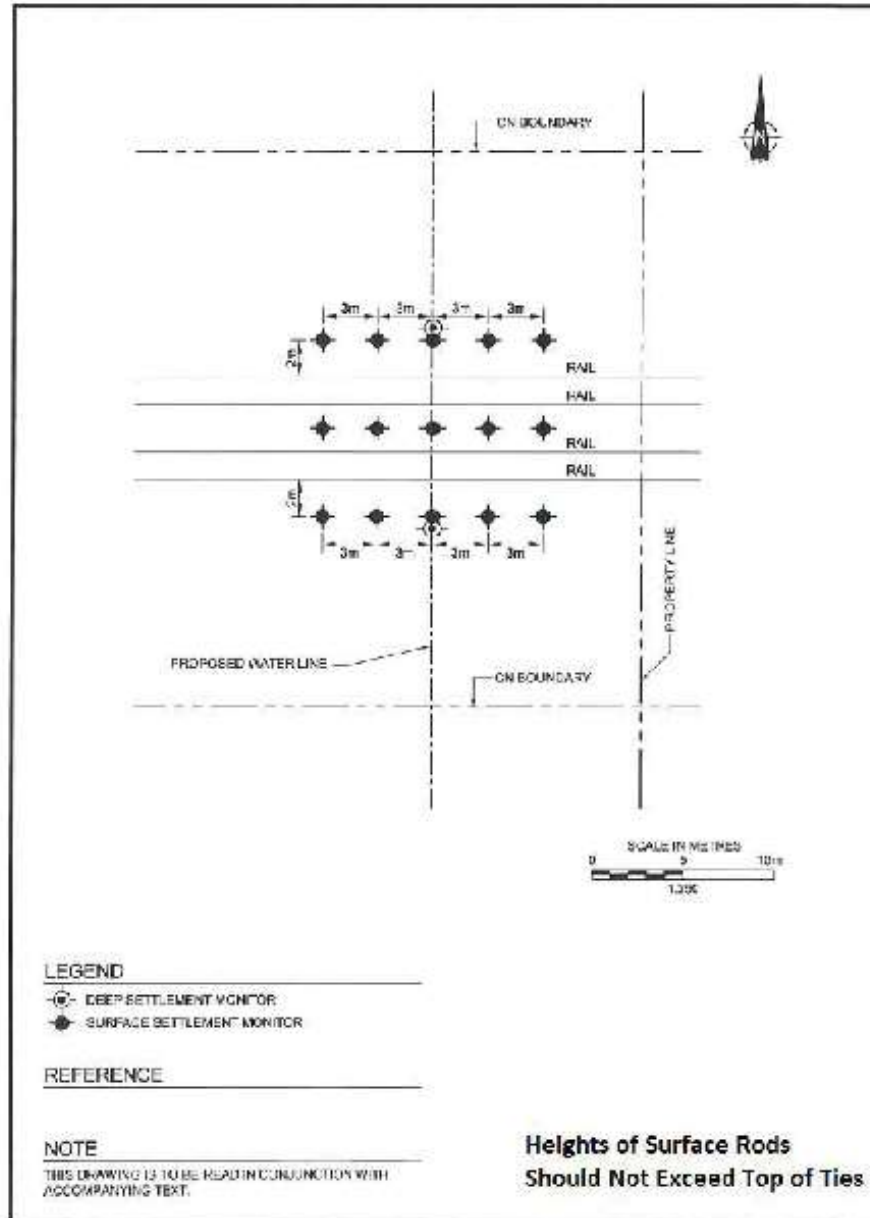
**INITIAL NOTIFICATION OF INTENT TO CONSTRUCT UTILITY CROSSING/ENCROACHMENT
REQUIREMENTS AND INSTRUCTIONS**

6. Monitoring During Construction
 - a. Monitoring by a qualified geotechnical personnel and report to CN on a daily basis.
 - b. Installation in accordance with the Contractor's detailed work plan.
 - c. Over-excavation does not occur, and the liner / casing is installed tight to the excavation.
 - d. Report theoretical vs. actual volumes of spoils removed on per meter and total bases.
 - e. The excavation is fully supported until the liner / pipe installation is complete.
 - f. The bulkhead is installed at the end of every work shift or during any prolonged stoppage of work.
 - g. Voids are fully grouted to refusal immediately after the completion of liner / pipe installation. Report theoretical vs. actual volumes of grout pumped.
7. Reporting to CN during/post Construction
 - a. Progress of the contractor and pipe installation and what work was completed on that day,
 - b. A summary of the daily ground surface and subsurface movements showing a comparison to a baseline reading taken before the start of construction, settlements of greater than 3/8" shall be reported to CN immediately.
 - c. Any other geotechnical issues that may be of concern to CN.
 - d. Log of settlement survey results showing
 - i. Station
 - ii. Date and Elevation of Initial Readings
 - iii. Date and Elevation of Subsequent Readings
 - iv. Difference in Elevation
 - e. Submit ground surface and subsurface monitoring reports to CN on a daily basis, showing a comparison to baseline readings taken prior to the commencement of construction. Settlement of 3/16" is to be reported to CN immediately, and a settlement of 3/8" or greater the work is stopped until a resolution is achieved.
8. Provide, in writing, the name and phone number of the Applicant's qualified site inspector who will be on the job site on a full time basis for the duration of construction. Update prior to work beginning if there are any changes.

**NO CONSTRUCTION OR ACCESS TO CN ROW WILL COMMENCE UNTIL AN AGREEMENT HAS BEEN
ENTERED INTO BETWEEN CN AND THE UTILITY OWNER**

**INITIAL NOTIFICATION OF INTENT TO CONSTRUCT UTILITY CROSSING/ENCROACHMENT
 REQUIREMENTS AND INSTRUCTIONS**

A-1. Monitoring Points Requirements



INITIAL NOTIFICATION OF INTENT TO CONSTRUCT UTILITY CROSSING/ENCROACHMENT
 REQUIREMENTS AND INSTRUCTIONS

A-2. Minimum Wall Thickness for Steel Casing Pipe for E80 Loading

Table 1-5-1. Minimum Wall Thickness for Steel Casing Pipe for E80 Loading

Nominal Diameter (inches)	When coated or cathodically protected Nominal Thickness (inches)	When not coated or cathodically protected Nominal Thickness (inches)
12-3/4 and under	0.188	0.188
14	0.188	0.250
16	0.219	0.281
18	0.250	0.312
20 and 22	0.281	0.344
24	0.312	0.375
26	0.344	0.406
28	0.375	0.438
30	0.406	0.469
32	0.438	0.500
34 and 36	0.469	0.531
38	0.500	0.562
40	0.531	0.594
42	0.562	0.625
44 and 46	0.594	0.656
48	0.625	0.688
50	0.656	0.719
52	0.688	0.750
54	0.719	0.781
56 and 58	0.750	0.812
60	0.781	0.844
62	0.812	0.875
64	0.844	0.906
66 and 68	0.875	0.938
70	0.906	0.969
72	0.938	1.000

**INITIAL NOTIFICATION OF INTENT TO CONSTRUCT UTILITY CROSSING/ENCROACHMENT
 REQUIREMENTS AND INSTRUCTIONS**

A-3. Overhead Wireline Clearance Chart

FORMULA: .5" increase for every 1,000 volts in excess of 50 KV
 6" increase for every 12,000 volts in excess of 50 KV

Voltage (to ground)	Minimum Clearance Required above top Of rail	Minimum Clearance (Including Static Wires) Required above Communication and Signal Lines
0 to 750	27'0"	4'0"
8,700	28'0"	4'0"
15,000	28'0"	6'0"
50,000	30'0"	6'0"
74,000	31'0"	7'0"
98,000	32'0"	8'0"
122,000	33'0"	9'0"
146,000	34'0"	10'0"
170,000	35'0"	11'0"
194,000	36'0"	12'0"
218,000	37'0"	13'0"
242,000	38'0"	14'0"
266,000	39'0"	15'0"
290,000	40'0"	16'0"
THESE CLEARANCES ARE TO INCLUDE ALL TRACKS OPERATED AS MAIN TRACKS, SIDINGS, AND OTHER AUXILIARY TRACKAGE.		

**INITIAL NOTIFICATION OF INTENT TO CONSTRUCT UTILITY CROSSING/ENCROACHMENT
REQUIREMENTS AND INSTRUCTIONS**

A-4. Marking of Utilities on Railroad Right-of-Way

CABLE ROUTE MUST BE MARKED AT EDGE OF RIGHT OF WAY WHERE CABLE ENTERS OR LEAVES RAILROAD PROPERTY. IN CASES OF PARALLEL CABLE ROUTE, SIGNS AS INDICATED IN FIGURE 1 ON THIS EXHIBIT WILL BE PLACED APPROXIMATELY EVERY 200 FEET. SIGNS TO BE OF A PERMANENT VERTICAL TYPE, NOT SMALLER THAN 5 INCHES WIDE BY 12 INCHES HEIGHT. YELLOW BACKGROUND WITH BOLD BLACK LETTERING. SIGNS TO BE MOUNTED ON METAL POSTS OR AS OTHERWISE AGREED TO AT A HEIGHT OF 3 FEET ABOVE GROUND LEVEL.



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A-7. Example Profile 2 – Requires Shoring



INITIAL NOTIFICATION OF INTENT TO CONSTRUCT UTILITY CROSSING/ENCROACHMENT

Complete this form and return it along with a non-refundable preparation fee of \$1350 made out to CN.

Date: _____

1. Owner/Applicant Information	
A. Name:	_____
B. Address:	_____
C. Authorized Representative:	_____
D. Title:	_____
E. Phone Number:	_____ F. Fax Number: _____
G. Email Address:	_____
2. Engineer/Consultant Information	
A. Name:	_____
B. Address:	_____
C. Authorized Representative:	_____
D. Title:	_____
E. Phone Number:	_____ F. Fax Number: _____
G. Email Address:	_____
3. Location Description (Attach a Copy of a Sketch Showing Location)	
A. _____ ¼ _____ ¼ Sec. _____, Township _____, Range _____	
B. Nearest Public Road Crossing Name: _____	
C. Nearest Public Road Crossing DOT Number: _____ (Number on Blue Sign at Crossing, e.g. 123456L)	
D. City / Village / Township: _____ (Circle One)	
E. County: _____	F. State: _____
G. Utility Location – Railroad Mile Post: _____ plus _____ ft (Start Railroad Mile Post of Segment if Longitudinal)	
H. Utility Location – Railroad Mile Post: _____ plus _____ ft (End Railroad Mile Post of Segment if Longitudinal)	
I. Latitude: _____ °, Longitude: _____ °	

Name of Submitter

Signature

Telephone #

Date

**INITIAL NOTIFICATION OF INTENT TO CONSTRUCT UTILITY CROSSING/ENCROACHMENT
 WIRE/FIBER/CABLE CONSTRUCTION INFORMATION**

4. Indicate Type of Utility/Facility A. Power Line _____ B. Telephone _____ • Fiber Optic _____ • Copper Pair _____ C. Cable TV _____ • Fiber Optic _____ • Coaxial _____ D. Other _____	5. Desired Method of Installation/Construction A. Underground _____ B. Overhead _____ C. Crossing _____ D. Longitudinal _____ E. Copper Pairs _____ • # of Wires _____ F. Fiber Optic _____ • # of Strands _____ G. Other _____
6. Wire/Cable Data A. Number of Poles/Towers on Property _____ B. Number of Guys/Anchors on Property _____ C. Cross arm Overhang _____ ft D. Maximum Voltage _____ E. Number of Wires/Cables/Pairs/Strands (circle one) _____ F. Depth of Top of Wire/Cable/Casing below base of Rail or Top of Ground _____ ft G. Clearance Over Railroad Company's Wires _____ ft H. Clearance Over Railroad Company's Tracks _____ ft I. Casing Length (Property Line to Property Line) _____ ft J. Size & Kind of Pipe or Duct _____ K. Method: How is Pipe or Duct to be installed under the track (dry bore & jack, directional, tunnel, other – specify) _____ L. Size and Type of Wire/Cable _____ M. Insulated _____ N. Bare/Open Wire _____ O. Stranded _____ P. Solid _____ Q. Angle of Crossing _____ R. Length of Span Crossing Tracks (unsupported length if above tracks) _____ ft	
7. Location References and Clearances of Facility (Encroachment) A. Width of Public Road (crossing track) _____ B. Distance From Each Facility (Encroachment) to Center Line of Main Track _____ ft C. Distance From Each Facility (Encroachment) to Center Line of any Adjacent Track _____ ft D. Side Clearance from Railroad Company's Wire to Nearest Pole/Tower _____ ft E. Distance and Direction From Bridge Abutment, Culvert, Switch, Road Crossing, etc. _____ ft	

 Name of Submitter

 Signature

 Telephone #

 Date

INITIAL NOTIFICATION OF INTENT TO CONSTRUCT PIPE CROSSING/ENCROACHMENT
 PIPE CONSTRUCTION INFORMATION

8. Commodity to be transmitted in pipe: _____
(Steam, air, water, gasoline or other petroleum products, chemical-specify: natural or artificial gas. If sewer, identify as to force or gravity line, sanitary, storm or chemical waste – specify)

9. Pipe Data

	CARRIER PIPE	CASING PIPE
A. Inside Diameter:	_____	_____
B. Outside Diameter:	_____	_____
C. Wall Thickness:	_____	_____
D. Pipe Material:	_____	_____
E. Specification/Grade or class:	_____	_____
F. Min. Yield Point of Material	_____	_____
G. Process of Manufacture	_____	_____
H. Name of Manufacturer	_____	_____
I. Type of Joint	_____	_____
J. Working Pressure	_____	_____
K. Maximum operating pressure (by gauge)		_____ psi
L. Length of Casing pipe:		_____ ft
M. Casing pipe/uncased carrier pipe cathodically protected?		Y / N
N. Hydrostatic pressure carrier pipe test pressure		_____ psi
O. Will casing pipe be vented?		Y / N
P. Pipe Vent Size:		_____ in
Q. Will casing pipe/uncased carrier pipe have a protective coating?		Y / N
R. Protective Coating Type		_____
S. Depth of top of casing or uncased carrier pipe below base of rail or top of ground. _____ ft (Closest point of utility to any base of rail or ground)		
T. Method of installing casing pipe /uncased carrier pipe (Dry bore & jack, directional, tunnel, other – specify)		_____
U. Depth of pipe below the ground. (not beneath tracks)		_____ ft
V. Depth of pipe below ditches.		_____ ft
W. Distance from centerline of track to face of jacking/receiving pits.		_____ ft
X. Depth from base of rail to bottom of jacking /receiving pits.		_____ ft

 Name of Submitter

 Signature

 Telephone #

 Date



INSURANCE REQUIREMENTS

1. By Licensee

Before commencing work, and until this Agreement shall be terminated or the FACILITY shall be removed (whichever date is later), the LICENSEE shall provide and maintain the following insurance in form and amount with companies satisfactory to and as approved by the RAILROAD.

- a. Statutory Workers Compensation and Employer's Liability insurance.
- b. Automobile Liability in an amount not less than \$1,000,000 dollars combined single limit.
- c. Comprehensive General Liability (Occurrence Form) in an amount not less than \$5,000,000 dollars combined single limit, with an aggregate of at least \$10,000,000 dollars. The Policy must name the appropriate RAILROAD as an Additional Insured and must not contain any exclusions related to:
 1. Doing business on, near, or adjacent to railroad facilities.
 2. Loss or damage resulting from surface, subsurface pollution contamination or seepage, or handling, treatment, disposal, or dumping of waste materials or substances.

Before commencing work, the LICENSEE shall deliver to the RAILROAD a certificate of insurance evidencing the foregoing coverage and upon request the LICENSEE shall deliver a certified, true and complete copy of the policy or policies. The policies shall provide for not less than ten (10) days prior written notice to the RAILROAD of cancellation of or any material change in, the policies; and shall contain the waiver of right of subrogation.

It is understood and agreed that the foregoing insurance coverage is not intended to, and shall not, relieve the LICENSEE from or serve to limit LICENSEE's liability under the indemnity provisions of any applicable agreement.

It is further understood and agreed that, so long as the Agreement shall remain in force or the FACILITY shall have been removed (whichever shall be later), the RAILROAD shall have the right, from time to time, to revise the amount or form of insurance coverage provided as circumstances or changing economic conditions may require. The RAILROAD shall give the LICENSEE written notice of any such requested change at least thirty (30) days prior to the date of expiration of the then existing policy or policies; and the LICENSEE agrees to, and shall, thereupon provide the RAILROAD with such revised policy or policies thereof.



INSURANCE REQUIREMENTS

2. By the Licensee's Contractor

If a contractor is to be employed by the Licensee for the installation of the FACILITY, then, before commencing work, the contractor shall provide and maintain the following insurance, in form and amount and with companies satisfactory to, and as approved by, the RAILROAD.

- a. Statutory Workers' Compensation and Employer's Liability insurance.
- b. Automobile Liability in an amount not less than \$1,000,000 dollars combined single limit.
- c. An Occurrence Form Railroad Protective Policy with limits of not less than \$5,000,000 dollars per occurrence for Bodily Injury Liability, Property Damage Liability and Physical Damage to Property with \$10,000,000 dollars aggregate for the term of the policy with respect of Bodily Injury Liability, Property Damage Liability and Physical Damage to Property. The policy must name the appropriate RAILROAD as the insured, and shall provide for not less than ten (10) days prior written notice to the RAILROAD'S as cancellation of, or any material change, in the policy.

FAP Route 771/FAU Route 1453 (22nd Street/Cermak Road)
Project STP-XVU6(771)
Section 2020-266-SUR, SW & TS
DuPage & Cook County
Contract No. 62N39

CN UTILITY CROSSING-ENCROACHMENT APPLICATION

Technical Memorandum



IL 64 @ CN Railroad Coordination

Date:	May 9, 2023	Jacobs Engineering Group
Project name:	IL-64 (North Avenue) Smart Corridor	525 W. Monroe Suite 1600
Project no:	62N40	Chicago IL, 60661
Attention:	Sagar Sonar, Mike Ruelle	www.jacobs.com
Company:	Kimley-Horn	
Prepared by:	Chad Hammett and Annie Alquicira	
Reviewed by:	Brian Manning	
Document no:	Railroad Coordination – CN Railroad	
Revision no:	1	

BACKGROUND

IDOT has initiated a project to make operational improvements along IL 64 (North Avenue) using technology to improve safety and operations along the corridor. As part of the IL-64 (North Avenue) Smart Corridor Project a fiber backbone consisting of two (2) 144 Strand Fiber Optic cables will be installed the length of the 25 miles corridor to connect the traffic signals and ITS devices to the IDOT District 1 Offices. At the far east portion of the corridor the fiber backbone crosses the Canadian National (CN) Railroad. This technical memorandum summarizes the recommended design approach for installing new conduit through the roadway easement under the CN bridge.

Canadian National Railway (016-0500, 016-1126)

Roadway Station / Location	380+85 West of IL 171/1st Avenue
IL-64 on RR Easement?	Per Cook County Assessor IDOT North Avenue crosses CN ROW with an easement
Length of Conduit on CN ROW / IDOT Easement	75 feet 132,000 feet (25 Miles)
Length of Conduit Project	
Existing IDOT Interconnect / Status	YES - 24 Hybrid (12 SM/12MM) FO Cable in 2" Galvanized Steel Conduit (GSC). / Conduit and interconnect cable will be removed.
Proposed Conduit	Install 2" HDPE Microduct within a 4" GSC encasement using trench and backfill under the safety walk. The safety walk is within the IL-64 (North Avenue) easement.

Description of Work

The spread footing for the bridge extends under the safety walk (2' wide concrete walk between bridge pier and back of curb), curb and gutter, and portion of northern most lane of IL-64 North Avenue. The spread footing is between 18 and 30 inches below the finished grade of the safety walk, with the minimum spacing located at the east end of the bridge pier.

To avoid any impacts to the structure the safety walk will be removed using mechanical hand tools.

Contractor will remove fill exposing the existing traffic signal interconnect cable and top of spread footing. Existing traffic signal interconnect cable and conduit will be removed.

The Proposed GSC conduit will be installed on 6 inches of backfill above top of spread footing. The remaining trench will be backfilled and 4" concrete safety wall will be replaced. Conduit will transition back to 30" – 42" depth outside CN ROW. Proposed Vaults/Heavy Duty handholes used to pull fiber will be located on IDOT ROW at a distance of 40' or more.

Installation of the New Conduit is expected to take 20 working days (4 weeks).

Technical Memorandum

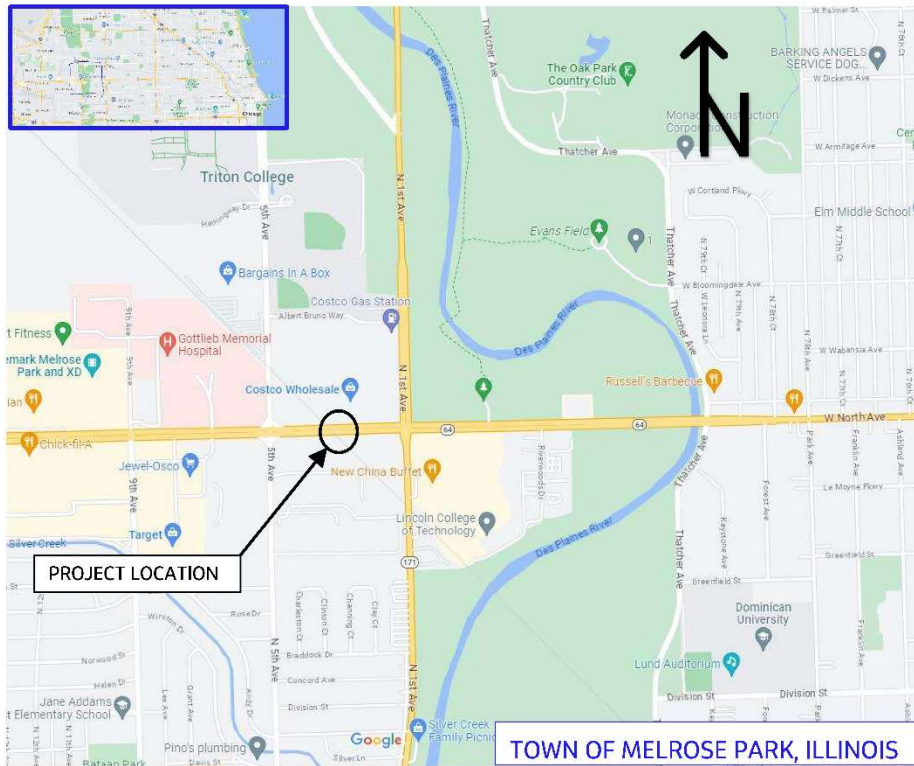


Figure 1 – Location Map



Figure 2 – Existing NS Bridge (Looking West)

Technical Memorandum

**ATTACHMENT 1 – CN INITIAL NOTIFICATION OF INTENT TO CONSTRUCT UTILITY
CROSSING/ENCROACHMENT**

INITIAL NOTIFICATION OF INTENT TO CONSTRUCT UTILITY CROSSING/ENCROACHMENT

Complete this form and return it along with a non-refundable preparation fee of \$1350 made out to CN.

Date: 5/12/2023

1. Owner/Applicant Information	
A. Name:	<u>Illinois Department of Transportation</u>
B. Address:	<u>201 West Center Court Schaumburg, IL 60196-1096</u>
C. Authorized Representative:	<u>Andy Rabadi, P.E.</u>
D. Title:	<u>Railroad Engineer</u>
E. Phone Number:	<u>847 - 705 - 4248</u>
F. Fax Number:	<u></u>
G. Email Address:	<u>Andy.Rabadi@illinois.gov</u>
2. Engineer/Consultant Information	
A. Name:	<u>Jacobs Engineering</u>
B. Address:	<u>525 W Monroe Ave #1600</u>
C. Authorized Representative:	<u>Chad Hammerl, P.E., PTOE</u>
D. Title:	<u>Group Leader, Advanced Mobility</u>
E. Phone Number:	<u>312 - 251 - 3000</u>
F. Fax Number:	<u></u>
G. Email Address:	<u>Chad.Hammerl@jacobs.com</u>
3. Location Description (Attach a Copy of a Sketch Showing Location)	
A.	<u>SouthEast</u> ¼ <u>SouthWest</u> ¼ Sec. <u>35</u> , Township <u>40</u> , Range <u>12</u>
B.	Nearest Public Road Crossing Name: <u>IL-64 North Ave</u>
C.	Nearest Public Road Crossing DOT Number: <u>689629F</u> (Number on Blue Sign at Crossing, e.g. 123456L)
D.	City / Village / Township: <u>Melrose Park</u> (Circle One)
E.	County: <u>Cook</u>
F.	State: <u>IL</u>
G.	Utility Location – Railroad Mile Post: <u>13</u> plus <u>1,320</u> ft (Start Railroad Mile Post of Segment if Longitudinal)
H.	Utility Location – Railroad Mile Post: <u></u> plus <u></u> ft (End Railroad Mile Post of Segment if Longitudinal)
I.	Latitude: <u>41.908330</u> °, Longitude: <u>87.837770</u> °

Chad R. Hammerl

Name of Submitter

Chad R. Hammerl
Signature

(312) 251-3000

Telephone #

6/2/2023

Date

INITIAL NOTIFICATION OF INTENT TO CONSTRUCT UTILITY CROSSING/ENCROACHMENT
 WIRE/FIBER/CABLE CONSTRUCTION INFORMATION

4. Indicate Type of Utility/Facility A. Power Line _____ B. Telephone _____ • Fiber Optic <u>X</u> _____ • Copper Pair _____ C. Cable TV _____ • Fiber Optic _____ • Coaxial _____ D. Other _____	5. Desired Method of Installation/Construction A. Underground <u>X - Trench and Backfill</u> B. Overhead _____ C. Crossing <u>X</u> _____ D. Longitudinal _____ E. Copper Pairs _____ • # of Wires _____ F. Fiber Optic <u>Quantity 2</u> • # of Strands <u>(144 Strand Fiber Optic Cables)</u> G. Other _____
6. Wire/Cable Data A. Number of Poles/Towers on Property <u>None</u> B. Number of Guys/Anchors on Property <u>None</u> C. Cross arm Overhang <u>None</u> ft D. Maximum Voltage <u>None</u> E. Number of Wires/Cables/Pairs/Strands (circle one) <u>2 (144 Strand Fiber Optic Cables)</u> F. Depth of Top of Wire/Cable/Casing below base of Rail or Top of Ground <u>2</u> ft G. Clearance Over Railroad Company's Wires <u>None</u> ft H. Clearance Over Railroad Company's Tracks <u>None</u> ft I. Casing Length (Property Line to Property Line) <u>98</u> ft J. Size & Kind of Pipe or Duct <u>2" Microduct within a 4" Galvanized Steel Conduit</u> K. Method: How is Pipe or Duct to be installed under the track (dry bore & jack, directional, tunnel, other – specify) <u>Trench and Backfill</u> L. Size and Type of Wire/Cable <u>Two (2)-144SM Fiber Optic Cables</u> M. Insulated <u>No</u> N. Bare/Open Wire <u>No</u> O. Stranded <u>Yes, (2) 144SM Fiber Optic Cables</u> P. Solid <u>No</u> Q. Angle of Crossing <u>30 degrees</u> R. Length of Span Crossing Tracks (unsupported length if above tracks) <u>N/A</u> ft	
7. Location References and Clearances of Facility (Encroachment) A. Width of Public Road (crossing track) <u>120 feet</u> B. Distance From Each Facility (Encroachment) to Center Line of Main Track <u>N/A</u> ft C. Distance From Each Facility (Encroachment) to Center Line of any Adjacent Track <u>N/A</u> ft D. Side Clearance from Railroad Company's Wire to Nearest Pole/Tower <u>N/A</u> ft E. Distance and Direction From Bridge Abutment, Culvert, Switch, Road Crossing, etc. <u>from face pier 3 ft</u>	

Chad R. Hammerl

Name of Submitter



Signature

(312) 251-3000

Telephone #

6/2/2023

Date

INITIAL NOTIFICATION OF INTENT TO CONSTRUCT PIPE CROSSING/ENCROACHMENT
 PIPE CONSTRUCTION INFORMATION

8. Commodity to be transmitted in pipe: N/A

(Steam, air, water, gasoline or other petroleum products, chemical-specify: natural or artificial gas. If sewer, identify as to force or gravity line, sanitary, storm or chemical waste – specify)

9. Pipe Data

	CARRIER PIPE	CASING PIPE
A. Inside Diameter:	<u>1.68 IN.</u>	<u>4.33 IN.</u>
B. Outside Diameter:	<u>1.93 IN.</u>	<u>4.50 IN.</u>
C. Wall Thickness:	<u>0.10 IN.</u>	<u>0.34 IN.</u>
D. Pipe Material:	<u>HDPE</u>	<u>GALV. STEEL</u>
E. Specification/Grade or class:	<u>N/A</u>	<u>SCH. 80</u>
F. Min. Yield Point of Material	<u>N/A</u>	<u>30,000 PSI</u>
G. Process of Manufacture	<u>N/A</u>	<u>30,000 PSI</u>
H. Name of Manufacturer	<u>TBD</u>	<u>TBD</u>
I. Type of Joint	<u>NOT JOINTED</u>	<u>GALV. COUPLING</u>
J. Working Pressure	<u>N/A</u>	<u>30,000 PSI</u>
K. Maximum operating pressure (by gauge)		<u>30,000</u> psi
L. Length of Casing pipe:		<u>180</u> ft
M. Casing pipe/uncased carrier pipe cathodically protected?		Y / <u>N</u>
N. Hydrostatic pressure carrier pipe test pressure		_____ psi
O. Will casing pipe be vented?		Y / <u>N</u>
P. Pipe Vent Size:		<u>N/A</u> in
Q. Will casing pipe/uncased carrier pipe have a protective coating?		Y / <u>N</u>
R. Protective Coating Type		<u>N/A</u>
S. Depth of top of casing or uncased carrier pipe below base of rail or top of ground. (Closest point of utility to any base of rail or ground)		<u>20</u> ft
T. Method of installing casing pipe /uncased carrier pipe (Dry bore & jack, directional, tunnel, other – specify)		<u>TRENCH AND BACKFILL</u>
U. Depth of pipe below the ground. (not beneath tracks)		<u>VARIES 1.0 TO 1.5</u> ft
V. Depth of pipe below ditches.		<u>N/A</u> ft
W. Distance from centerline of track to face of jacking/receiving pits.		<u>N/A</u> ft
X. Depth from base of rail to bottom of jacking /receiving pits.		<u>N/A</u> ft

Chad R. Hammerl

Name of Submitter


 Signature

(312) 251-3000

Telephone #

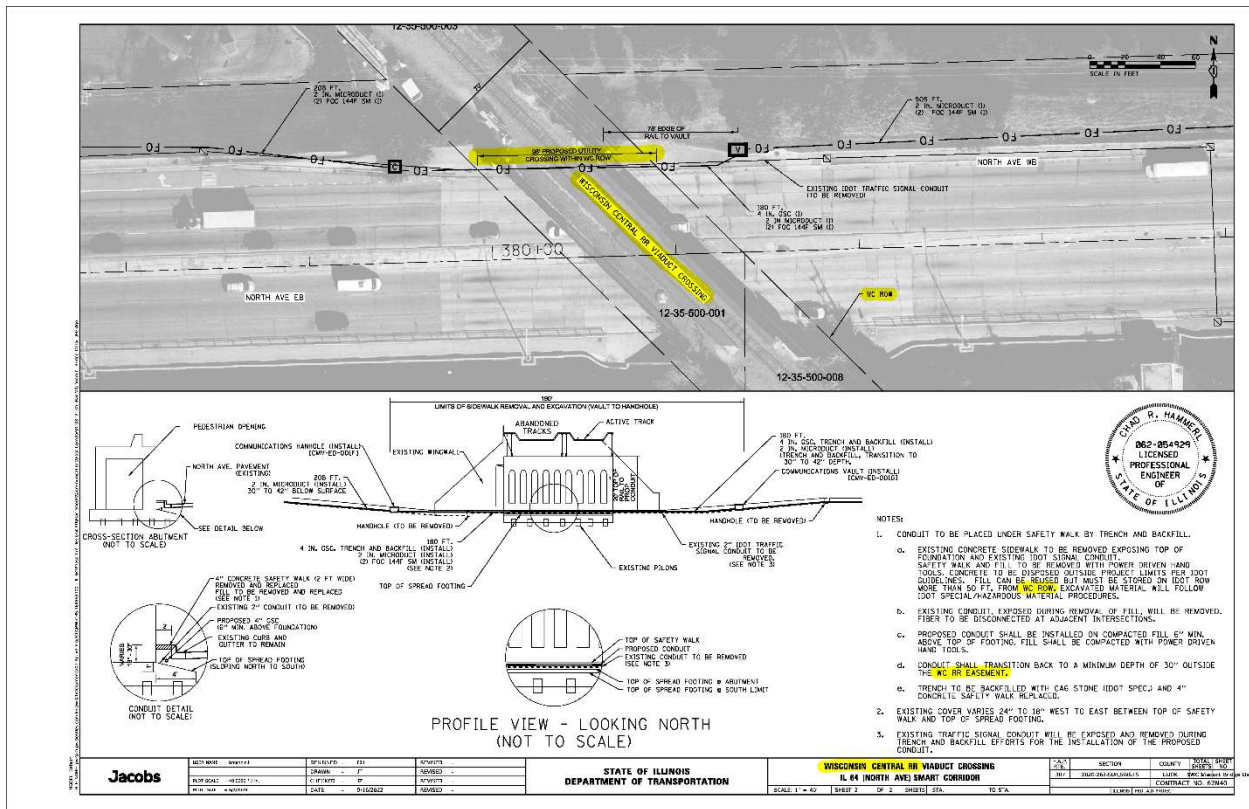
6/2/2023

Date

Technical Memorandum

ATTACHEMENT 2 – PLAN, PROFILE, CROSSECTION OF THE PROPOSED WORK

FAP Route 771/FAU Route 1453 (22nd Street/Cermak Road)
 Project STP-XVU6(771)
 Section 2020-266-SUR, SW & TS
 DuPage & Cook County
 Contract No. 62N39



DRILLED SHAFTS

Effective: October 5, 2015

Revised: October 27, 2023

Revise Section 516 of the Standard Specifications to read:

“SECTION 516. DRILLED SHAFTS

516.01 Description. This work shall consist of constructing drilled shaft foundations.

516.02 Materials. Materials shall be according to the following.

Item	Article/Section
(a) Portland Cement Concrete (Note 1)	1020
(b) Reinforcement Bars.....	1006.10
(c) Grout (Note 2).....	1024.01
(d) Permanent Steel Casing.....	1006.05(d)
(e) Slurry (Note 3)	

Note 1. When the soil contains sulfate contaminates, ASTM C 1580 testing will be performed to assess the severity of sulfate exposure to the concrete. If the sulfate contaminate is >0.10 to < 0.20 percent by mass, a Type II (MH) cement shall be used. If the sulfate contaminate is >0.20 to < 2.0 percent by mass, a Type V cement shall be used. If the sulfate contaminate is \geq 2.0 percent by mass, refer to ACI 201.2R for guidance.

Note 2. The sand-cement grout mix shall be according to Section 1020 and shall be two to five parts sand and one part Type I or II cement. The maximum water cement ratio shall be sufficient to provide a flowable mixture with a typical slump of 10 in. (250 mm).

Note 3. Slurry shall be bentonite, emulsified polymer, or dry polymer, and shall be approved by the Engineer.

516.03 Equipment. Equipment shall be according to the following.

Item	Article/Section
(a) Concrete Equipment	1020.03
(b) Drilling Equipment (Note 1)	
(c) Hand Vibrator	1103.17(a)
(d) Underwater Concrete Placement Equipment	1103.18

Note 1. The drilling equipment shall have adequate capacity, including power, torque and down thrust, to create a shaft excavation of the maximum diameter specified to a depth of 20 percent beyond the depths shown on the plans.

516.04 Submittals. The following information shall be submitted on form BBS 133.

- (a) Qualifications. At the time of the preconstruction conference, the Contractor shall provide the following documentation.
 - (1) References. A list containing at least three projects completed within the three years prior to this project's bid date which the Contractor performing this work has installed drilled shafts of similar diameter, length, and site conditions to those shown in the plans. The list of projects shall contain names and phone numbers of owner's representatives who can verify the Contractor's participation on those projects.
 - (2) Experience. Name and experience record of the drilled shaft supervisor, responsible for all facets of the shaft installation, and the drill operator(s) who will be assigned to this project. The supervisor and operator(s) shall each have a minimum of three years experience in the construction of drilled shafts.
- (b) Installation Procedure. A detailed installation procedure shall be submitted to the Engineer for acceptance at least 28 days prior to drilled shaft construction and shall address each of the following items unless otherwise directed by the Engineer in writing.
 - (1) Equipment List. List of proposed equipment to be used including cranes, drill rigs, augers, belling tools, casing, vibratory hammers, core barrels, bailing buckets, final cleaning equipment, slurry equipment, tremies, or concrete pumps, etc.
 - (2) General Sequence. Details of the overall construction operation sequence, equipment access, and the sequence of individual shaft construction within each substructure bent or footing group. The submittal shall address the Contractor's proposed time delay and/or the minimum concrete strength necessary before initiating a shaft excavation adjacent to a recently installed drilled shaft.
 - (3) Shaft Excavation. A site specific step by step description of how the Contractor anticipates the shaft excavation to be advanced based on their evaluation of the subsurface data and conditions expected to be encountered. This sequence shall note the method of casing advancement, anticipated casing lengths, tip elevations and diameters, the excavation tools used and drilled diameters created. The Contractor shall indicate whether wet or dry drilling conditions are expected and if groundwater will be sealed from the excavation.
 - (4) Slurry. When the use of slurry is proposed, details on the types of additives to be used and their manufacturers shall be provided. In addition, details covering the measurement and control of the hardness of the mixing water, agitation, circulation, de-sanding, sampling, testing, and chemical properties of the slurry shall be submitted.
 - (5) Shaft Cleaning. Method(s) and sequence proposed for the shaft cleaning operation.

- (6) Reinforcement Cage and Permanent Casing. Details of reinforcement placement including rolling spacers to be used and method to maintain proper elevation and location of the reinforcement cage within the shaft excavation during concrete placement. The method(s) of adjusting the reinforcement cage length and permanent casing if rock is encountered at an elevation other than as shown on the plans. As an option, the Contractor may perform soil borings and rock cores at the drilled shaft locations to determine the required reinforcement cage and permanent casing lengths.
- (7) Concrete Placement. Details of concrete placement including proposed operational procedures for free fall, tremie or pumping methods. The sequence and method of casing removal shall also be stated along with the top of pour elevation, and method of forming through water above streambed.
- (8) Mix Design. The proposed concrete mix design(s).
- (9) Disposal Plan. Containment and disposal plan for slurry and displaced water. Containment and disposal plan for contaminated concrete pushed out of the top of the shaft by uncontaminated concrete during concrete placement.
- (10) Access and Site Protection Plan. Details of access to the drilled shafts and safety measures proposed. This shall include a list of casing, scaffolding, work platforms, temporary walkways, railings, and other items needed to provide safe access to the drilled shafts. Provisions to protect open excavations during non-working hours shall be included.

The Engineer will evaluate the drilled shaft installation procedure and notify the Contractor of acceptance, need for additional information, or concerns with the installation's effect on the existing or proposed structure(s).

CONSTRUCTION REQUIREMENTS

516.05 General. Excavation for drilled shaft(s) shall not proceed until written authorization is received from the Engineer. The Contractor shall be responsible for verification of the dimensions and alignment of each shaft excavation as directed by the Engineer.

Unless otherwise approved in the Contractor's installation procedure, no shaft excavation, casing installation, or casing removal with a vibratory hammer shall be made within four shaft diameters center to center of a shaft with concrete that has a compressive strength less than 1500 psi (10,300 kPa). The site-specific soil strengths and installation methods selected will determine the actual required minimum spacing, if any, to address vibration and blow out concerns.

Lost tools shall not remain in the shaft excavation without the approval of the Engineer.

Blasting shall not be used as a method of shaft excavation.

516.06 Shaft Excavation Protection Methods. The construction of drilled shafts may involve the use of one or more of the following methods to support the excavation during the various phases of shaft excavation, cleaning, and concrete placement dependent on the site conditions encountered. Surface water shall not flow uncontrolled into the shaft excavation, however water may be placed into the shaft excavation in order to meet head pressure requirements according to Articles 516.06(c) and 516.13.

The following are general descriptions indicating the conditions when these methods may be used.

- (a) Dry Method. The dry construction method shall only be used at sites where the groundwater and soil conditions are suitable to permit the drilling and dewatering of the excavation without causing subsidence of adjacent ground, boiling of the base soils, squeezing, or caving of the shaft side walls. The dry method shall consist of drilling the shaft excavation, removing accumulated water, cleaning the shaft base, and placing the reinforcement cage and concrete in a predominately dry excavation.

Slurry Method. The slurry construction method may be used at sites where dewatering the excavation would cause collapse of the shaft sidewalls or when the volume and head of water flowing into the shaft is likely to contaminate the concrete during placement resulting in a shaft defect. This method uses slurry, or in rare cases water, to maintain stability of the shaft sidewall while advancing the shaft excavation. After the shaft excavation is completed, the slurry level in the shaft shall be kept at an elevation to maintain stability of the shaft sidewall, maintain stability of the shaft base, and prevent additional groundwater from entering the shaft. The shaft base shall be cleaned, the reinforcement cage shall be set, and the concrete shall be discharged at the bottom of the shaft excavation, displacing the slurry upwards.

- (b) Temporary Casing Method. Temporary casing shall be used when either the dry or slurry methods provide inadequate support to prevent sidewall caving or excessive deformation of the shaft excavation. Temporary casing may be used with slurry or be used to reduce the flow of water into the excavation to allow dewatering and concrete placement in a dry shaft excavation. Temporary casing shall not be allowed to remain permanently without the approval of the Engineer.

During removal of the temporary casing, the level of concrete in the casing shall be maintained at a level such that the head pressure inside the casing is a minimum of 1.25 times the head pressure outside the casing, but in no case is less than 5 ft (1.5 m) above the bottom of the casing. Casing removal shall be at a slow, uniform rate with the pull in line with the shaft axis. Excessive rotation of the casing shall be avoided to limit deformation of the reinforcement cage. In addition, the slump requirements during casing removal shall be according to Article 516.12.

When called for on the plans, the Contractor shall install a permanent casing as specified. Permanent casing may be used as a shaft excavation support method or may be installed after shaft excavation is completed using one of the above methods. After construction, if voids are present between the permanent casing and the drilled excavation, the voids shall be filled with grout by means of tremie(s) or concrete pump which shall be lowered to the bottom of the excavation. The contractor's means and methods for grout placement shall fill the annular void(s) between the permanent casing and the surrounding earth material to restore and provide lateral earth resistance to the shaft. Grout yield checks shall be performed by the contractor for submittal to the Engineer. Permanent casing shall not remain in place beyond the limits shown on the plans without the specific approval of the Engineer.

When the shaft extends above the streambed through a body of water and permanent casing is not shown, the portion above the streambed shall be formed with removable casings, column forms, or other forming systems as approved by the Engineer. The forming system shall not scar or spall the finished concrete or leave in place any forms or casing within the removable form limits as shown on the plans unless approved as part of the installation procedure. The forming system shall not be removed until the concrete has attained a minimum compressive strength of 2500 psi (17,200 kPa) and cured for a minimum of 72 hours. For shafts extending through water, the concrete shall be protected from water action after placement for a minimum of seven days.

516.07 Slurry. When slurry is used, the Contractor shall provide a technical representative of the slurry additive manufacturer at the site prior to introduction of the slurry into the first shaft where slurry will be used, and during drilling and completion of a minimum of one shaft to adjust the slurry mix to the specific site conditions. During construction, the level of the slurry shall be maintained a minimum of 5 feet (1.5 m) above the height required to prevent caving of the shaft excavation. In the event of a sudden or significant loss of slurry in the shaft excavation, the construction of that foundation shall be stopped and the shaft excavation backfilled or supported by temporary casing, until a method to stop slurry loss, or an alternate construction procedure, has been approved by the Engineer.

- (a) General Properties. The material used to make the slurry shall not be detrimental to the concrete or surrounding ground. Mineral slurries shall have both a mineral grain size that remains in suspension and sufficient viscosity and gel characteristics to transport excavated material to a suitable screening system. Polymer slurries shall have sufficient viscosity and gel characteristics to transport excavated material to suitable screening systems or settling tanks. The percentage and specific gravity of the material used to make the slurry shall be sufficient to maintain the stability of the excavation and to allow proper concrete placement.

If approved by the Engineer, the Contractor may use water and excavated soils as drilling slurry. In this case, the range of acceptable values for density, viscosity and pH, as shown in the following table for bentonite slurry shall be met.

When water is used as the slurry to construct rock sockets in limestone, dolomite, sandstone or other formations that are not erodible, the requirements for slurry testing shall not apply if the entire fluid column is replaced with fresh water after drilling. To do so, fresh water shall be introduced at the top of the shaft excavation and existing water used during drilling shall be pumped out of the shaft excavation from the bottom of the shaft excavation until the entire volume of fluid has been replaced.

- (b) Preparation. Prior to introduction into the shaft excavation, the manufactured slurry admixture shall be pre-mixed thoroughly with clean, fresh water and for adequate time in accordance with the slurry admixture manufacturer's recommendations. Slurry tanks of adequate capacity shall be used for slurry mixing, circulation, storage and treatment. No excavated slurry pits will be allowed in lieu of slurry tanks without approval from the Engineer. Adequate desanding equipment shall be provided to control slurry properties during the drilled shaft excavation in accordance with the values provided in Table 1.
- (c) Quality Control. Quality control tests shall be performed on the slurry to determine density, viscosity, sand content and pH of freshly mixed slurry, recycled slurry and slurry in the shaft excavation. Tests of slurry samples from within two feet of the bottom and at mid-height of the shaft excavation shall be conducted in each shaft excavation during the excavation process to measure the consistency of the slurry. A minimum of four sets of tests shall be conducted during the first eight hours of slurry use on the project. When a series of four test results do not change more than 1% from the initial test, the testing frequency may be decreased to one set every four hours of slurry use. Reports of all tests, signed by an authorized representative of the Contractor, shall be furnished to the Engineer upon completion of each drilled shaft. The physical properties of the slurry shall be as shown in Table 1.

The slurry shall be sampled and tested less than 1 hour before concrete placement. Any heavily contaminated slurry that has accumulated at the bottom of the shaft shall be removed. The contractor shall perform final shaft bottom cleaning after suspended solids have settled from the slurry. Concrete shall not be placed if the slurry does not have the required physical properties.

Table 1 – SLURRY PROPERTIES				
	Bentonite	Emulsified Polymer	Dry Polymer	Test Method
Density, lb/cu ft (kg/cu m) (at introduction)	65.2 ± 1.6 ¹ (1043.5 ± 25.6)	63 (1009.0) max.	63 (1009.0) max.	ASTM D 4380
Density, lb/cu ft (kg/cu m) (prior to concrete placement)	67.0 ± 3.5 ¹ (1073.0 ± 56.0)	63 (1009.0) max.	63 (1009.0) max.	ASTM D 4380
Viscosity ² , sec/qt (sec/L)	46 ± 14 (48 ± 14)	38 ± 5 (40 ± 5)	65 ± 15 (69 ± 16)	ASTM D 6910
pH	9.0 ± 1.0	9.5 ± 1.5	9.0 ± 2.0	ASTM D 4972
Sand Content, percent by volume (at introduction)	4 max.	1 max.	1 max.	ASTM D 4381
Sand Content, percent by volume (prior to concrete placement)	10 max.	1 max.	1 max.	ASTM D 4381
Contact Time ³ , hours	4 max.	72 max.	72 max	

Note 1. When the slurry consists of only water and excavated soils, the density shall not exceed 70 lb/cu ft (1121 kg/cu m).

Note 2. Higher viscosities may be required in loose or gravelly sand deposits.

Note 3. Contact time is the time without agitation and sidewall cleaning.

516.08 Obstructions. An obstruction is an unknown isolated object that causes the shaft excavation method to experience a significant decrease in the actual production rate and requires the Contractor to core, break up, push aside, or use other means to mitigate the obstruction. Subsurface conditions such as boulders, cobbles, or logs and buried infrastructure such as footings, piling, or abandoned utilities, when shown on the plans, shall not constitute an obstruction. When an obstruction is encountered, the Contractor shall notify the Engineer immediately and upon concurrence of the Engineer, the Contractor shall mitigate the obstruction with an approved method.

516.09 Top of Rock. The top of rock will be considered as the point where rock, defined as bedded deposits and conglomerate deposits exhibiting the physical characteristics and difficulty of rock removal as determined by the Engineer, is encountered which cannot be drilled with augers and/or underreaming tools configured to be effective in the soils indicated in the contract documents.

516.10 Design Modifications. If the top of rock elevation differs from that shown on the plans by more than 10 percent of the length of the drilled shaft above the rock, the Engineer shall be contacted to determine if any drilled shaft design changes may be required. In addition, if the type of soil or rock encountered is not similar to that shown in the subsurface exploration data, the Contractor may be required to extend the drilled shaft length(s) beyond those specified in the plans. In either case, the Engineer will determine if revisions are necessary and the extent of the modifications required.

516.11 Excavation Cleaning and Inspection. Materials removed or generated from the shaft excavations shall be disposed of according to Article 202.03.

After excavation, each shaft shall be cleaned. For a drilled shaft terminating in soil, the depth of sediment or debris shall be a maximum of 1 1/2 in. (38 mm). For a drilled shaft terminating in rock, the depth of sediment or debris shall be a maximum of 1/2 in. (13 mm).

A shaft excavation shall be overreamed when, in the opinion of the Engineer, the sidewall has softened, swelled, or has a buildup of slurry cake. Overreaming may also be required to correct a shaft excavation which has been drilled out of tolerance. Overreaming may be accomplished with a grooving tool, overreaming bucket, or other approved equipment. Overreaming thickness shall be a minimum of 1/2 in. (13 mm) and a maximum of 3 in. (75 mm).

516.12 Reinforcement. This work shall be according to Section 508 and the following.

The shaft excavation shall be cleaned and inspected prior to placing the reinforcement cage. The reinforcement cage shall be completely assembled prior to drilling and be ready for adjustment in length as required by the conditions encountered. The reinforcement cage shall be lifted using multiple point sling straps or other approved methods to avoid reinforcement cage distortion or stress. Cross frame stiffeners may be required for lifting or to keep the reinforcement cage in proper position during lifting and concrete placement.

The Contractor shall attach rolling spacers to keep the reinforcement cage centered within the shaft excavation during concrete placement and to ensure that at no point will the finished shaft have less than the minimum concrete cover(s) shown on the plans. The rolling spacers or other approved non-corrosive spacing devices shall be installed within 2 ft (0.6 m) of both the top and bottom of the drilled shaft and at intervals not exceeding 10 ft (3 m) throughout the length of the shaft to ensure proper reinforcement cage alignment and clearance for the entire shaft. The number of rolling spacers at each level shall be one for each 1.0 ft (300 mm) of shaft diameter, with a minimum of four rolling spacers at each level. For shafts with different shaft diameters throughout the length of the excavation, different sized rolling spacers shall be provided to ensure the reinforcement cage is properly positioned throughout the entire length of the shaft.

When a specific concrete cover between the base of the drilled shaft and the reinforcement cage is shown on the plans, the bottom of the reinforcement cage shall be supported so that the proper concrete cover is maintained.

If the conditions differ such that the length of the shaft is increased, additional longitudinal bars shall be either mechanically spliced or lap spliced to the lower end of the reinforcement cage and confined with either hoop ties or spirals. The Contractor shall have additional reinforcement available or fabricate the reinforcement cages with additional length as necessary to make the required adjustments in a timely manner as dictated by the encountered conditions. The additional reinforcement may be non-epoxy coated.

516.13 Concrete Placement. Concrete work shall be performed according to the following.

Throughout concrete placement the head pressure inside the drilled shaft shall be at least 1.1 times the head pressure outside the drilled shaft.

Concrete placement shall begin within 1 hour of shaft cleaning and inspection. The pour shall be made in a continuous manner from the bottom to the top elevation of the shaft as shown on the contract plan or as approved in the Contractor's installation procedure. Concrete placement shall continue after the shaft excavation is full and until 18 in. (450 mm) of good quality, uncontaminated concrete is expelled at the top of shaft. Vibration of the concrete will not be allowed when the concrete is displacing slurry or water. In dry excavations, the concrete in the top 10 ft (3 m) of the shaft shall be vibrated.

When using temporary casing or placing concrete under water or slurry, a minimum of seven days prior to concrete placement, a 4 cu yd (3 cu m) trial batch of the concrete mixture shall be performed to evaluate slump retention. Temporary casing shall be withdrawn before the slump of the concrete drops below 6 in. (150 mm). For concrete placed using the slurry method of construction, the slump of all concrete placed shall be a minimum of 6 in. (150 mm) at the end of concrete placement.

Devices used to place concrete shall have no aluminum parts in contact with concrete.

When the top of the shaft is at the finished elevation and no further concrete placement above the finished elevation is specified, the top of the shaft shall be level and finished according to Article 503.15(a).

Concrete shall be placed by free fall, tremie, or concrete pump subject to the following conditions.

- (a) Free Fall Placement. Concrete shall only be placed by free fall when the rate of water infiltration into the shaft excavation is less than 12 in. (300 mm) per hour and the depth of water in the shaft excavation is less than 3 in. (75 mm) at the time of concrete placement.

Concrete placed by free fall shall fall directly to the base without contacting the reinforcement cage, cross frame stiffeners, or shaft sidewall. Drop chutes may be used to direct concrete to the base during free fall placement.

Drop chutes used to direct placement of free fall concrete shall consist of a smooth tube. Concrete may be placed through either a hopper at the top of the tube or side openings as the drop chute is retrieved during concrete placement. The drop chute shall be supported so that free fall does not exceed 60 ft (18.3 m) for conventional concrete or 30 ft (9.1 m) for self-consolidating concrete. If placement cannot be satisfactorily accomplished by free fall in the opinion of the Engineer, either a tremie or pump shall be used to accomplish the pour.

- (b) Tremie and Concrete Pump Placement. Concrete placement shall be according to Article 503.08, except the discharge end of the steel pipe shall remain embedded in the concrete a minimum of 10 ft (3.0 m) throughout concrete placement when displacing slurry or water.

516.14 Construction Tolerances. The following construction tolerances shall apply to all drilled shafts.

- (a) Center of Shaft. The center of the drilled shaft shall be within 3 in. (75 mm) of the plan station and offset at the top of the shaft.
- (b) Center of Reinforcement Cage. The center of the reinforcement cage shall be within 1 1/2 in. (40 mm) of plan station and offset at the top of the shaft.
- (c) Vertical Plumbness of Shaft. The out of vertical plumbness of the shaft shall not exceed 1.5 percent.
- (d) Vertical Plumbness of Reinforcement Cage. The out of vertical plumbness of the shaft reinforcement cage shall not exceed 0.83 percent.
- (e) Top of Shaft. The top of the shaft shall be no more than 1 in. (25 mm) above and no more than 3 in. (75 mm) below the plan elevation.
- (f) Top of Reinforcement Cage. The top of the reinforcement cage shall be no more than 1 in. (25 mm) above and no more than 3 in. (75 mm) below the plan elevation.
- (g) Bottom of shaft. Excavation equipment and methods used to complete the shaft excavation shall have a nearly planar bottom. The cutting edges of excavation equipment used to create the bottom of shafts in rock shall be normal to the vertical axis of the shaft within a tolerance of 6.25 percent.

516.15 Method of Measurement. This work will be measured for payment in place and the volume computed in cubic yards (cubic meters). The volume will be computed using the plan diameter of the shaft multiplied by the measured length of the shaft. The length of shaft in soil will be computed as the difference in elevation between the top of the drilled shaft shown on the plans, or as installed as part of the Contractor's installation procedure, and the bottom of the shaft or the top of rock (when present) whichever is higher. The length of shaft in rock will be computed as the difference in elevation between the measured top of rock and the bottom of the shaft.

When permanent casing is specified, it will be measured for payment in place, in feet (meters). Permanent casing installed at the Contractor's option will not be measured for payment.

Reinforcement furnished and installed will be measured for payment according to Article 508.07.

516.16 Basis of Payment. This work will be paid for at the contract unit price per cubic yard (cubic meter) for DRILLED SHAFT IN SOIL, and/or DRILLED SHAFT IN ROCK.

Permanent casing will be paid for at the contract unit price per foot (meter) for PERMANENT CASING.

Reinforcement furnished and installed will be paid for according to Article 508.08.

Obstruction mitigation will be paid for according to Article 109.04."

CEMENT, FINELY DIVIDED MINERALS, ADMIXTURES; CONCRETE, AND MORTAR (BDE)

Effective: January 1, 2025

Revise the first paragraph of Article 285.05 of the Standard Specifications to read:

"285.05 Fabric Formed Concrete Revetment Mat. The grout shall consist of a mixture of cement, fine aggregate, and water so proportioned and mixed as to provide a pumpable slurry. Fly ash or ground granulated blast furnace (GGBF) slag, and concrete admixtures may be used at the option of the Contractor. The grout shall have an air content of not less than 6.0 percent nor more than 9.0 percent of the volume of the grout. The mix shall obtain a compressive strength of 2500 psi (17,000 kPa) at 28 days according to Article 1020.09."

Revise Article 302.02 of the Standard Specifications to read:

"302.02 Materials. Materials shall be according to the following.

Item	Article/Section
(a) Cement	1001
(b) Water	1002
(c) Hydrated Lime	1012.01
(d) By-Product, Hydrated Lime	1012.02
(e) By-Product, Non-Hydrated Lime	1012.03
(f) Lime Slurry	1012.04
(g) Fly Ash	1010
(h) Soil for Soil Modification (Note 1)	1009.01
(i) Bituminous Materials (Note 2)	1032

Note 1. This soil requirement only applies when modifying with lime (slurry or dry).

Note 2. The bituminous materials used for curing shall be emulsified asphalt RS-2, CRS-2, HFE 90, or HFE 150; rapid curing liquid asphalt RC-70; or medium curing liquid asphalt MC-70 or MC-250.”

Revise Article 312.07(c) of the Standard Specifications to read:

“(c) Cement 1001”

Add Article 312.07(i) of the Standard Specifications to read:

“(i) Ground Granulated Blast Furnace (GGBF) Slag 1010”

Revise the first paragraph of Article 312.09 of the Standard Specifications to read:

“312.09 Proportioning and Mix Design. At least 60 days prior to start of placing CAM II, the Contractor shall submit samples of materials to be used in the work for proportioning and testing. The mixture shall contain a minimum of 200 lb (120 kg) of cement per cubic yard (cubic meter). Cement may be replaced with fly ash or ground granulated blast furnace (GGBF) slag according to Article 1020.05(c)(1) or 1020.05(c)(2), respectively, however the minimum cement content in the mixture shall be 170 lbs/cu yd (101 kg/cu m). Blends of coarse and fine aggregates will be permitted, provided the volume of fine aggregate does not exceed the volume of coarse aggregate. The Engineer will determine the proportions of materials for the mixture according to the “Portland Cement Concrete Level III Technician Course” manual. However, the Contractor may substitute their own mix design. Article 1020.05(a) shall apply, and a Level III PCC Technician shall develop the mix design.”

Revise Article 352.02 of the Standard Specifications to read:

“352.02 Materials. Materials shall be according to the following.

Item	Article/Section
(a) Cement (Note 1)	1001
(b) Soil for Soil-Cement Base Course	1009.03
(c) Water	1002
(d) Bituminous Materials (Note 2)	1032

Note 1. Bulk cement may be used for the traveling mixing plant method if the equipment for handling, weighing, and spreading the cement is approved by the Engineer.

Note 2. The bituminous materials used for curing shall be emulsified asphalt RS-2, CRS-2, HFE 90, or HFE 150; rapid curing liquid asphalt RC-70; or medium curing liquid asphalt MC-70 or MC-250.”

Revise Article 404.02 of the Standard Specifications to read:

“404.02 Materials. Materials shall be according to the following.

Item	Article/Section
(a) Cement	1001
(b) Water	1002
(c) Fine Aggregate	1003.08
(d) Bituminous Material (Tack Coat)	1032.06
(e) Emulsified Asphalts (Note 1) (Note 2)	1032.06
(f) Fiber Modified Joint Sealer	1050.05
(g) Additives (Note 3)	

Note 1. When used for slurry seal, the emulsified asphalt shall be CQS-1h according to Article 1032.06(b).

Note 2. When used for micro-surfacing, the emulsified asphalt shall be CQS-1hP according to Article 1032.06(e).

Note 3. Additives may be added to the emulsion mix or any of the component materials to provide the control of the quick-traffic properties. They shall be included as part of the mix design and be compatible with the other components of the mix.

Revise the last sentence of the fourth paragraph of Article 404.08 of the Standard Specifications to read:

“When approved by the Engineer, the sealant may be dusted with fine sand, cement, or mineral filler to prevent tracking.”

Revise Note 2 of Article 516.02 of the Standard Specifications to read:

“Note 2. The sand-cement grout mix shall be according to Section 1020 and shall be a 1:1 blend of sand and cement comprised of a Type I, IL, or II cement at 185 lb/cu yd (110 kg/cu m). The maximum water cement ratio shall be sufficient to provide a flowable mixture with a typical slump of 10 in. (250 mm).”

Revise Note 2 of Article 543.02 of the Standard Specifications to read:

“Note 2. The grout mixture shall be 6.50 hundredweight/cu yd (385 kg/cu m) of cement plus fine aggregate and water. Fly ash or ground granulated blast furnace (GGBF) slag may replace a maximum of 5.25 hundredweight/cu yd (310 kg/cu m) of the cement. The water/cement ratio, according to Article 1020.06, shall not exceed 0.60. An air-entraining admixture shall be used to produce an air content, according to Article 1020.08, of not less than 6.0 percent nor more than 9.0 percent of the volume of the grout. The Contractor shall have the option to use a water-reducing or high range water-reducing admixture.”

Revise Article 583.01 of the Standard Specifications to read:

“583.01 Description. This work shall consist of placing cement mortar along precast, prestressed concrete bridge deck beams as required for fairing out any unevenness between adjacent deck beams prior to placing of waterproofing membrane and surfacing.”

Revise Article 583.02(a) of the Standard Specifications to read:

“(a) Cement1001”

Revise the first paragraph of Article 583.03 of the Standard Specifications to read:

“ 583.03 General. This work shall only be performed when the air temperature is 45 °F (7 °C) and rising. The mixture for cement mortar shall consist of three parts sand to one part cement by volume. The amount of water shall be no more than that necessary to produce a workable, plastic mortar.”

Revise Note 2/ in Article 1003.01(b) of the Standard Specifications to read:

“2/ Applies only to sand. Sand exceeding the colorimetric test standard of 11 (Illinois Modified AASHTO T 21) will be checked for mortar making properties according to Illinois Modified ASTM C 87 and shall develop a compressive strength at the age of 14 days when using Type I, IL, or II cement of not less than 95 percent of the comparable standard.

Revise the second sentence of Article 1003.02(e)(1) of the Standard Specifications to read:

“The test will be performed with Type I, IL, or II portland cement having a total equivalent alkali content ($\text{Na}_2\text{O} + 0.658\text{K}_2\text{O}$) of 0.90 percent or greater.”

Revise the first sentence of the second paragraph of Article 1003.02(e)(3) of the Standard Specifications to read:

“The ASTM C 1293 test shall be performed with Type I, IL, or II portland cement having a total equivalent alkali content ($\text{Na}_2\text{O} + 0.658\text{K}_2\text{O}$) of 0.80 percent or greater.”

Revise the second sentence of Article 1004.02(g)(1) of the Standard Specifications to read:

“The test will be performed with Type I, IL, or II portland cement having a total equivalent alkali content ($\text{Na}_2\text{O} + 0.658\text{K}_2\text{O}$) of 0.90 percent or greater.”

Revise Article 1017.01 of the Standard Specifications to read:

“1017.01 Requirements. The mortar shall be high-strength according to ASTM C 387 and shall have a minimum 80.0 percent relative dynamic modulus of elasticity when tested by the Department according to Illinois Modified AASHTO T 161 or AASHTO T 161 when tested by an independent lab. The high-strength mortar shall have a water-soluble chloride ion content of less than 0.40 lb/cu yd (0.24 kg/cu m). The test shall be performed according to ASTM C 1218, and the high-strength mortar shall have an age of 28 to 42 days at the time of test. The ASTM C 1218 test shall be performed by an independent lab a minimum of once every five years, and the test results shall be provided to the Department. Mixing of the high-strength mortar shall be according to the manufacturer’s specifications. The Department will maintain a qualified product list.”

Revise the fourth sentence of Article 1018.01 of the Standard Specifications to read:

“The ASTM C 1218 test shall be performed by an independent lab a minimum of once every five years, and the test results shall be provided to the Department.”

Revise Article 1019.02 of the Standard Specifications to read:

“1019.02 Materials. Materials shall be according to the following.

Item	Article/Section
(a) Cement	1001
(b) Water	1002
(c) Fine Aggregate for Controlled Low-Strength Material (CLSM)	1003.06
(d) Fly Ash	1010
(e) Ground Granulated Blast Furnace (GGBF) Slag.....	1010
(f) Admixtures (Note 1)	

Note 1. The air-entraining admixture may be in powder or liquid form. Prior to approval, a CLSM air-entraining admixture will be evaluated by the Department. The admixture shall be able to meet the air content requirements of Mix 2. The Department will maintain a qualified product list.”

Revise Article 1019.05 of the Standard Specifications to read:

“1019.05 Department Mix Design. The Department mix design shall be Mix 1, 2, or 3 and shall be proportioned to yield approximately one cubic yard (cubic meter).

Mix 1	
Cement	50 lb (30 kg)
Fly Ash – Class C or F, and/or GGBF Slag	125 lb (74 kg)
Fine Aggregate – Saturated Surface Dry	2900 lb (1720 kg)
Water	50-65 gal (248-322 L)
Air Content	No air is entrained

Mix 2	
Cement	125 lb (74 kg)
Fine Aggregate – Saturated Surface Dry	2500 lb (1483 kg)
Water	35-50 gal (173-248 L)
Air Content	15-25 %

Mix 3	
Cement	40 lb (24 kg)
Fly Ash – Class C or F, and/or GGBF Slag	125 lb (74 kg)
Fine Aggregate – Saturated Surface Dry	2500 lb (1483 kg)
Water	35-50 gal (179-248 L)
Air Content	15-25 %

Revise Article 1020.04, Table 1, Note (8) of the Standard Specifications to read:

“(8) In addition to the Type III portland cement, 100 lb/cu yd of ground granulated blast-furnace slag and 50 lb/cu yd of microsilica (silica fume) shall be used. For an air temperature greater than 85 °F, the Type III portland cement may be replaced with Type I, IL, or II portland cement.”

Revise Article 1020.04, Table 1 (Metric), Note (8) of the Standard Specifications to read:

“(8) In addition to the Type III portland cement, 60 kg/cu m of ground granulated blast-furnace slag and 30 kg/cu m of microsilica (silica fume) shall be used. For an air temperature greater than 30 °C, the Type III portland cement may be replaced with Type I, IL, or II portland cement.”

Revise the second paragraph of Article 1020.05(a) of the Standard Specifications to read:

“For a mix design using a portland-pozzolan cement, portland blast-furnace slag cement, portland-limestone cement, or replacing portland cement with finely divided minerals per Articles 1020.05(c) and 1020.05(d), the Contractor may submit a mix design with a minimum portland cement content less than 400 lbs/cu yd (237 kg/cu m), but not less than 375 lbs/cu yd (222 kg/cu m), if the mix design is shown to have a minimum relative dynamic modulus of elasticity of 80 percent determined according to AASHTO T 161. Testing shall be performed by an independent laboratory accredited by AASHTO re:source for Portland Cement Concrete.”

Revise the first sentence of the first paragraph of Article 1020.05(b) of the Standard Specifications to read:

“Corrosion inhibitors and concrete admixtures shall be according to the qualified product lists.”

Delete the fourth and fifth sentences of the second paragraph of Article 1020.05(b) of the Standard Specifications.

Revise the third sentence of the second paragraph of Article 1020.05(b)(5) of the Standard Specifications to read:

“The qualified product lists of concrete admixtures shall not apply.”

Revise second paragraph of Article 1020.05(b)(10) of the Standard Specifications to read:

“When calcium nitrite is used, it shall be added at the rate of 4 gal/cu yd (20 L/cu m) and shall be added to the mix immediately after all compatible admixtures have been introduced to the batch. Other corrosion inhibitors shall be added per the manufacturer’s specifications.”

Delete the third paragraph of Article 1020.05(b)(10) of the Standard Specifications.

Revise Article 1020.15(b)(1)c. of the Standard Specifications to read:

“c. The minimum portland cement content in the mixture shall be 375 lbs/cu yd (222 kg/cu m). When the total of organic processing additions, inorganic processing additions, and limestone addition exceed 5.0 percent in the cement, the minimum portland cement content in the mixture shall be 400 lbs/cu yd (237 kg/cu m). For a drilled shaft, foundation, footing, or substructure, the minimum portland cement may be reduced to as low as 330 lbs/cu yd (196 kg/cu m) if the concrete has adequate freeze/thaw durability. The Contractor shall provide freeze/thaw test results according to AASHTO T 161, and the relative dynamic modulus of elasticity of the mix design shall be a minimum of 80 percent. Testing shall be performed by an independent laboratory accredited by AASHTO re:source for Portland Cement Concrete. Freeze/thaw testing will not be required for concrete that will not be exposed to freezing and thawing conditions as determined by the Engineer.”

Revise Article 1021.01 of the Standard Specifications to read:

“**1021.01 General.** Admixtures shall be furnished in liquid or powder form ready for use. The admixtures shall be delivered in the manufacturer's original containers, bulk tank trucks or such containers or tanks as are acceptable to the Engineer. Delivery shall be accompanied by a ticket which clearly identifies the manufacturer, the date of manufacture, and trade name of the material. Containers shall be readily identifiable as to manufacturer, the date of manufacture, and trade name of the material they contain.

Concrete admixtures shall be on one of the Department's qualified product lists. Unless otherwise noted, admixtures shall have successfully completed and remain current with the AASHTO Product Eval and Audit Concrete Admixture (CADD) testing program. For admixture submittals to the Department; the product brand name, manufacturer name, admixture type or types, an electronic link to the product's technical data sheet, and the NTPEP testing number which contains an electronic link to all test data shall be provided. In addition, a letter shall be submitted certifying that no changes have been made in the formulation of the material since the most current round of tests conducted by AASHTO Product Eval and Audit. After 28 days of testing by AASHTO Product Eval and Audit, air-entraining admixtures may be provisionally approved and used on Departmental projects. For all other admixtures, unless otherwise noted, the time period after which provisionally approved status may be earned is 6 months.

The manufacturer shall include the following in the submittal to the AASHTO Product Eval and Audit CADD testing program: the manufacturing range for specific gravity, the midpoint and manufacturing range for residue by oven drying, and manufacturing range of pH. The submittal shall also include an infrared spectrophotometer trace no more than five years old.

For air-entraining admixtures according to Article 1021.02, the specific gravity allowable manufacturing range established by the manufacturer shall be according to AASHTO M 194. For residue by oven drying and pH, the allowable manufacturing range and test methods shall be according to AASHTO M 194.

For admixtures according to Articles 1021.03, 1021.04, 1021.05, 1021.06, 1021.07, and 1021.08, the pH allowable manufacturing range established by the manufacturer shall be according to ASTM E 70. For specific gravity and residue by oven drying, the allowable manufacturing range and test methods shall be according to AASHTO M 194.

All admixtures, except chloride-based accelerators, shall contain a maximum of 0.3 percent chloride by weight (mass) as determined by an appropriate test method. To verify the test result, the Department will use Illinois Modified AASHTO T 260, Procedure A, Method 1.

Prior to final approval of an admixture, the Engineer reserves the right to request a sample for testing. The test and reference concrete mixtures tested by the Engineer will contain a cement content of 5.65 cwt/cu yd (335 kg/cu m). For freeze-thaw testing, the Department will perform the test according to Illinois Modified AASHTO T 161. The flexural strength test will be performed according to AASHTO T 177. If the Engineer decides to test the admixture, the manufacturer shall submit AASHTO T 197 water content and set time test results on the standard cement used by the Department. The manufacturer may select their lab or an independent lab to perform this testing. The laboratory is not required to be accredited by AASHTO.

Random field samples may be taken by the Department to verify an admixture meets specification. A split sample will be provided to the manufacturer if requested. Admixtures that do not meet specification requirements or an allowable manufacturing range established by the manufacturer shall be replaced with new material."

Revise Article 1021.03 of the Standard Specifications to read:

“1021.03 Retarding and Water-Reducing Admixtures. The admixture shall be according to the following.

- (a) Retarding admixtures shall be according to AASHTO M 194, Type B (retarding) or Type D (water-reducing and retarding).
- (b) Water-reducing admixtures shall be according to AASHTO M 194, Type A.
- (c) High range water-reducing admixtures shall be according to AASHTO M 194, Type F (high range water-reducing) or Type G (high range water-reducing and retarding).”

Revise Article 1021.05 of the Standard Specifications to read:

“1021.05 Self-Consolidating Admixtures. Self-consolidating admixture systems shall consist of either a high range water-reducing admixture only or a high range water-reducing admixture combined with a separate viscosity modifying admixture. The one or two component admixture system shall be capable of producing a concrete that can flow around reinforcement and consolidate under its own weight without additional effort and without segregation.

High range water-reducing admixtures shall be according to AASHTO M 194, Type F.

Viscosity modifying admixtures shall be according to AASHTO M 194, Type S (specific performance).”

Revise Article 1021.06 of the Standard Specifications to read:

“1021.06 Rheology-Controlling Admixture. Rheology-controlling admixtures shall be capable of producing a concrete mixture with a lower yield stress that will consolidate easier for slipform applications used by the Contractor. Rheology-controlling admixtures shall be according to AASHTO M 194, Type S (specific performance).”

Revise Article 1021.07 of the Standard Specifications to read:

“1021.07 Corrosion Inhibitor. The corrosion inhibitor shall be according to one of the following.

- (a) Calcium Nitrite. Corrosion inhibitors shall contain a minimum 30 percent calcium nitrite by weight (mass) of solution and shall comply with either the requirements of AASHTO M 194, Type C (accelerating) or the requirements of ASTM C 1582. The corrosion inhibiting performance requirements of ASTM C 1582 shall not apply.
- (b) Other Materials. The corrosion inhibitor shall be according to ASTM C 1582.

For submittals requiring testing according to ASTM M 194, Type C (accelerating), the admixture shall meet the requirements of the AASHTO Product Eval and Audit CADD testing program according to Article 1021.01.

For submittals requiring testing according to ASTM C 1582, a report prepared by an independent laboratory accredited by AASHTO re:source for portland cement concrete shall be provided. The report shall show the results of physical tests conducted no more than five years prior to the time of submittal, according to applicable specifications. However, ASTM G 109 test information specified in ASTM C 1582 is not required to be from an independent accredited lab. All other information in ASTM C 1582 shall be from an independent accredited lab. Test data and other information required to be submitted to AASHTO Product Eval and Audit according to Article 1021.01, shall instead be submitted directly to the Department.”

Add Article 1021.08 of the Standard Specifications as follows:

“1021.08 Other Specific Performance Admixtures. Other specific performance admixtures shall, at a minimum, be according to AASHTO M 194, Type S (specific performance). The Department also reserves the right to require other testing, as determined by the Engineer, to show evidence of specific performance characteristics.

Initial testing according to AASHTO M 194 may be conducted under the AASHTO Product Eval and Audit CADD testing program according to Article 1021.01, or by an independent laboratory accredited by AASHTO re:source for Portland Cement Concrete. In either case, test data and other information required to be submitted to AASHTO Product Eval and Audit according to Article 1021.01, shall also be submitted directly to the Department. The independent accredited lab report shall show the results of physical tests conducted no more than five years prior to the time of submittal, according to applicable specifications.”

Revise Article 1024.01 of the Standard Specifications to read:

“1024.01 Requirements for Grout. The grout shall be proportioned by dry volume, thoroughly mixed, and shall have a minimum temperature of 50 °F (10 °C). Water shall not exceed the minimum needed for placement and finishing.

Materials for the grout shall be according to the following.

Item	Article/Section
(a) Cement	1001
(b) Water	1002
(c) Fine Aggregate	1003.02
(d) Fly Ash	1010
(e) Ground Granulated Blast Furnace (GGBF) Slag.....	1010
(f) Concrete Admixtures	1021”

Revise Note 1 of Article 1024.02 of the Standard Specifications to read:

“Note 1. Nonshrink grout shall be according to Illinois Modified ASTM C 1107.

The nonshrink grout shall have a water-soluble chloride ion content of less than 0.40 lb/cu yd (0.24 kg/cu m). The test shall be performed according to ASTM C 1218, and the grout shall have an age of 28 to 42 days at the time of test. The ASTM C 1218 test shall be performed by an independent lab a minimum of once every five years, and the test results shall be provided to the Department. Mixing of the nonshrink grout shall be according to the manufacturer's specifications. The Department will maintain a qualified product list.”

Revise Article 1029.02 of the Standard Specifications to read:

“ **1029.02 Materials.** Materials shall be according to the following.

Item	Article/Section
(a) Cement.....	1001
(b) Fly Ash	1010
(c) Ground Granulated Blast Furnace (GGBF) Slag	1010
(d) Water.....	1002
(e) Fine Aggregate.....	1003
(f) Concrete Admixtures	1021
(g) Foaming Agent (Note 1)	

Note 1. The manufacturer shall submit infrared spectrophotometer trace and test results indicating the foaming agent meets the requirements of ASTM C 869 in order to be on the Department's qualified product list. Submitted data/results shall not be more than five years old.”

Revise the second paragraph of Article 1103.03(a)(4) the Standard Specifications to read:

“The dispenser system shall provide a visual indication that the liquid admixture is actually entering the batch, such as via a transparent or translucent section of tubing or by independent check with an integrated secondary metering device. If approved by the Engineer, an alternate indicator may be used for admixtures dosed at rates of 25 oz/cwt (1630 mL/100 kg) or greater, such as accelerating admixtures, corrosion inhibitors, and viscosity modifying admixtures.”

Revise the first two sections of Check Sheet #11 of the Supplemental Specifications and Recurring Special Provisions to read:

“Description. This work shall consist of filling voids beneath rigid and composite pavements with cement grout.

Materials. Materials shall be according to the following Articles of Division 1000 - Materials of the Standard Specifications:

Item	Article/Section
(a) Cement	1001
(b) Water	1002
(c) Fly Ash	1010
(d) Ground Granulated Blast Furnace (GGBF) Slag.....	1010
(e) Admixtures	1021
(f) Packaged Rapid Hardening Mortar or Concrete	1018"

Revise the third paragraph of Materials Note 2 of Check Sheet #28 of the Supplemental Specifications and Recurring Special Provisions to read:

“The Department will maintain a qualified product list of synthetic fibers, which will include the minimum required dosage rate. For the minimum required fiber dosage rate based on the Illinois Modified ASTM C 1609 test, a report prepared by an independent laboratory accredited by AASHTO re:source for Portland Cement Concrete shall be provided. The report shall show results of tests conducted no more than five years prior to the time of submittal.”

COMPENSABLE DELAY COSTS (BDE)

Effective: June 2, 2017

Revised: April 1, 2019

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 according to Article 109.04.

When an extended traffic control 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."

CONSTRUCTION AIR QUALITY – DIESEL RETROFIT (BDE)

Effective: June 1, 2010

Revised: January 1, 2025

The reduction of emissions of particulate matter (PM) for off-road equipment shall be accomplished by installing retrofit emission control devices. The term “equipment” refers to diesel fuel powered devices rated at 50 hp and above, to be used on the jobsite in excess of seven calendar days over the course of the construction period on the jobsite (including rental equipment).

Contractor and subcontractor diesel powered off-road equipment assigned to the contract shall be retrofitted according to the table below.

Horsepower Range	Model Year and Older
50-99	2003
100-299	2002
300-599	2000
600-749	2001
750 and up	2005

The retrofit emission control devices shall achieve a minimum PM emission reduction of 50 percent and shall be:

- a) Included on the U.S. Environmental Protection Agency (USEPA) *Verified Retrofit Technology List* (<https://www.epa.gov/verified-diesel-tech/verified-technologies-list-clean-diesel>), or verified by the California Air Resources Board (CARB) (<http://www.arb.ca.gov/diesel/verdev/vt/cvt.htm>); or
- b) Retrofitted with a non-verified diesel retrofit emission control device if verified retrofit emission control devices are not available for equipment proposed to be used on the project, and if the Contractor has obtained a performance certification from the retrofit device manufacturer that the emission control device provides a minimum PM emission reduction of 50 percent.

Note: Large cranes (Crawler mounted cranes) which are responsible for critical lift operations are exempt from installing retrofit emission control devices if such devices adversely affect equipment operation.

Diesel powered off-road equipment with engine ratings of 50 hp and above, which are unable to be retrofitted with verified emission control devices or if performance certifications are not available which will achieve a minimum 50 percent PM reduction, may be granted a waiver by the Department if documentation is provided showing good faith efforts were made by the Contractor to retrofit the equipment.

Construction shall not proceed until the Contractor submits a certified list of the diesel powered off-road equipment that will be used, and as necessary, retrofitted with emission control devices. The list(s) shall include (1) the equipment number, type, make, Contractor/rental company name; and (2) the emission control devices make, model, USEPA or CARB verification number, or performance certification from the retrofit device manufacturer. Equipment reported as fitted with emissions control devices shall be made available to the Engineer for visual inspection of the device installation, prior to being used on the jobsite.

The Contractor shall submit an updated list of retrofitted off-road construction equipment as retrofitted equipment changes or comes on to the jobsite. The addition or deletion of any diesel powered equipment shall be included on the updated list.

If any diesel powered off-road equipment is found to be in non-compliance with any portion of this special provision, the Engineer will issue the Contractor a diesel retrofit deficiency deduction.

Any costs associated with retrofitting any diesel powered off-road equipment with emission control devices 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. The Contractor's compliance with this notice and any associated regulations shall not be grounds for a claim.

Diesel Retrofit Deficiency Deduction

When the Engineer determines that a diesel retrofit deficiency exists, a daily monetary deduction will be imposed for each calendar day or fraction thereof the deficiency continues to exist. The calendar day(s) will begin when the time period for correction is exceeded and end with the Engineer's written acceptance of the correction. The daily monetary deduction will be \$1,000.00 for each deficiency identified.

The deficiency will be based on lack of diesel retrofit emissions control.

If a Contractor accumulates three diesel retrofit deficiency deductions for the same piece of equipment in a contract period, the Contractor will be shutdown until the deficiency is corrected. Such a shutdown will not be grounds for any extension of the contract time, waiver of penalties, or be grounds for any claim.

DISADVANTAGED BUSINESS ENTERPRISE PARTICIPATION (BDE)

Effective: September 1, 2000

Revised: January 2, 2025

1. OVERVIEW AND GENERAL 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 in accordance with the requirements of 49 CFR Part 26 and listed in the Illinois Unified Certification Program (IL UCP) DBE Directory. Award of the contract is conditioned on meeting the requirements of 49 CFR Part 26, and failure by the Contractor to carry out the requirements of Part 26 is a material breach of the contract and may result in the termination of the contract or such other remedies as the Department deems appropriate.
2. CONTRACTOR ASSURANCE. All assurances set forth in FHWA 1273 are hereby incorporated by reference and will be physically attached to the final contract and all subcontracts.
3. CONTRACT GOAL TO BE ACHIEVED BY THE CONTRACTOR. The Department has determined the work of this contract has subcontracting opportunities that may be suitable for performance by DBE companies and that, in the absence of unlawful discrimination and in an arena of fair and open competition, DBE companies can be expected to perform **15.00%** 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 in accordance with the requirements of 49 CFR 26.53 and SBE Memorandum No. 24-02.
4. IDENTIFICATION OF CERTIFIED DBE. Information about certified DBE Contractors can be found in the Illinois UCP Directory. Bidders can obtain additional information and assistance with identifying DBE-certified companies at the Department's website or by contacting the Department's Bureau of Small Business Enterprises at (217) 785-4611.
5. BIDDING PROCEDURES. Compliance with this Special Provision and SBE Policy Memorandum 24-02 is a material bidding requirement. The following shall be included with the bid.
 - (a) DBE Utilization Plan (form SBE 2026) documenting enough DBE participation has been obtained to meet the goal, or a good faith effort has been made to meet the goal even though the efforts did not succeed in obtaining enough DBE participation to meet the goal.
 - (b) Applicable DBE Participation Statement (form SBE 2023, 2024, and/or 2025) for each DBE firm the bidder has committed to perform the work to achieve the contract goal.

The required forms and documentation shall be submitted as a single .pdf file using the "Integrated Contractor Exchange (iCX)" application within the Department's "EBids System".

The Department will not accept a bid if it does not meet the bidding procedures set forth herein and the bid will be declared non-responsive. A bidder declared non-responsive for failure to meet the bidding procedures will not give rise to an administrative reconsideration. In the event the bid is declared non-responsive, 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.

6. UTILIZATION PLAN EVALUATION. The contract will not be awarded until the Utilization Plan is approved. All information submitted by the bidder must be complete, accurate, and adequately document the bidder has committed to DBE participation sufficient to meet the goal, or that the bidder has made good faith efforts to do so, in the event the bidder cannot meet the goal, in order for the Department to 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 Department determines, based upon the documentation submitted, that the bidder has made a good faith effort to meet the contract goal pursuant to 49 CFR Part 26, Appendix A and the requirements of SBE 2026.

If the Department determines that a good faith effort has not been made, the Department will notify the responsible company official designated in the Utilization Plan of that determination in accordance with SBE Policy Memorandum 24-02.

7. CALCULATING DBE PARTICIPATION. The Utilization Plan values represent work the bidder commits to have performed by the specified DBEs 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 firms. 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 guidelines for counting goal credit are provided in 49 CFR Part 26.55. In evaluating Utilization Plans for award the Department will count goal credit as set forth in Part 26 and in accordance with SBE Policy Memorandum 24-02.

8. CONTRACT COMPLIANCE. The Contractor must utilize the specific DBEs listed to perform the work and supply the materials for which each DBE is listed in the Contractor's approved Utilization Plan, unless the Contractor obtains the Department's written consent to terminate the DBE or any portion of its work. The DBE Utilization Plan approved by SBE is a condition-of-award, and any deviation to that Utilization Plan, the work set forth therein to be performed by DBE firms, or the DBE firms specified to perform that work, must be approved, in writing, by the Department in accordance with federal regulatory requirements. Deviation from the DBE Utilization Plan condition-of-award without such written approval is a violation of the contract and may result in termination of the contract or such other remedy the Department deems appropriate. The following administrative procedures and remedies govern the compliance by the Contractor with the contractual obligations established by the Utilization Plan.
- (a) NOTICE OF DBE PERFORMANCE. The Contractor shall provide the Engineer with at least three days advance notice of when all DBE firms are expected to perform the work committed under the Contractor's Utilization Plan.
 - (b) SUBCONTRACT. If awarded the contract, the Contractor is required to enter into written subcontracts with all DBE firms indicated in the approved Utilization Plan and must provide copies of fully executed DBE subcontracts to the Department 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.
 - (c) PAYMENT TO DBE FIRMS. 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 goal has been paid to the DBE. The Contractor shall document and report all payments for work performed by DBE certified firms in accordance with Article 109.11 of the Standard Specifications. All records of payment for work performed by DBE certified firms shall be made available to the Department upon request.
 - (d) FINAL PAYMENT. After the performance of the final item of work or trucking, or delivery of material by a DBE and final payment to the DBE by the Contractor, but not later than 30 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 (form SBE 2115) to the Engineer. 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.
 - (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.

MECHANICALLY STABILIZED EARTH RETAINING WALLS (BDE)

Effective: August 1, 2023

Revise the second sentence of Articles 1003.07(d) and 1004.06(d) of the Standard Specifications to read:

“The Illinois Modified AASHTO T 296 test with pore pressure measurement may be used in lieu of AASHTO T 236.”

Add the following to Article 522.02 of the Standard Specifications:

“(s) Metal Hardware Cast into Concrete..... 1006.13”

PAVEMENT MARKING INSPECTION (BDE)

Effective: April 1, 2025

Revise the second sentence of the first paragraph of Article 780.13 of the Standard Specifications to read:

“In addition, thermoplastic, preformed plastic, epoxy, preformed thermoplastic, polyurea, and modified urethane pavement markings will be inspected following a winter performance period that extends from November 15 to April 1 of the next year.”

PERFORMANCE GRADED ASPHALT BINDER (BDE)

Effective: January 1, 2023

Revise Article 1032.05 of the Standard Specifications to read:

“**1032.05 Performance Graded Asphalt Binder.** These materials will be accepted according to the Bureau of Materials Policy Memorandum, “Performance Graded Asphalt Binder Qualification Procedure.” The Department will maintain a qualified producer list. These materials shall be free from water and shall not foam when heated to any temperature below the actual flash point. Air blown asphalt, recycle engine oil bottoms (ReOB), and polyphosphoric acid (PPA) modification shall not be used.

When requested, producers shall provide the Engineer with viscosity/temperature relationships for the performance graded asphalt binders delivered and incorporated in the work.

- (a) Performance Graded (PG) Asphalt Binder. The asphalt binder shall meet the requirements of AASHTO M 320, Table 1 "Standard Specification for Performance Graded Asphalt Binder" for the grade shown on the plans and the following.

Test	Parameter
Small Strain Parameter (AASHTO PP 113) BBR, ΔT_c , 40 hrs PAV (40 hrs continuous or 2 PAV at 20 hrs)	-5 °C min.

- (b) Modified Performance Graded (PG) Asphalt Binder. The asphalt binder shall meet the requirements of AASHTO M 320, Table 1 "Standard Specification for Performance Graded Asphalt Binder" for the grade shown on the plans.

Asphalt binder modification shall be performed at the source, as defined in the Bureau of Materials Policy Memorandum, "Performance Graded Asphalt Binder Qualification Procedure."

Modified asphalt binder shall be safe to handle at asphalt binder production and storage temperatures or HMA construction temperatures. Safety Data Sheets (SDS) shall be provided for all asphalt modifiers.

- (1) Polymer Modification (SB/SBS or SBR). Elastomers shall be added to the base asphalt binder to achieve the specified performance grade and shall be either a styrene-butadiene diblock, triblock copolymer without oil extension, or a styrene-butadiene rubber. The polymer modified asphalt binder shall be smooth, homogeneous, and be according to the requirements shown in Table 1 or 2 for the grade shown on the plans.

Table 1 - Requirements for Styrene-Butadiene Copolymer (SB/SBS) Modified Asphalt Binders		
Test	Asphalt Grade SB/SBS PG 64-28 SB/SBS PG 70-22	Asphalt Grade SB/SBS PG 64-34 SB/SBS PG 70-28 SB/SBS PG 76-22 SB/SBS PG 76-28
Separation of Polymer ITP, "Separation of Polymer from Asphalt Binder" Difference in °F (°C) of the softening point between top and bottom portions	4 (2) max.	4 (2) max.
TESTS ON RESIDUE FROM ROLLING THIN FILM OVEN TEST (AASHTO T 240)		
Elastic Recovery ASTM D 6084, Procedure A, 77 °F (25 °C), 100 mm elongation, %	60 min.	70 min.

Table 2 - Requirements for Styrene-Butadiene Rubber (SBR) Modified Asphalt Binders		
Test	Asphalt Grade SBR PG 64-28 SBR PG 70-22	Asphalt Grade SB/SBS PG 64-34 SB/SBS PG 70-28 SBR PG 76-22 SBR PG 76-28
Separation of Polymer ITP, "Separation of Polymer from Asphalt Binder" Difference in °F (°C) of the softening point between top and bottom portions	4 (2) max.	4 (2) max.
Toughness ASTM D 5801, 77 °F (25 °C), 20 in./min. (500 mm/min.), in.-lbs (N-m)	110 (12.5) min.	110 (12.5) min.
Tenacity ASTM D 5801, 77 °F (25 °C), 20 in./min. (500 mm/min.), in.-lbs (N-m)	75 (8.5) min.	75 (8.5) min.
TESTS ON RESIDUE FROM ROLLING THIN FILM OVEN TEST (AASHTO T 240)		
Elastic Recovery ASTM D 6084, Procedure A, 77 °F (25 °C), 100 mm elongation, %	40 min.	50 min.

- (2) Ground Tire Rubber (GTR) Modification. GTR modification is the addition of recycled ground tire rubber to liquid asphalt binder to achieve the specified performance grade. GTR shall be produced from processing automobile and/or truck tires by the ambient grinding method or micronizing through a cryogenic process. GTR shall not exceed 1/16 in. (2 mm) in any dimension and shall not contain free metal particles, moisture that would cause foaming of the asphalt, or other foreign materials. A mineral powder (such as talc) meeting the requirements of AASHTO M 17 may be added, up to a maximum of four percent by weight of GTR to reduce sticking and caking of the GTR particles. When tested in accordance with Illinois Modified AASHTO T 27 "Standard Method of Test for Sieve Analysis of Fine and Coarse Aggregates" or AASHTO PP 74 "Standard Practice for Determination of Size and Shape of Glass Beads Used in Traffic Markings by Means of Computerized Optical Method", a 50 g sample of the GTR shall conform to the following gradation requirements.

Sieve Size	Percent Passing
No. 16 (1.18 mm)	100
No. 30 (600 µm)	95 ± 5
No. 50 (300 µm)	> 20

GTR modified asphalt binder shall be tested for rotational viscosity according to AASHTO T 316 using spindle S27. GTR modified asphalt binder shall be tested for original dynamic shear and RTFO dynamic shear according to AASHTO T 315 using a gap of 2 mm.

The GTR modified asphalt binder shall meet the requirements of Table 3.

Table 3 - Requirements for Ground Tire Rubber (GTR) Modified Asphalt Binders		
Test	Asphalt Grade GTR PG 64-28 GTR PG 70-22	Asphalt Grade GTR PG 76-22 GTR PG 76-28 GTR PG 70-28
TESTS ON RESIDUE FROM ROLLING THIN FILM OVEN TEST (AASHTO T 240)		
Elastic Recovery ASTM D 6084, Procedure A, 77 °F (25 °C), 100 mm elongation, %	60 min.	70 min.

- (3) Softener Modification (SM). Softener modification is the addition of organic compounds, such as engineered flux, bio-oil blends, modified vegetable oils, glycol amines, and fatty acid derivatives, to the base asphalt binder to achieve the specified performance grade. Softeners shall be dissolved, dispersed, or reacted in the asphalt binder to enhance its performance and shall remain compatible with the asphalt binder with no separation. Softeners shall not be added to modified PG asphalt binder as defined in Articles 1032.05(b)(1) or 1032.05(b)(2).

An Attenuated Total Reflectance-Fourier Transform Infrared spectrum (ATR-FTIR) shall be collected for both the softening compound as well as the softener modified asphalt binder at the dose intended for qualification. The ATR-FTIR spectra shall be collected on unaged softener modified binder, 20-hour Pressurized Aging Vessel (PAV) aged softener modified binder, and 40-hour PAV aged softener modified binder. The ATR-FTIR shall be collected in accordance with Illinois Test Procedure 601. The electronic files spectral files (in one of the following extensions or equivalent: *.SPA, *.SPG, *.IRD, *.IFG, *.CSV, *.SP, *.IRS, *.GAML, *. [0-9], *.IGM, *.ABS, *.DRT, *.SBM, *.RAS) shall be submitted to the Central Bureau of Materials.

Softener modified asphalt binders shall meet the requirements in Table 4.

Table 4 - Requirements for Softener Modified Asphalt Binders		
Test	Asphalt Grade	
	SM PG 46-28	SM PG 46-34
	SM PG 52-28	SM PG 52-34
	SM PG 58-22	SM PG 58-28
	SM PG 64-22	
Small Strain Parameter (AASHTO PP 113) BBR, ΔT_c , 40 hrs PAV (40 hrs continuous or 2 PAV at 20 hrs)	-5°C min.	
Large Strain Parameter (Illinois Modified AASHTO T 391) DSR/LAS Fatigue Property, $\Delta G^* _{peak}$, 40 hrs PAV (40 hrs continuous or 2 PAV at 20 hrs)	≥ 54 %	

The following grades may be specified as tack coats.

Asphalt Grade	Use
PG 58-22, PG 58-28, PG 64-22	Tack Coat"

Revise Article 1031.06(c)(1) and 1031.06(c)(2) of the Standard Specifications to read:

“(1) RAP/RAS. When RAP is used alone or RAP is used in conjunction with RAS, the percentage of virgin ABR shall not exceed the amounts listed in the following table.

HMA Mixtures - RAP/RAS Maximum ABR % ^{1/ 2/}			
Ndesign	Binder	Surface	Polymer Modified Binder or Surface ^{3/}
30	30	30	10
50	25	15	10
70	15	10	10
90	10	10	10

1/ For Low ESAL HMA shoulder and stabilized subbase, the RAP/RAS ABR shall not exceed 50 percent of the mixture.

2/ When RAP/RAS ABR exceeds 20 percent, the high and low virgin asphalt binder grades shall each be reduced by one grade (i.e. 25 percent ABR would require a virgin asphalt binder grade of PG 64-22 to be reduced to a PG 58-28).

3/ The maximum ABR percentages for ground tire rubber (GTR) modified mixes shall be equivalent to the percentages specified for SBS/SBR polymer modified mixes.

(2) FRAP/RAS. When FRAP is used alone or FRAP is used in conjunction with RAS, the percentage of virgin asphalt binder replacement shall not exceed the amounts listed in the following table.

HMA Mixtures - FRAP/RAS Maximum ABR % ^{1/ 2/}			
Ndesign	Binder	Surface	Polymer Modified Binder or Surface ^{3/}
30	55	45	15
50	45	40	15
70	45	35	15
90	45	35	15
SMA	--	--	25
IL-4.75	--	--	35

- 1/ For Low ESAL HMA shoulder and stabilized subbase, the FRAP/RAS ABR shall not exceed 50 percent of the mixture.
- 2/ When FRAP/RAS ABR exceeds 20 percent for all mixes, the high and low virgin asphalt binder grades shall each be reduced by one grade (i.e. 25 percent ABR would require a virgin asphalt binder grade of PG 64-22 to be reduced to a PG 58-28).
- 3/ The maximum ABR percentages for GTR modified mixes shall be equivalent to the percentages specified for SBS/SBR polymer modified mixes.”

Add the following to the end of Note 2 of Article 1030.03 of the Standard Specifications.

“A dedicated storage tank for the ground tire rubber (GTR) modified asphalt binder shall be provided. This tank shall be capable of providing continuous mechanical mixing throughout and/or recirculation of the asphalt binder to provide a uniform mixture. The tank shall be heated and capable of maintaining the temperature of the asphalt binder at 300 °F to 350 °F (149 °C to 177 °C). The asphalt binder metering systems of dryer drum plants shall be calibrated with the actual GTR modified asphalt binder material with an accuracy of ± 0.40 percent.”

REMOVAL AND DISPOSAL OF REGULATED SUBSTANCES (BDE)

Effective: January 1, 2024

Revised: April 1, 2024

Revise the first paragraph of Article 669.04 of the Standard Specifications to read:

“669.04 Regulated Substances Monitoring. Regulated substances monitoring includes environmental observation and field screening during regulated substances management activities. The excavated soil and groundwater within the work areas shall be managed as either uncontaminated soil, hazardous waste, special waste, or non-special waste.

As part of the regulated substances monitoring, the monitoring personnel shall perform and document the applicable duties listed on form BDE 2732 “Regulated Substances Monitoring Daily Record (RSMDR)”.

Revise the first two sentences of the nineteenth paragraph of Article 669.05 of the Standard Specifications to read:

“The Contractor shall coordinate waste disposal approvals with the disposal facility and provide the specific analytical testing requirements of that facility. The Contractor shall make all arrangements for collection, transportation, and analysis of landfill acceptance testing.”

Revise the last paragraph of Article 669.05 of the Standard Specifications to read:

“The Contractor shall select a permitted landfill facility or CCDD/USFO facility meeting the requirements of 35 Ill. Admin. Code Parts 810-814 or Part 1100, respectively. The Department will review and approve or reject the facility proposed by the Contractor based upon information provided in BDE 2730. The Contractor shall verify whether the selected facility is compliant with those applicable standards as mandated by their permit and whether the 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 use of a Contractor selected facility shall in no manner delay the construction schedule or alter the Contractor's responsibilities as set forth.”

Revise the first paragraph of Article 669.07 of the Standard Specifications to read:

“669.07 Temporary Staging. Soil classified according to Articles 669.05(a)(2), (b)(1), or (c) may be temporarily staged at the Contractor's option. All other soil classified according to Articles 669.05(a)(1), (a)(3), (a)(4), (a)(5), (a)(6), or (b)(2) shall be managed and disposed of without temporary staging to the greatest extent practicable. If circumstances beyond the Contractor's control require temporary staging of these latter materials, the Contractor shall request approval from the Engineer in writing.

Topsoil for re-use as final cover which has been field screened and found not to exhibit PID readings over daily background readings as documented on the BDE 2732, visual staining or odors, and is classified according to Articles 669.05(a)(2), (a)(3), (a)(4), (b)(1), or (c) may be temporarily staged at the Contractor's option.”

Add the following paragraph after the sixth paragraph of Article 669.11 of the Standard Specifications.

“The sampling and testing of effluent water derived from dewatering discharges for priority pollutants volatile organic compounds (VOCs), priority pollutants semi-volatile organic compounds (SVOCs), or priority pollutants metals, will be paid for at the contract unit price per each for VOCS GROUNDWATER ANALYSIS using EPA Method 8260B, SVOCs GROUNDWATER ANALYSIS using EPA Method 8270C, or RCRA METALS GROUNDWATER ANALYSIS using EPA Methods 6010B and 7471A. This price shall include transporting the sample from the job site to the laboratory.”

Revise the first sentence of the eight paragraph of Article 669.11 of the Standard Specifications to read:

“Payment for temporary staging of soil classified according to Articles 669.05(a)(1), (a)(3), (a)(4), (a)(5), (a)(6), or (b)(2) to be managed and disposed of, if required and approved by the Engineer, will be paid according to Article 109.04.”

SHORT TERM AND TEMPORARY PAVEMENT MARKINGS (BDE)

Effective: April 1, 2024

Revised: April 2, 2024

Revise Article 701.02(d) of the Standard Specifications to read:

“(d) Pavement Marking Tapes (Note 3)1095.06”

Add the following Note to the end of Article 701.02 of the Standard Specifications:

“Note 3. White or yellow pavement marking tape that is to remain in place longer than 14 days shall be Type IV tape.”

Revise Article 703.02(c) of the Standard Specifications to read:

“(c) Pavement Marking Tapes (Note 1)1095.06”

Add the following Note to the end of Article 703.02 of the Standard Specifications:

“Note 1. White or yellow pavement marking tape that is to remain in place longer than 14 days shall be Type IV tape.”

Revise Article 1095.06 of the Standard Specifications to read:

“1095.06 Pavement Marking Tapes. Type I white or yellow marking tape shall consist of glass spheres embedded into a binder on a foil backing that is precoated with a pressure sensitive adhesive. The spheres shall be of uniform gradation and distributed evenly over the surface of the tape.

Type IV tape shall consist of white or yellow tape with wet reflective media incorporated to provide immediate and continuing retroreflection in wet and dry conditions. The wet retroreflective media shall be bonded to a durable polyurethane surface. The patterned surface shall have approximately 40 ± 10 percent of the surface area raised and presenting a near vertical face to traffic from any direction. The channels between the raised areas shall be substantially free of exposed reflective elements or particles.

Blackout tape shall consist of a matte black, non-reflective, patterned surface that is precoated with a pressure sensitive adhesive.

- (a) Color. The white and yellow markings shall meet the following requirements for daylight reflectance and color, when tested, using a color spectrophotometer with 45 degrees circumferential/zero degree geometry, illuminant D65, and two degree observer angle. The color instrument shall measure the visible spectrum from 380 to 720 nm with a wavelength measurement interval and spectral bandpass of 10 nm.

Color	Daylight Reflectance %Y
White	65 min.
Yellow *	36 - 59

*Shall match Aerospace Material Specification Standard 595 33538 (Orange Yellow) and the chromaticity limits as follows.

x	0.490	0.475	0.485	0.530
y	0.470	0.438	0.425	0.456

- (b) Retroreflectivity. The white and yellow markings shall be retroreflective. Reflective values measured in accordance with the photometric testing procedure of ASTM D 4061 shall not be less than those listed in the table below. The coefficient of retroreflected luminance, R_L , shall be expressed as average millicandelas/footcandle/sq ft (millicandelas/lux/sq m), measured on a 3.0 x 0.5 ft (900 mm x 150 mm) panel at 86 degree entrance angle.

Coefficient of Retroreflected Luminance, R_L , Dry					
Type I			Type IV		
Observation Angle	White	Yellow	Observation Angle	White	Yellow
0.2°	2700	2400	0.2°	1300	1200
0.5°	2250	2000	0.5°	1100	1000

Wet retroreflectance shall be measured for Type IV under wet conditions according to ASTM E 2177 and meet the following.

Wet Retroreflectance, Initial R_L	
Color	R_L 1.05/88.76
White	300
Yellow	200

- (c) Skid Resistance. The surface of Type IV and blackout markings shall provide a minimum skid resistance of 45 BPN when tested according to ASTM E 303.
- (d) Application. The pavement marking tape shall have a precoated pressure sensitive adhesive and shall require no activation procedures. Test pieces of the tape shall be applied according to the manufacturer's instructions and tested according to ASTM D 1000, Method A, except that a stiff, short bristle roller brush and heavy hand pressure will be substituted for the weighted rubber roller in applying the test pieces to the metal test panel. Material tested as directed above shall show a minimum adhesion value of 750 g/in. (30 g/mm) width at the temperatures specified in ASTM D 1000. The adhesive shall be resistant to oils, acids, solvents, and water, and shall not leave objectionable stains or residue after removal. The material shall be flexible and conformable to the texture of the pavement.

- (e) Durability. Type IV and blackout tape shall be capable of performing for the duration of a normal construction season and shall then be capable of being removed intact or in large sections at pavement temperatures above 40 °F (4 °C) either manually or with a roll-up device without the use of sandblasting, solvents, or grinding. The Contractor shall provide a manufacturer's certification that the material meets the requirements for being removed after the following minimum traffic exposure based on transverse test decks with rolling traffic.

- (1) Time in place - 400 days
- (2) ADT per lane - 9,000 (28 percent trucks)
- (3) Axle hits - 10,000,000 minimum

Samples of the material applied to standard specimen plates will be measured for thickness and tested for durability in accordance with ASTM D 4060, using a CS-17 wheel and 1000-gram load, and shall meet the following criteria showing no significant change in color after being tested for the number of cycles indicated.

Test	Type I	Type IV	Blackout
Minimum Initial Thickness, mils (mm)	20 (0.51)	65 (1.65) ^{1/} 20 (0.51) ^{2/}	65 (1.65) ^{1/} 20 (0.51) ^{2/}
Durability (cycles)	5,000	1,500	1,500

1/ Measured at the thickest point of the patterned surface.

2/ Measured at the thinnest point of the patterned surface.

The pavement marking tape, when applied according to the manufacturer's recommended procedures, shall be weather resistant and shall show no appreciable fading, lifting, or shrinkage during the useful life of the marking. The tape, as applied, shall be of good appearance, free of cracks, and edges shall be true, straight, and unbroken.

- (f) Sampling and Inspection.

- (1) Sample. Prior to approval and use of Type IV pavement marking tape, the manufacturer shall submit a notarized certification from an independent laboratory, together with the results of all tests, stating that the material meets the requirements as set forth herein. The independent laboratory test report shall state the lot tested, the manufacturer's name, and the date of manufacture.

After initial approval by the Department, samples and certification by the manufacturer shall be submitted for each subsequent batch of Type IV tape used. The manufacturer shall submit a certification stating that the material meets the requirements as set forth herein and is essentially identical to the material sent for qualification. The certification shall state the lot tested, the manufacturer's name, and the date of manufacture.

- (2) Inspection. The Contractor shall provide a manufacturer's certification to the Engineer stating the material meets all requirements of this specification. All material samples for acceptance tests shall be taken or witnessed by a representative of the Bureau of Materials and shall be submitted to the Engineer of Materials, 126 East Ash Street, Springfield, Illinois 62704-4766 at least 30 days in advance of the pavement marking operations."

SIGN PANELS AND APPURTENANCES (BDE)

Effective: January 1, 2025

Revised: April 1, 2025

Add Article 720.02(c) of the Standard Specifications to read:

"(c) Aluminum Epoxy Mastic 1008.03"

Revise the second and third paragraphs of Article 720.02 of the Standard Specifications to read:

"The sign mounting support channel shall be manufactured from steel or aluminum and shall be according to Standard 720001.

Steel support channels shall be according to ASTM A 1011 (A 1011M), ASTM A 635 (A 635M), ASTM A 568 (A 568M), or ASTM A 684 (A 684M), and shall be galvanized. Galvanizing shall be according to ASTM A 653 (A 653M) when galvanized before fabrication, and AASHTO M 111 (M 111M) when galvanized after fabrication. Field or post fabricated drilled holes shall be spot painted with one coat of aluminum epoxy mastic paint prior to installation."

Revise the fifth paragraph of Article 720.02 of the Standard Specifications to read:

"The stainless steel banding for mounting signs or sign support channels to light or signal standards shall be according to ASTM A 240 (A 240M) Type 302 stainless steel."

SOURCE OF SUPPLY AND QUALITY REQUIREMENTS (BDE)

Effective: January 2, 2023

Add the following to Article 106.01 of the Standard Specifications:

“The final manufacturing process for construction materials and the immediately preceding manufacturing stage for construction materials shall occur within the United States. Construction materials shall include an article, material, or supply that is or consists primarily of the following.

- (a) Non-ferrous metals;
- (b) Plastic and polymer-based products (including polyvinylchloride, composite building materials, and polymers used in fiber optic cables);
- (c) Glass (including optic glass);
- (d) Lumber;
- (e) Drywall.

Items consisting of two or more of the listed construction materials that have been combined through a manufacturing process, and items including at least one of the listed materials combined with a material that is not listed through a manufacturing process shall be exempt.”

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

Revised: April 1, 2019

Replace the second paragraph of Article 109.12 of the Standard Specifications with the following:

“This mobilization payment shall be made at least seven 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%”

SUBMISSION OF BIDDERS LIST INFORMATION (BDE)

Effective: January 2, 2025

Revised: March 2, 2025

In accordance with 49 CFR 26.11(c) all DBE and non-DBEs who bid as prime contractors and subcontractors shall provide bidders list information, including all DBE and non-DBE firms from whom the bidder has received a quote or bid to work as a subcontractor, whether or not the bidder has relied upon that bid in placing its bid as the prime contractor.

The bidders list information shall be submitted with the bid using the link provided within the “Integrated Contractor Exchange (iCX)” application of the Department’s “EBids System”.

SUBMISSION OF PAYROLL RECORDS (BDE)

Effective: April 1, 2021

Revised: November 2, 2023

FEDERAL AID CONTRACTS. Revise the following section of Check Sheet #1 of the Recurring Special Provisions to read:

“STATEMENTS AND PAYROLLS

The payroll records shall include the worker’s name, social security number, last known address, telephone number, email address, classification(s) of work actually performed, hourly rates of wages paid (including rates of contributions or costs anticipated for bona fide fringe benefits or cash equivalents thereof), daily and weekly number of hours actually worked in total, deductions made, and actual wages paid.

The Contractor and each subcontractor shall submit certified payroll records to the Department each week from the start to the completion of their respective work, except that full social security numbers, last known addresses, telephone numbers, and email addresses shall not be included on weekly submittals. Instead, the payrolls need only include an identification number for each employee (e.g., the last four digits of the employee’s social security number). The submittals shall be made using LCPtracker Pro software. The software is web-based and can be accessed at <https://lcptracker.com/>. When there has been no activity during a work week, a payroll record shall still be submitted with the appropriate option (“No Work”, “Suspended”, or “Complete”) selected.”

STATE CONTRACTS. Revise Item 3 of Section IV of Check Sheet #5 of the Recurring Special Provisions to read:

- “3. Submission of Payroll Records. The Contractor and each subcontractor shall, no later than the 15th day of each calendar month, file a certified payroll for the immediately preceding month to the Illinois Department of Labor (IDOL) through the Illinois Prevailing Wage Portal in compliance with the State Prevailing Wage Act (820 ILCS 130). The portal can be found on the IDOL website at <https://www2.illinois.gov/idol/Laws-Rules/CONMED/Pages/Prevailing-Wage-Portal.aspx>. Payrolls shall be submitted in the format prescribed by the IDOL.

In addition to filing certified payroll(s) with the IDOL, the Contractor and each subcontractor shall certify and submit payroll records to the Department each week from the start to the completion of their respective work, except that full social security numbers shall not be included on weekly submittals. Instead, the payrolls shall include an identification number for each employee (e.g., the last four digits of the employee’s social security number). In addition, starting and ending times of work each day may be omitted from the payroll records submitted. The submittals shall be made using LCPtracker Pro software. The software is web-based and can be accessed at <https://lcptracker.com/>. When there has been no activity during a work week, a payroll record shall still be submitted with the appropriate option (“No Work”, “Suspended”, or “Complete”) selected.”

SURVEYING SERVICES (BDE)

Effective: April 1, 2025

Delete the fourth paragraph of Article 667.04 of the Standard Specifications.

Delete Section 668 of the Standard Specifications.

TRAINING SPECIAL PROVISIONS (BDE)

Effective: October 15, 1975

Revised: September 2, 2021

This Training Special Provision supersedes Section 7b of the Special Provision entitled "Specific Equal Employment Opportunity Responsibilities," and is in implementation of 23 U.S.C. 140(a).

As part of the Contractor's equal employment opportunity affirmative action program, training shall be provided as follows:

The Contractor shall provide on-the-job training aimed at developing full journeyman in the type of trade or job classification involved. The number of trainees to be trained under this contract will be 1. In the event the Contractor subcontracts a portion of the contract work, it shall determine how many, if any, of the trainees are to be trained by the subcontractor, provided however, that the Contractor shall retain the primary responsibility for meeting the training requirements imposed by this special provision. The Contractor shall also ensure that this Training Special Provision is made applicable to such subcontract. Where feasible, 25 percent of apprentices or trainees in each occupation shall be in their first year of apprenticeship or training.

The number of trainees shall be distributed among the work classifications on the basis of the Contractor's needs and the availability of journeymen in the various classifications within the reasonable area of recruitment. Prior to commencing construction, the Contractor shall submit to the Illinois Department of Transportation for approval the number of trainees to be trained in each selected classification and training program to be used. Furthermore, the Contractor shall specify the starting time for training in each of the classifications. The Contractor will be credited for each trainee it employs on the contract work who is currently enrolled or becomes enrolled in an approved program and will be reimbursed for such trainees as provided hereinafter.

Training and upgrading of minorities and women toward journeyman status is a primary objective of this Training Special Provision. Accordingly, the Contractor shall make every effort to enroll minority trainees and women (e.g. by conducting systematic and direct recruitment through public and private sources likely to yield minority and women trainees) to the extent such persons are available within a reasonable area of recruitment. The Contractor will be responsible for demonstrating the steps it has taken in pursuance thereof, prior to a determination as to whether the Contractor is in compliance with this Training Special Provision. This training commitment is not intended, and shall not be used, to discriminate against any applicant for training, whether a member of a minority group or not.

No employee shall be employed as a trainee in any classification in which he or she has successfully completed a training course leading to journeyman status or in which he or she has been employed as a journeyman. The Contractor should satisfy this requirement by including appropriate questions in the employee application or by other suitable means. Regardless of the method used, the Contractor's records should document the findings in each case.

The minimum length and type of training for each classification will be as established in the training program selected by the Contractor and approved by the Illinois Department of Transportation and the Federal Highway Administration. The Illinois Department of Transportation and the Federal Highway Administration shall approve a program, if it is reasonably calculated to meet the equal employment opportunity obligations of the Contractor and to qualify the average trainee for journeyman status in the classification concerned by the end of the training period. Furthermore, apprenticeship programs registered with the U.S. Department of Labor, Bureau of Apprenticeship and Training, or with a State apprenticeship agency recognized by the Bureau and training programs approved by not necessarily sponsored by the U.S. Department of Labor Employment Training Administration shall also be considered acceptable provided it is being administered in a manner consistent with the equal employment obligations of Federal-aid highway construction contracts. Approval or acceptance of a training program shall be obtained from the State prior to commencing work on the classification covered by the program. It is the intention of these provisions that training is to be provided in the construction crafts rather than clerk-typists or secretarial-type positions. Training is permissible in lower level management positions such as office engineers, estimators, timekeepers, etc., where the training is oriented toward construction applications. Training in the laborer classification may be permitted provided that significant and meaningful training is provided and approved by the Illinois Department of Transportation and the Federal Highway Administration. Some offsite training is permissible as long as the training is an integral part of an approved training program and does not comprise a significant part of the overall training.

Except as otherwise noted below, the Contractor will be reimbursed 80 cents per hour of training given an employee on this contract in accordance with an approved training program. As approved by the Engineer, reimbursement will be made for training of persons in excess of the number specified herein. This reimbursement will be made even though the Contractor receives additional training program funds from other sources, provided such other source does not specifically prohibit the Contractor from receiving other reimbursement. Reimbursement for offsite training indicated above may only be made to the Contractor where he does one or more of the following and the trainees are concurrently employed on a Federal-aid project; contributes to the cost of the training, provides the instruction to the trainee or pays the trainee's wages during the offsite training period.

No payment shall be made to the Contractor if either the failure to provide the required training, or the failure to hire the trainee as a journeyman, is caused by the Contractor and evidences a lack of good faith on the part of the Contractor in meeting the requirement of this Training Special Provision. It is normally expected that a trainee will begin his training on the project as soon as feasible after start of work utilizing the skill involved and remain on the project as long as training opportunities exist in his work classification or until he has completed his training program.

It is not required that all trainees be on board for the entire length of the contract. A Contractor will have fulfilled his responsibilities under this Training Special Provision if he has provided acceptable training to the number of trainees specified. The number trained shall be determined on the basis of the total number enrolled on the contract for a significant period.

Trainees will be paid at least 60 percent of the appropriate minimum journeyman's rate specified in the contract for the first half of the training period, 75 percent for the third quarter of the training period, and 90 percent for the last quarter of the training period, unless apprentices or trainees in an approved existing program are enrolled as trainees on this project. In that case, the appropriate rates approved by the Departments of Labor or Transportation in connection with the existing program shall apply to all trainees being trained for the same classification who are covered by this Training Special Provision.

The Contractor shall furnish the trainee a copy of the program he will follow in providing the training. The Contractor shall provide each trainee with a certification showing the type and length of training satisfactorily complete.

The Contractor shall provide for the maintenance of records and furnish periodic reports documenting its performance under this Training Special Provision.

For contracts with an awarded contract value of \$500,000 or more, the Contractor is required to comply with the Illinois Works Apprenticeship Initiative (30 ILCS 559/20-20 to 20-25) and all applicable administrative rules to the extent permitted by Section 20-20(g). For federally funded projects, the number of trainees to be trained under this contract, as stated in the Training Special Provisions, will be the established goal for the Illinois Works Apprenticeship Initiative 30 ILCS 559/20-20(g). The Contractor shall make a good faith effort to meet this goal. For federally funded projects, the Illinois Works Apprenticeship Initiative will be implemented using the FHWA approved OJT procedures. The Contractor must comply with the recordkeeping and reporting obligations of the Illinois Works Apprenticeship Initiative for the life of the project, including the certification as to whether the trainee/apprentice labor hour goals were met.

Method of Measurement. The unit of measurement is in hours.

Basis of Payment. This work will be paid for at the contract unit price of 80 cents per hour for TRAINEES. The estimated total number of hours, unit price, and total price have been included in the schedule of prices.

IDOT TRAINING PROGRAM GRADUATE ON-THE-JOB TRAINING SPECIAL PROVISION

Effective: August 1, 2012

Revised: February 2, 2017

In addition to the Contractor's equal employment opportunity (EEO) affirmative action efforts undertaken as required by this Contract, the Contractor is encouraged to participate in the incentive program described below to provide additional on-the-job training to certified graduates of the IDOT pre-apprenticeship training program, as outlined in this Special Provision.

IDOT funds, and various Illinois community colleges operate, pre-apprenticeship training programs throughout the State to provide training and skill-improvement opportunities to promote the increased employment of minority groups, disadvantaged persons and women in all aspects of the highway construction industry. The intent of this IDOT Pre-Apprenticeship Training Program Graduate (TPG) special provision (Special Provision) is to place these certified program graduates on the project site for this Contract in order to provide the graduates with meaningful on-the-job training. Pursuant to this Special Provision, the Contractor must make every reasonable effort to recruit and employ certified TPG trainees to the extent such individuals are available within a practicable distance of the project site.

Specifically, participation of the Contractor or its subcontractor in the Program entitles the participant to reimbursement for graduates' hourly wages at \$15.00 per hour per utilized TPG trainee, subject to the terms of this Special Provision. Reimbursement payment will be made even though the Contractor or subcontractor may also receive additional training program funds from other non-IDOT sources for other non-TPG trainees on the Contract, provided such other source does not specifically prohibit the Contractor or subcontractor from receiving reimbursement from another entity through another program, such as IDOT through the TPG program. With regard to any IDOT funded construction training program other than TPG, however, additional reimbursement for other IDOT programs will not be made beyond the TPG Program described in this Special Provision when the TPG Program is utilized.

No payment will be made to the Contractor if the Contractor or subcontractor fails to provide the required on-site training to TPG trainees, as solely determined by IDOT. A TPG trainee must begin training on the project as soon as the start of work that utilizes the relevant trade skill and the TPG trainee must remain on the project site through completion of the Contract, so long as training opportunities continue to exist in the relevant work classification. Should a TPG trainee's employment end in advance of the completion of the Contract, the Contractor must promptly notify the IDOT District EEO Officer for the Contract that the TPG's involvement in the Contract has ended. The Contractor must supply a written report for the reason the TPG trainee involvement terminated, the hours completed by the TPG trainee on the Contract, and the number of hours for which the incentive payment provided under this Special Provision will be, or has been claimed for the separated TPG trainee.

Finally, the Contractor must maintain all records it creates as a result of participation in the Program on the Contract, and furnish periodic written reports to the IDOT District EEO Officer that document its contractual performance under and compliance with this Special Provision. Finally, through participation in the Program and reimbursement of wages, the Contractor is not relieved of, and IDOT has not waived, the requirements of any federal or state labor or employment law applicable to TPG workers, including compliance with the Illinois Prevailing Wage Act.

Method of Measurement: The unit of measurement is in hours.

Basis of Payment: This work will be paid for at the contract unit price of \$15.00 per hour for each utilized certified TPG Program trainee (TRAINEES TRAINING PROGRAM GRADUATE). The estimated total number of hours, unit price, and total price must be included in the schedule of prices for the Contract submitted by Contractor prior to beginning work. The initial number of TPG trainees for which the incentive is available for this contract is 1.

The Department has contracted with several educational institutions to provide screening, tutoring and pre-training to individuals interested in working as a TPG trainee in various areas of common construction trade work. Only individuals who have successfully completed a Pre-Apprenticeship Training Program at these IDOT approved institutions are eligible to be TPG trainees. To obtain a list of institutions that can connect the Contractor with eligible TPG trainees, the Contractor may contact: HCCTP TPG Program Coordinator, Office of Business and Workforce Diversity (IDOT OBWD), Room 319, Illinois Department of Transportation, 2300 S. Dirksen Parkway, Springfield, Illinois 62764. Prior to commencing construction with the utilization of a TPG trainee, the Contractor must submit documentation to the IDOT District EEO Officer for the Contract that provides the names and contact information of the TPG trainee(s) to be trained in each selected work classification, proof that the TPG trainee(s) has successfully completed a Pre-Apprenticeship Training Program, proof that the TPG is in an Apprenticeship Training Program approved by the U.S. Department of Labor Bureau of Apprenticeship Training, and the start date for training in each of the applicable work classifications.

To receive payment, the Contractor must provide training opportunities aimed at developing a full journeyworker in the type of trade or job classification involved. During the course of performance of the Contract, the Contractor may seek approval from the IDOT District EEO Officer to employ additional eligible TPG trainees. In the event the Contractor subcontracts a portion of the contracted work, it must determine how many, if any, of the TPGs will be trained by the subcontractor. Though a subcontractor may conduct training, the Contractor retains the responsibility for meeting all requirements imposed by this Special Provision. The Contractor must also include this Special Provision in any subcontract where payment for contracted work performed by a TPG trainee will be passed on to a subcontractor.

Training through the Program is intended to move TPGs toward journeyman status, which is the primary objective of this Special Provision. Accordingly, the Contractor must make every effort to enroll TPG trainees by recruitment through the Program participant educational institutions to the extent eligible TPGs are available within a reasonable geographic area of the project. The Contractor is responsible for demonstrating, through documentation, the recruitment efforts it has undertaken prior to the determination by IDOT whether the Contractor is in compliance with this Special Provision, and therefore, entitled to the Training Program Graduate reimbursement of \$15.00 per hour.

Notwithstanding the on-the-job training requirement of this TPG Special Provision, some minimal off-site training is permissible as long as the offsite training is an integral part of the work of the contract, and does not compromise or conflict with the required on-site training that is central to the purpose of the Program. No individual may be employed as a TPG trainee in any work classification in which he/she has previously successfully completed a training program leading to journeyman status in any trade, or in which he/she has worked at a journeyman level or higher.

VEHICLE AND EQUIPMENT WARNING LIGHTS (BDE)

Effective: November 1, 2021

Revised: November 1, 2022

Add the following paragraph after the first paragraph of Article 701.08 of the Standard Specifications:

“The Contractor shall equip all vehicles and equipment with high-intensity oscillating, rotating, or flashing, amber or amber-and-white, warning lights which are visible from all directions. In accordance with 625 ILCS 5/12-215, the lights may only be in operation while the vehicle or equipment is engaged in construction operations.”

WEEKLY DBE TRUCKING REPORTS (BDE)

Effective: June 2, 2012

Revised: January 2, 2025

The following applies to all Disadvantaged Business Enterprise (DBE) trucks on the project, whether they are utilized for DBE goal credit or not.

The Contractor shall notify the Engineer at least three days prior to DBE trucking activity.

The Contractor shall submit a weekly report of DBE trucks hired by the Contractor or subcontractors (i.e. not owned by the Contractor or subcontractors) to the Engineer on Department form “SBE 723” within ten business days following the reporting period. The reporting period shall be Sunday through Saturday 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.

WORK ZONE TRAFFIC CONTROL DEVICES (BDE)

Effective: March 2, 2020

Revised: January 1, 2025

Add the following to Article 701.03 of the Standard Specifications:

“(q) Temporary Sign Supports 1106.02”

Revise the third paragraph of Article 701.14 of the Standard Specifications to read:

“For temporary sign supports, the Contractor shall provide a FHWA eligibility letter for each device used on the contract. The letter shall provide information for the set-up and use of the device as well as a detailed drawing of the device. The signs shall be supported within 20 degrees of vertical. Weights used to stabilize signs shall be attached to the sign support per the manufacturer’s specifications.”

Revise the first paragraph of Article 701.15 of the Standard Specifications to read:

“ **701.15 Traffic Control Devices.** For devices that must meet crashworthiness standards, the Contractor shall provide a manufacturer’s self-certification or a FHWA eligibility letter for each Category 1 device and a FHWA eligibility letter for each Category 2 and Category 3 device used on the contract. The self-certification or letter shall provide information for the set-up and use of the device as well as a detailed drawing of the device.”

Revise the first six paragraphs of Article 1106.02 of the Standard Specifications to read:

“ **1106.02 Devices.** Work zone traffic control devices and combinations of devices shall meet crashworthiness standards for their respective categories. The categories are as follows.

Category 1 includes small, lightweight, channelizing and delineating devices that have been in common use for many years and are known to be crashworthy by crash testing of similar devices or years of demonstrable safe performance. These include cones, tubular markers, plastic drums, and delineators, with no attachments (e.g. lights). Category 1 devices shall be MASH compliant.

Category 2 includes devices that are not expected to produce significant vehicular velocity change but may otherwise be hazardous. These include vertical panels with lights, barricades, temporary sign supports, and Category 1 devices with attachments (e.g. drums with lights). Category 2 devices shall be MASH compliant.

Category 3 includes devices that are expected to cause significant velocity changes or other potentially harmful reactions to impacting vehicles. These include crash cushions (impact attenuators), truck mounted attenuators, and other devices not meeting the definitions of Category 1 or 2. Category 3 devices manufactured after December 31, 2019 shall be MASH compliant. Category 3 devices manufactured on or before December 31, 2019, and compliant with NCHRP 350, may be used on contracts let before December 31, 2029. Category 3 devices shall be crash tested for Test Level 3 or the test level specified.

Category 4 includes portable or trailer-mounted devices such as sign supports, speed feedback displays, arrow boards, changeable message signs, temporary traffic signals, and area lighting supports. It is preferable for Category 4 devices manufactured after December 31, 2019 to be MASH-16 compliant; however, there are currently no crash tested devices in this category, so it remains exempt from the NCHRP 350 or MASH compliance requirement.

For each type of device, when no more than one MASH compliant is available, an NCHRP 350 compliant device may be used, even if manufactured after December 31, 2019.”

Revise Articles 1106.02(g), 1106.02(k), and 1106.02(l) to read:

“(g) Truck Mounted/Trailer Mounted Attenuators. The attenuator shall be approved for use at Test Level 3. Test Level 2 may be used for normal posted speeds less than or equal to 45 mph.

(k) Temporary Water Filled Barrier. The water filled barrier shall be a lightweight plastic shell designed to accept water ballast and be on the Department’s qualified product list.

Shop drawings shall be furnished by the manufacturer and shall indicate the deflection of the barrier as determined by acceptance testing; the configuration of the barrier in that test; and the vehicle weight, velocity, and angle of impact of the deflection test. The Engineer shall be provided one copy of the shop drawings.

(l) Movable Traffic Barrier. The movable traffic barrier shall be on the Department’s qualified product list.

Shop drawings shall be furnished by the manufacturer and shall indicate the deflection of the barrier as determined by acceptance testing; the configuration of the barrier in that test; and the vehicle weight, velocity, and angle of impact of the deflection test. The Engineer shall be provided one copy of the shop drawings. The barrier shall be capable of being moved on and off the roadway on a daily basis.”

PROJECT LABOR AGREEMENT

Effective: May 18, 2007

Revised: August 1, 2019

Description. The Illinois Project Labor Agreements Act, 30 ILCS 571, states that the State of Illinois has a compelling interest in awarding public works contracts so as to ensure the highest standards of quality and efficiency at the lowest responsible cost. A project labor agreement (PLA) is a form of pre-hire collective bargaining agreement covering all terms and conditions of employment on a specific project that is intended to support this compelling interest. It has been determined by the Department that a PLA is appropriate for the project that is the subject of this contract. The PLA document, provided below, only applies to the construction site for this contract. It is the policy of the Department on this contract, and all construction projects, to allow all contractors and subcontractors to compete for contracts and subcontracts without regard to whether they are otherwise parties to collective bargaining agreements.

Execution of Letter of Assent. A copy of the PLA applicable to this project is included as part of this special provision. As a condition of the award of the contract, the successful bidder and each of its subcontractors shall execute a "Contractor Letter of Assent", in the form attached to the PLA as Exhibit A. The successful bidder shall submit a Subcontractor's Contractor Letter of Assent to the Department prior to the subcontractor's performance of work on the project. Upon request, copies of the applicable collective bargaining agreements will be provided by the appropriate signatory labor organization at the pre-job conference.

Quarterly Reporting. Section 37 of the Illinois Project Labor Agreements Act requires the Department to submit quarterly reports regarding the number of minorities and females employed under PLAs. To assist in this reporting effort, the Contractor shall provide a quarterly workforce participation report for all minority and female employees working under the PLA of this contract. The data shall be reported on Construction Form BC 820, Project Labor Agreement (PLA) Workforce Participation Quarterly Reporting Form available on the Department's website <https://idot.illinois.gov/content/dam/soi/en/web/idot/documents/idot-forms/bc/bc-820.pdf>.

The report shall be submitted no later than the 15th of the month following the end of each quarter (i.e., April 15 for the January – March reporting period). The form shall be emailed to DOT.PLA.Reporting@illinois.gov or faxed to (217) 524-4922.

Any costs associated with complying with this provision 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.

Illinois Department of Transportation
PROJECT LABOR AGREEMENT

This Project Labor Agreement (“PLA” or “Agreement”) is entered into this _____ day of _____, 2025, by and between the Illinois Department of Transportation (“IDOT” or “Department”) in its proprietary capacity, and each relevant Illinois AFL-CIO Building Trades signatory hereto as determined by the Illinois AFL-CIO Statewide Project Labor Agreement Committee on behalf of each of its affiliated members (individually and collectively, the “Unions”). This PLA shall apply to Construction Work (as defined herein) to be performed by IDOT’s Prime Contractor and each of its subcontractors of whatever tier (“Subcontractor” or “Subcontractors”) on Contract No. 62N39(hereinafter, the “Project”).

ARTICLE 1 - INTENT AND PURPOSES

- 1.1 This PLA is entered into in accordance with the Project Labor Agreement Act (“Act”, 30 ILCS 571). It is mutually understood and agreed that the terms and conditions of this PLA are intended to promote the public interest in obtaining timely and economical completion of the Project by encouraging productive and efficient construction operations; by establishing a spirit of harmony and cooperation among the parties; and by providing for peaceful and prompt settlement of any and all labor grievances or jurisdictional disputes of any kind without strikes, lockouts, slowdowns, delays, or other disruptions to the prosecution of the work. The parties acknowledge the obligations of the Contractors and Subcontractors to comply with the provisions of the Act. The parties will work with the Contractors and Subcontractors within the parameters of other statutory and regulatory requirements to implement the Act’s goals and objectives.
- 1.2 As a condition of the award of the contract for performance of work on the Project, IDOT’s Prime Contractor and each of its Subcontractors shall execute a “Contractor Letter of Assent”, in the form attached hereto as Exhibit A, prior to commencing Construction Work on the Project. The Contractor shall submit a Subcontractor’s Contractor Letter of Assent to the Department prior to the Subcontractor’s performance of Construction Work on the Project. Upon request copies of the applicable collective bargaining agreements will be provided by the appropriate signatory labor organization consistent with this Agreement and at the pre-job conference referenced in Article III, Section 3.1.

- 1.3 Each Union affiliate and separate local representing workers engaged in Construction Work on the Project in accordance with this PLA are bound to this agreement by the Illinois AFL-CIO Statewide Project Labor Agreement Committee which is the central committee established with full authority to negotiate and sign PLAs with the State on behalf of all respective crafts. Upon their signing the Contractor Letter of Assent, the Prime Contractor, each Subcontractor, and the individual Unions shall thereafter be deemed a party to this PLA. No party signatory to this PLA shall, contract or subcontract, nor permit any other person, firm, company, or entity to contract or subcontract for the performance of Construction Work for the Project to any person, firm, company, or entity that does not agree in writing to become bound for the term of this Project by the terms of this PLA prior to commencing such work and to the applicable area-wide collective bargaining agreement(s) with the Union(s) signatory hereto.
- 1.4 It is understood that the Prime Contractor(s) and each Subcontractor will be considered and accepted by the Unions as separate employers for the purposes of collective bargaining, and it is further agreed that the employees working under this PLA shall constitute a bargaining unit separate and distinct from all others. The parties hereto also agree that this PLA shall be applicable solely with respect to this Project, and shall have no bearing on the interpretation of any other collective bargaining agreement or as to the recognition of any bargaining unit other than for the specific purposes of this Project.
- 1.5 In the event of a variance or conflict, whether explicit or implicit, between the terms and conditions of this PLA and the provisions of any other applicable national, area, or local collective bargaining agreement, the terms and conditions of this PLA shall supersede and control. For any work performed under the NTL Articles of Agreement, the National Stack/Chimney Agreement, the National Cooling Tower Agreement, the National Agreement of the International Union of Elevator Constructors, and for any instrument calibration work and loop checking performed under the UA/IBEW Joint National Agreement for Instrument and Control Systems Technicians, the preceding sentence shall apply only with respect to Articles I, II, V, VI, and VII.

- 1.6 Subject to the provisions of paragraph 1.5 of this Article, it is the parties' intent to respect the provisions of any other collective bargaining agreements that may now or hereafter pertain, whether between the Prime Contractor and one or more of the Unions or between a Subcontractor and one or more of the Unions. Accordingly, except and to the extent of any contrary provision set forth in this PLA, the Prime Contractor and each of its Subcontractors agrees to be bound and abide by the terms of the following in order of precedence: (a) the applicable collective bargaining agreement between the Prime Contractor and one or more of the Unions made signatory hereto; (b) the applicable collective bargaining agreement between a Subcontractor and one or more of the Unions made signatory hereto; or (c) the current applicable area collective bargaining agreement for the relevant Union that is the agreement certified by the Illinois Department of Labor for purposes of establishing the Prevailing Wage applicable to the Project. The Union will provide copies of the applicable collective bargaining agreements pursuant to part (c) of the preceding sentence to the Prime Contractor. Assignments by the Contractors or Subcontractors amongst the trades shall be consistent with area practices; in the event of unresolved disagreements as to the propriety of such assignments, the provisions of Article VI shall apply.
- 1.7 Subject to the limitations of paragraphs 1.4 to 1.6 of this Article, the terms of each applicable collective bargaining agreement as determined in accordance with paragraph 1.6 are incorporated herein by reference, and the terms of this PLA shall be deemed incorporated into such other applicable collective bargaining agreements only for purposes of their application to the Project.
- 1.8 To the extent necessary to comply with the requirements of any fringe benefit fund to which the Prime Contractor or Subcontractor is required to contribute under the terms of an applicable collective bargaining agreement pursuant to the preceding paragraph, the Prime Contractor or Subcontractor shall execute all "Participation Agreements" as may be reasonably required by the Union to accomplish such purpose; provided, however, that such Participation Agreements shall, when applicable to the Prime Contractor or Subcontractor solely as a result of this PLA, be amended as reasonably necessary to reflect such fact. Upon written notice in the form of a lien of a Contractor's or Subcontractor's delinquency from any applicable fringe benefit fund, IDOT will withhold from the Contractor's periodic pay request an amount sufficient to extinguish any delinquency obligation of the Contractor or Subcontractor arising out of the Project.
- 1.9 In the event that the applicable collective bargaining agreement between a Prime Contractor and the Union or between the Subcontractor and the Union expires prior to the completion of this Project, the expired applicable contract's terms will be maintained until a new applicable collective bargaining agreement is ratified. The wages and fringe benefits included in any new applicable collective bargaining agreement will apply on and after the effective date of the newly negotiated collective bargaining agreement, except to the extent wage and fringe benefit retroactivity is specifically agreed upon by the relevant bargaining parties.

ARTICLE II – APPLICABILITY, RECOGNITION, AND COMMITMENTS

- 2.1 The term Construction Work as used herein shall include all “construction, demolition, rehabilitation, renovation, or repair” work performed by a “laborer or mechanic” at the “site of the work” for the purpose of “building” the specific structures and improvements that constitute the Project. Terms appearing within quotation marks in the preceding sentence shall have the meaning ascribed to them pursuant to 29 CFR Part 5 and Illinois labor laws.
- 2.2 By executing the Letters of Assent, Prime Contractor and each of its Subcontractors recognizes the Unions signatory to this PLA as the sole and exclusive bargaining representatives for their craft employees employed on the jobsite for this Project. Unions who are signatory to this PLA will have recognition on the Project for their craft.
- 2.3 The Prime Contractor and each of its Subcontractors retains and shall be permitted to exercise full and exclusive authority and responsibility for the management of its operations, except as expressly limited by the terms of this PLA or by the terms and conditions of the applicable collective bargaining agreement.
- 2.4 Except to the extent contrary to an express provision of the relevant collective bargaining agreement, equipment or materials used in the Project may be pre-assembled or pre-fabricated, and there shall be no refusal by the Union to handle, transport, install, or connect such equipment or materials. Equipment or materials delivered to the job-site will be unloaded and handled promptly without regard to potential jurisdictional disputes; any such disputes shall be handled in accordance with the provisions of this PLA.
- 2.5 The parties are mutually committed to promoting a safe working environment for all personnel at the job-site. It shall be the responsibility of each employer to which this PLA applies to provide and maintain safe working conditions for its employees, and to comply with all applicable federal, state, and local health and safety laws and regulations.
- 2.6 The use or furnishing of alcohol or drugs and the conduct of any other illegal activity at the job-site is strictly prohibited. The parties shall take every practical measure consistent with the terms of applicable collective bargaining agreements to ensure that the job-site is free of alcohol and drugs.
- 2.7 All parties to this PLA agree that they will not discriminate against any employee based on race, creed, religion, color, national origin, union activity, age, gender or sexual orientation and shall comply with all applicable federal, state, and local laws.

- 2.8 In accordance with the Act and to promote diversity in employment, IDOT will establish, in cooperation with the other parties, the apprenticeship hours which are to be performed by minorities and females on the Project. IDOT shall consider the total hours to be performed by these underrepresented groups, as a percentage of the workforce, and create aspirational goals for each Project, based on the level of underutilization for the service area of the Project (together "Project Employment Objectives"). IDOT shall provide a quarterly report regarding the racial and gender composition of the workforce on the Project.

Persons currently lacking qualifications to enter apprenticeship programs will have the opportunity to obtain skills through basic training programs as have been established by the Department. The parties will endeavor to support such training programs to allow participants to obtain the requisite qualifications for the Project Employment Objectives.

The parties agree that all Contractors and Subcontractors working on the Project shall be encouraged to utilize the maximum number of apprentices as permitted under the terms of the applicable collective bargaining agreements to realize the Project Employment Objectives.

The Unions shall assist the Contractor and each Subcontractor in efforts to satisfy Project Employment Objectives. A Contractor or Subcontractor may request from a Union specific categories of workers necessary to satisfy Project Employment Objectives. The application of this section shall be consistent with all local Union collective bargaining agreements, and the hiring hall rules and regulations established for the hiring of personnel, as well as the apprenticeship standards set forth by each individual Union.

- 2.9 The parties hereto agree that engineering consultants and materials testing employees, to the extent subject to the terms of this PLA, shall be fully expected to objectively and responsibly perform their duties and obligations owed to the Department without regard to the potential union affiliation of such employees or of other employees on the Project.
- 2.10 This Agreement shall not apply to IDOT employees or employees of any other governmental entity.

ARTICLE III - ADMINISTRATION OF AGREEMENT

- 3.1 In order to assure that all parties have a clear understanding of the PLA, and to promote harmony, at the request of the Unions a post-award pre-job conference will be held among the Prime Contractor, all Subcontractors and Union representatives prior to the start of any Construction Work on the Project. No later than the conclusion of such pre-job conference, the parties shall, among other matters, provide to one another contact information for their respective representatives (including name, address, phone number, facsimile number, e-mail). Nothing herein shall be construed to limit the right of the Department to discuss or explain the purpose and intent of this PLA with prospective bidders or other interested parties prior to or following its award of the job.
- 3.2 Representatives of the Prime Contractor and the Unions shall meet as often as reasonably necessary following award until completion of the Project to assure the effective implementation of this PLA.
- 3.3 Any notice contemplated under Article VI and VII of this Agreement to a signatory labor organization shall be made in writing to the Local Union with copies to the local union's International Representative.

ARTICLE IV - HOURS OF WORK AND GENERAL CONDITIONS

- 4.1 The standard work day and work week for Construction Work on the Project shall be consistent with the respective collective bargaining agreements. In the event Project site or other job conditions dictate a change in the established starting time and/or a staggered lunch period for portions of the Project or for specific crafts, the Prime Contractor, relevant Subcontractors and business managers of the specific crafts involved shall confer and mutually agree to such changes as appropriate. If proposed work schedule changes cannot be mutually agreed upon between the parties, the hours fixed at the time of the pre-job meeting shall prevail.
- 4.2 Shift work may be established and directed by the Prime Contractor or relevant Subcontractor as reasonably necessary or appropriate to fulfill the terms of its contract with the Department. If used, shift hours, rates and conditions shall be as provided in the applicable collective bargaining agreement.
- 4.3 The parties agree that chronic and/or unexcused absenteeism is undesirable and must be controlled in accordance with procedures established by the applicable collective bargaining agreement. Any employee disciplined for absenteeism in accordance with such procedures shall be suspended from all work on the Project for not less than the maximum period permitted under the applicable collective bargaining agreement.

- 4.4 Except as may be otherwise expressly provided by the applicable collective bargaining agreement, employment begins and ends at the Project site; employees shall be at their place of work at the starting time; and employees shall remain at their place of work until quitting time.
- 4.5 Except as may be otherwise expressly provided by the applicable collective bargaining agreement, there shall be no limit on production by workmen, no restrictions on the full use of tools or equipment, and no restrictions on efficient use of manpower or techniques of construction other than as may be required by safety regulations.
- 4.6 The parties recognize that specialized or unusual equipment may be installed on the Project. In such cases, the Union recognizes the right of the Prime Contractor or Subcontractor to involve the equipment supplier or vendor's personnel in supervising the setting up of the equipment, making modifications and final alignment, and performing similar activities that may be reasonably necessary prior to and during the start-up procedure in order to protect factory warranties. The Prime Contractor or Subcontractor shall notify the Union representatives in advance of any work at the job-site by such vendor personnel in order to promote a harmonious relationship between the equipment vendor's personnel and other Project employees.
- 4.7 For the purpose of promoting full and effective implementation of this PLA, authorized Union representatives shall have access to the Project job-site during scheduled work hours. Such access shall be conditioned upon adherence to all reasonable visitor and security rules of general applicability that may be established for the Project site at the pre-job conference or from time to time thereafter.

ARTICLE V – GRIEVANCE PROCEDURES FOR DISPUTES ARISING UNDER A PARTICULAR COLLECTIVE BARGAINING AGREEMENT

- 5.1 In the event a dispute arises under a particular collective bargaining agreement specifically not including jurisdictional disputes referenced in Article VI below, said dispute shall be resolved by the Grievance/Arbitration procedure of the applicable collective bargaining agreement. The resulting determination from this process shall be final and binding on all parties bound to its process.
- 5.2 Employers covered under this Agreement shall have the right to discharge or discipline any employee who violates the provisions of this Agreement. Such discharge or discipline by a contractor or subcontractor shall be subject to Grievance/Arbitration procedure of the applicable collective bargaining agreement only as to the fact of such violation of this agreement. If such fact is established, the penalty imposed shall not be disturbed. Work at the Project site shall continue without disruption or hindrance of any kind as a result of a Grievance/Arbitration procedure under this Article.

- 5.3 In the event there is a deadlock in the foregoing procedure, the parties agree that the matter shall be submitted to arbitration for the selection and decision of an Arbitrator governed under paragraph 6.8.

ARTICLE VI –DISPUTES: GENERAL PRINCIPLES

- 6.1 This Agreement is entered into to prevent strikes, lost time, lockouts and to facilitate the peaceful adjustment of jurisdictional disputes in the building and construction industry and to prevent waste and unnecessary avoidable delays and expense, and for the further purpose of at all times securing for the employer sufficient skilled workers.

- 6.2 A panel of Permanent Arbitrators are attached as addendum (A) to this agreement. By mutual agreement between IDOT and the Unions, the parties can open this section of the agreement as needed to make changes to the list of permanent arbitrators.

The arbitrator is not authorized to award back pay or any other damages for a miss assignment of work. Nor may any party bring an independent action for back pay or any other damages, based upon a decision of an arbitrator.

- 6.3 The PLA Jurisdictional Dispute Resolution Process ("Process") sets forth the procedures below to resolve jurisdictional disputes between and among Contractors, Subcontractors, and Unions engaged in the building and construction industry. Further, the Process will be followed for any grievance or dispute arising out of the interpretation or application of this PLA by the parties except for the prohibition on attorneys contained in 6.11. All decisions made through the Process are final and binding upon all parties.

DISPUTE PROCESS

- 6.4 Administrative functions under the Process shall be performed through the offices of the President and/or Secretary-Treasurer of the Illinois State Federation of Labor, or their designated representative, called the Administrator. In no event shall any officer, employee, agent, attorney, or other representative of the Illinois Federation of Labor, AFL- CIO be subject to any subpoena to appear or testify at any jurisdictional dispute hearing.
- 6.5 There shall be no abandonment of work during any case participating in this Process or in violation of the arbitration decision. All parties to this Process release the Illinois State Federation of Labor ("Federation") from any liability arising from its action or inaction and covenant not to sue the Federation, nor its officers, employees, agents or attorneys.

- 6.6 In the event of a dispute relating to trade or work jurisdiction, all parties, including the employers, Contractors or Subcontractors, agree that a final and binding resolution of the dispute shall be resolved as follows:
- (a) Representatives of the affected trades and the Contractor or Subcontractor shall meet on the job site within two (2) business days after receiving written notice in an effort to resolve the dispute. (In the event there is a dispute between local unions affiliated with the same International Union, the decision of the General President, or his/her designee, as the internal jurisdictional authority of that International Union, shall constitute a final and binding decision and determination as to the jurisdiction of work.)
 - (b) If no settlement is achieved subsequent to the preceding Paragraph, the matter shall be referred to the local area Building & Construction Trades Council, which shall meet with the affected trades within two (2) business days subsequent to receiving written notice. In the event the parties do not wish to avail themselves of the local Building & Construction Trades Council, the parties may elect to invoke the services of their respective International Representatives with no extension of the time limitations. An agreement reached at this Step shall be final and binding upon all parties.
 - (c) If no settlement agreement is reached during the proceedings contemplated by Paragraphs "a" or "b" above, the matter shall be immediately referred to the Illinois Jurisdictional Dispute Process for final and binding resolution of said dispute. Said referral submission shall be in writing and served upon the Illinois State Federation of Labor, or the Administrator, pursuant to paragraph 6.4 of this agreement. The Administrator shall, within three (3) days, provide for the selection of an available Arbitrator to hear said dispute within this time period. Upon good cause shown and determined by the Administrator, an additional three (3) day extension for said hearing shall be granted at the sole discretion of the Administrator. Only upon mutual agreement of all parties may the Administrator extend the hearing for a period in excess of the time frames contemplated under this Paragraph. Business days are defined as Monday through Friday, excluding contract holidays.
- 6.7 The primary concern of the Process shall be the adjustment of jurisdictional disputes arising out of the Project. A sufficient number of Arbitrators shall be selected from list of approved Arbitrators as referenced Sec. 6.2 and shall be assigned per Sec. 6.8. Decisions shall be only for the Project and shall become effective immediately upon issuance and complied with by all parties. The authority of the Arbitrator shall be restricted and limited specifically to the terms and provisions of Article VI and generally to this Agreement as a whole.

- 6.8 Arbitrator chosen shall be randomly selected based on the list of Arbitrators in Sec. 6.2 and geographical location of the jurisdictional dispute and upon his/her availability, and ability to conduct a Hearing within two (2) business days of said notice. The Arbitrator may issue a "bench" decision immediately following the Hearing or he/she may elect to only issue a written decision, said decision must be issued within two (2) business days subsequent to the completion of the Hearing. Copies of all notices, pleadings, supporting memoranda, decisions, etc. shall be provided to all disputing parties and the Illinois State Federation of Labor.

Any written decision shall be in accordance with this Process and shall be final and binding upon all parties to the dispute and may be a "short form" decision. Fees and costs of the arbitrator shall be divided evenly between the contesting parties except that any party wishing a full opinion and decision beyond the short form decision shall bear the reasonable fees and costs of such full opinion. The decision of the Arbitrator shall be final and binding upon the parties hereto, their members, and affiliates.

In cases of jurisdictional disputes or other disputes between a signatory labor organization and another labor organization, both of which is an affiliate or member of the same International Union, the matter or dispute shall be settled in the manner set forth by their International Constitution and/or as determined by the International Union's General President whose decision shall be final and binding upon all parties. In no event shall there be an abandonment of work.

- 6.9 In rendering a decision, the Arbitrator shall determine:
- (a) First, whether a previous agreement of record or applicable agreement, including a disclaimer agreement, between National or International Unions to the dispute or agreements between local unions involved in the dispute, governs;
 - (b) Only if the Arbitrator finds that the dispute is not covered by an appropriate or applicable agreement of record or agreement between the crafts to the dispute, he shall then consider the established trade practice in the industry and prevailing practice in the locality. Where there is a previous decision of record governing the case, the Arbitrator shall give equal weight to such decision of record, unless the prevailing practice in the locality in the past ten years favors one craft. In that case, the Arbitrator shall base his decision on the prevailing practice in the locality. Except, that if the Arbitrator finds that a craft has improperly obtained the prevailing practice in the locality through raiding, the undercutting of wages or by the use of vertical agreements, the Arbitrator shall rely on the decision of record and established trade practice in the industry rather than the prevailing practice in the locality; and,

- (c) Only if none of the above criteria is found to exist, the Arbitrator shall then consider that because efficiency, cost or continuity and good management are essential to the well being of the industry, the interests of the consumer or the past practices of the employer shall not be ignored.
 - (d) The arbitrator is not authorized to award back pay or any other damages for a mis-assignment of work. Nor may any party bring an independent action for back pay or any other damages, based upon a decision of an arbitrator.
- 6.10 The Arbitrator shall set forth the basis for his/her decision and shall explain his/her findings regarding the applicability of the above criteria. If lower ranked criteria are relied upon, the Arbitrator shall explain why the higher-ranked criteria were not deemed applicable. The Arbitrator's decision shall only apply to the Project. Agreements of Record, for other PLA projects, are applicable only to those parties signatory to such agreements. Decisions of Record are those that were either attested to by the former Impartial Jurisdictional Disputes Board or adopted by the National Arbitration Panel.
- 6.11 All interested parties, as determined by the Arbitrator, shall be entitled to make presentations to the Arbitrator. Any interested labor organization affiliated to the PLA Committee and party present at the Hearing, whether making a presentation or not, by such presence shall be deemed to accept the jurisdiction of the Arbitrator and to agree to be bound by its decision. In addition to the representative of the local labor organization, a representative of the labor organization's International Union may appear on behalf of the parties. Each party is responsible for arranging for its witnesses. In the event an Arbitrator's subpoena is required, the party requiring said subpoena shall prepare the subpoena for the Arbitrator to execute. Service of the subpoena upon any witness shall be the responsibility of the issuing party.

Attorneys shall not be permitted to attend or participate in any portion of a Hearing.

The parties are encouraged to determine, prior to Hearing, documentary evidence which may be presented to the Arbitrator on a joint basis.

- 6.12 The Order of Presentation in all Hearings before an Arbitrator shall be
- I. Identification and Stipulation of the Parties
 - II. Unions(s) claiming the disputed work presents its case
 - III. Union(s) assigned the disputed work presents its case
 - IV. Employer assigning the disputed work presents its case
 - V. Evidence from other interested parties (i.e., general contractor, project manager, owner)
 - VI. Rebuttal by union(s) claiming the disputed work
 - VII. Additional submissions permitted and requested by Arbitrator
 - VIII. Closing arguments by the parties

- 6.13 All parties bound to the provisions of this Process hereby release the Illinois State Federation of Labor and IDOT, their respective officers, agents, employees or designated representatives, specifically including any Arbitrator participating in said Process, from any and all liability or claim, of whatsoever nature, and specifically incorporating the protections provided in the Illinois Arbitration Act, as amended from time to time.
- 6.14 The Process, as an arbitration panel, nor its Administrator, shall have any authority to undertake any action to enforce its decision(s). Rather, it shall be the responsibility of the prevailing party to seek appropriate enforcement of a decision, including findings, orders or awards of the Arbitrator or Administrator determining non-compliance with a prior award or decision.
- 6.15 If at any time there is a question as to the jurisdiction of the Illinois Jurisdictional Dispute Resolution Process, the primary responsibility for any determination of the arbitrability of a dispute and the jurisdiction of the Arbitrator shall be borne by the party requesting the Arbitrator to hear the underlying jurisdictional dispute. The affected party or parties may proceed before the Arbitrator even in the absence or one or more stipulated parties with the issue of jurisdiction as an additional item to be decided by the Arbitrator. The Administrator may participate in proceedings seeking a declaration or determination that the underlying dispute is subject to the jurisdiction and process of the Illinois Jurisdictional Dispute Resolution Process. In any such proceedings, the non-prevailing party and/or the party challenging the jurisdiction of the Illinois Jurisdictional Dispute Resolution Process shall bear all the costs, expenses and attorneys' fees incurred by the Illinois Jurisdictional Dispute Resolution Process and/or its Administrator in establishing its jurisdiction.

ARTICLE VII - WORK STOPPAGES AND LOCKOUTS

- 7.1 During the term of this PLA, no Union or any of its members, officers, stewards, employees, agents or representatives shall instigate, support, sanction, maintain, or participate in any strike, picketing, walkout, work stoppage, slow down or other activity that interferes with the routine and timely prosecution of work at the Project site or at any other contractor's or supplier's facility that is necessary to performance of work at the Project site. Hand billing at the Project site during the designated lunch period and before commencement or following conclusion of the established standard workday shall not, in itself, be deemed an activity that interferes with the routine and timely prosecution of work on the Project.

7.2 Should any activity prohibited by paragraph 7.1 of this Article occur, the Union shall undertake all steps reasonably necessary to promptly end such prohibited activities.

7.2.A No Union complying with its obligations under this Article shall be liable for acts of employees for which it has no responsibility or for the unauthorized acts of employees it represents. Any employee who participates or encourages any activity prohibited by paragraph 7.1 shall be immediately suspended from all work on the Project for a period equal to the greater of (a) 60 days; or (b) the maximum disciplinary period allowed under the applicable collective bargaining agreement for engaging in comparable unauthorized or prohibited activity.

7.2.B Neither the PLA Committee nor its affiliates shall be liable for acts of employees for which it has no responsibility. The principal officer or officers of the PLA Committee will immediately instruct, order and use the best efforts of his office to cause the affiliated union or unions to cease any violations of this Article. The PLA Committee in its compliance with this obligation shall not be liable for acts of its affiliates. The principal officer or officers of any involved affiliate will immediately instruct, order or use the best effort of his office to cause the employees the union represents to cease any violations of this Article. A union complying with this obligation shall not be liable for unauthorized acts of employees it represents. The failure of the Contractor to exercise its rights in any instance shall not be deemed a waiver of its rights in any other instance.

During the term of this PLA, the Prime Contractor and its Subcontractors shall not engage in any lockout at the Project site of employees covered by this Agreement.

7.3 Upon notification of violations of this Article, the principal officer or officers of the local area Building and Construction Trades Council, and the Illinois AFL-CIO Statewide Project Labor Agreement Committee as appropriate, will immediately instruct, order and use their best efforts to cause the affiliated union or unions to cease any violations of this Article. A Trades Council and the Committee otherwise in compliance with the obligations under this paragraph shall not be liable for unauthorized acts of its affiliates.

7.4 In the event that activities in violation of this Article are not immediately halted through the efforts of the parties, any aggrieved party may invoke the special arbitration provisions set forth in paragraph 7.5 of this Article.

- 7.5 Upon written notice to the other involved parties by the most expeditious means available, any aggrieved party may institute the following special arbitration procedure when a breach of this Article is alleged:
- 7.5.A The party invoking this procedure shall notify the individual designated as the Permanent Arbitrator pursuant to paragraph 6.8 of the nature of the alleged violation; such notice shall be by the most expeditious means possible. The initiating party may also furnish such additional factual information as may be reasonably necessary for the Permanent Arbitrator to understand the relevant circumstances. Copies of any written materials provided to the arbitrator shall also be contemporaneously provided by the most expeditious means possible to the party alleged to be in violation and to all other involved parties.
- 7.5.B Upon receipt of said notice the Permanent Arbitrator shall set and hold a hearing within twenty-four (24) hours if it is contended the violation is ongoing, but not before twenty-four (24) hours after the written notice to all parties involved as required above.
- 7.5.C The Permanent Arbitrator shall notify the parties by facsimile or any other effective written means, of the place and time chosen by the Permanent Arbitrator for this hearing. Said hearing shall be completed in one session. A failure of any party or parties to attend said hearing shall not delay the hearing of evidence or issuance of an Award by the Permanent Arbitrator.
- 7.5.D The sole issue at the hearing shall be whether a violation of this Article has, in fact, occurred. An Award shall be issued in writing within three (3) hours after the close of the hearing, and may be issued without a written opinion. If any party desires a written opinion, one shall be issued within fifteen (15) days, but its issuance shall not delay compliance with, or enforcement of, the Award. The Permanent Arbitrator may order cessation of the violation of this Article, and such Award shall be served on all parties by hand or registered mail upon issuance.
- 7.5.E Such Award may be enforced by any court of competent jurisdiction upon the filing of the Award and such other relevant documents as may be required. Facsimile or other hardcopy written notice of the filing of such enforcement proceedings shall be given to the other relevant parties. In a proceeding to obtain a temporary order enforcing the Permanent Arbitrator's Award as issued under this Article, all parties waive the right to a hearing and agree that such proceedings may be ex parte. Such agreement does not waive any party's right to participate in a hearing for a final order of enforcement. The Court's order or orders enforcing the Permanent Arbitrator's Award shall be served on all parties by hand or by delivery to their last known address or by registered mail.

- 7.6 Individuals found to have violated the provisions of this Article are subject to immediate termination. In addition, IDOT reserves the right to terminate this PLA as to any party found to have violated the provisions of this Article.
- 7.7 Any rights created by statute or law governing arbitration proceedings inconsistent with the above procedure or which interfere with compliance therewith are hereby waived by parties to whom they accrue.
- 7.8 The fees and expenses of the Permanent Arbitrator shall be borne by the party or parties found in violation, or in the event no violation is found, such fees and expenses shall be borne by the moving party.

ARTICLE VIII – TERMS OF AGREEMENT

- 8.1 If any Article or provision of this Agreement shall be declared invalid, inoperative or unenforceable by operation of law or by any of the above mentioned tribunals of competent jurisdiction, the remainder of this Agreement or the application of such Article or provision to persons or circumstances other than those as to which it has been held invalid, inoperative or unenforceable shall not be affected thereby.
- 8.2 This Agreement shall be in full force as of and from the date of the Notice of Award until the Project contract is closed.
- 8.3 This PLA may not be changed or modified except by the subsequent written agreement of the parties. All parties represent that they have the full legal authority to enter into this PLA. This PLA may be executed by the parties in one or more counterparts.
- 8.4 Any liability arising out of this PLA shall be several and not joint. IDOT shall not be liable to any person or other party for any violation of this PLA by any other party, and no Contractor or Union shall be liable for any violation of this PLA by any other Contractor or Union.
- 8.5 The failure or refusal of a party to exercise its rights hereunder in one or more instances shall not be deemed a waiver of any such rights in respect of a separate instance of the same or similar nature.

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Addendum A

IDOT Slate of Permanent Arbitrators

1. Bruce Feldacker
2. Thomas F. Gibbons
3. Edward J. Harrick
4. Brent L. Motchan
5. Robert Perkovich
6. Byron Yaffee
7. Glenn A. Zipp

Exhibit A - Contractor Letter of Assent

(Date)

To All Parties:

In accordance with the terms and conditions of the contract for Construction Work on [Contract No. 62N39], this Letter of Assent hereby confirms that the undersigned Prime Contractor or Subcontractor agrees to be bound by the terms and conditions of the Project Labor Agreement established and entered into by the Illinois Department of Transportation in connection with said Project.

It is the understanding and intent of the undersigned party that this Project Labor Agreement shall pertain only to the identified Project. In the event it is necessary for the undersigned party to become signatory to a collective bargaining agreement to which it is not otherwise a party in order that it may lawfully make certain required contributions to applicable fringe benefit funds, the undersigned party hereby expressly conditions its acceptance of and limits its participation in such collective bargaining agreement to its work on the Project.

(Authorized Company Officer)

(Company)

REQUIRED CONTRACT PROVISIONS FEDERAL-AID CONSTRUCTION CONTRACTS

- I. General
- II. Nondiscrimination
- III. Non-segregated Facilities
- IV. Davis-Bacon and Related Act Provisions
- V. Contract Work Hours and Safety Standards Act Provisions
- VI. Subletting or Assigning the Contract
- VII. Safety: Accident Prevention
- VIII. False Statements Concerning Highway Projects
- IX. Implementation of Clean Air Act and Federal Water Pollution Control Act
- X. Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion
- XI. Certification Regarding Use of Contract Funds for Lobbying
- XII. Use of United States-Flag Vessels:

ATTACHMENTS

A. Employment and Materials Preference for Appalachian Development Highway System or Appalachian Local Access Road Contracts (included in Appalachian contracts only)

I. GENERAL

1. Form FHWA-1273 must be physically incorporated in each construction contract funded under title 23, United States Code, as required in 23 CFR 633.102(b) (excluding emergency contracts solely intended for debris removal). The contractor (or subcontractor) must insert this form in each subcontract and further require its inclusion in all lower tier subcontracts (excluding purchase orders, rental agreements and other agreements for supplies or services). 23 CFR 633.102(e).

The applicable requirements of Form FHWA-1273 are incorporated by reference for work done under any purchase order, rental agreement or agreement for other services. The prime contractor shall be responsible for compliance by any subcontractor, lower-tier subcontractor or service provider. 23 CFR 633.102(e).

Form FHWA-1273 must be included in all Federal-aid design-build contracts, in all subcontracts and in lower tier subcontracts (excluding subcontracts for design services, purchase orders, rental agreements and other agreements for supplies or services) in accordance with 23 CFR 633.102. The design-builder shall be responsible for compliance by any subcontractor, lower-tier subcontractor or service provider.

Contracting agencies may reference Form FHWA-1273 in solicitation-for-bids or request-for-proposals documents, however, the Form FHWA-1273 must be physically incorporated (not referenced) in all contracts, subcontracts and lower-tier subcontracts (excluding purchase orders, rental agreements and other agreements for supplies or services related to a construction contract). 23 CFR 633.102(b).

2. Subject to the applicability criteria noted in the following sections, these contract provisions shall apply to all work

performed on the contract by the contractor's own organization and with the assistance of workers under the contractor's immediate superintendence and to all work performed on the contract by piecework, station work, or by subcontract. 23 CFR 633.102(d).

3. A breach of any of the stipulations contained in these Required Contract Provisions may be sufficient grounds for withholding of progress payments, withholding of final payment, termination of the contract, suspension / debarment or any other action determined to be appropriate by the contracting agency and FHWA.

4. Selection of Labor: During the performance of this contract, the contractor shall not use convict labor for any purpose within the limits of a construction project on a Federal-aid highway unless it is labor performed by convicts who are on parole, supervised release, or probation. 23 U.S.C. 114(b). The term Federal-aid highway does not include roadways functionally classified as local roads or rural minor collectors. 23 U.S.C. 101(a).

II. NONDISCRIMINATION (23 CFR 230.107(a); 23 CFR Part 230, Subpart A, Appendix A; EO 11246)

The provisions of this section related to 23 CFR Part 230, Subpart A, Appendix A are applicable to all Federal-aid construction contracts and to all related construction subcontracts of \$10,000 or more. The provisions of 23 CFR Part 230 are not applicable to material supply, engineering, or architectural service contracts.

In addition, the contractor and all subcontractors must comply with the following policies: Executive Order 11246, 41 CFR Part 60, 29 CFR Parts 1625-1627, 23 U.S.C. 140, Section 504 of the Rehabilitation Act of 1973, as amended (29 U.S.C. 794), Title VI of the Civil Rights Act of 1964, as amended (42 U.S.C. 2000d et seq.), and related regulations including 49 CFR Parts 21, 26, and 27; and 23 CFR Parts 200, 230, and 633.

The contractor and all subcontractors must comply with: the requirements of the Equal Opportunity Clause in 41 CFR 60-1.4(b) and, for all construction contracts exceeding \$10,000, the Standard Federal Equal Employment Opportunity Construction Contract Specifications in 41 CFR 60-4.3.

Note: The U.S. Department of Labor has exclusive authority to determine compliance with Executive Order 11246 and the policies of the Secretary of Labor including 41 CFR Part 60, and 29 CFR Parts 1625-1627. The contracting agency and the FHWA have the authority and the responsibility to ensure compliance with 23 U.S.C. 140, Section 504 of the Rehabilitation Act of 1973, as amended (29 U.S.C. 794), and Title VI of the Civil Rights Act of 1964, as amended (42 U.S.C. 2000d et seq.), and related regulations including 49 CFR Parts 21, 26, and 27; and 23 CFR Parts 200, 230, and 633.

The following provision is adopted from 23 CFR Part 230, Subpart A, Appendix A, with appropriate revisions to conform to the U.S. Department of Labor (US DOL) and FHWA requirements.

1. Equal Employment Opportunity: Equal Employment Opportunity (EEO) requirements not to discriminate and to take affirmative action to assure equal opportunity as set forth under laws, executive orders, rules, regulations (see 28 CFR Part 35, 29 CFR Part 1630, 29 CFR Parts 1625-1627, 41 CFR Part 60 and 49 CFR Part 27) and orders of the Secretary of Labor as modified by the provisions prescribed herein, and imposed pursuant to 23 U.S.C. 140, shall constitute the EEO and specific affirmative action standards for the contractor's project activities under this contract. The provisions of the Americans with Disabilities Act of 1990 (42 U.S.C. 12101 et seq.) set forth under 28 CFR Part 35 and 29 CFR Part 1630 are incorporated by reference in this contract. In the execution of this contract, the contractor agrees to comply with the following minimum specific requirement activities of EEO:

a. The contractor will work with the contracting agency and the Federal Government to ensure that it has made every good faith effort to provide equal opportunity with respect to all of its terms and conditions of employment and in their review of activities under the contract. 23 CFR 230.409 (g)(4) & (5).

b. The contractor will accept as its operating policy the following statement:

"It is the policy of this Company to assure that applicants are employed, and that employees are treated during employment, without regard to their race, religion, sex, sexual orientation, gender identity, color, national origin, age or disability. Such action shall include: employment, upgrading, demotion, or transfer; recruitment or recruitment advertising; layoff or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship, pre-apprenticeship, and/or on-the-job training."

2. EEO Officer: The contractor will designate and make known to the contracting officers an EEO Officer who will have the responsibility for and must be capable of effectively administering and promoting an active EEO program and who must be assigned adequate authority and responsibility to do so.

3. Dissemination of Policy: All members of the contractor's staff who are authorized to hire, supervise, promote, and discharge employees, or who recommend such action or are substantially involved in such action, will be made fully cognizant of and will implement the contractor's EEO policy and contractual responsibilities to provide EEO in each grade and classification of employment. To ensure that the above agreement will be met, the following actions will be taken as a minimum:

a. Periodic meetings of supervisory and personnel office employees will be conducted before the start of work and then not less often than once every six months, at which time the contractor's EEO policy and its implementation will be reviewed and explained. The meetings will be conducted by the EEO Officer or other knowledgeable company official.

b. All new supervisory or personnel office employees will be given a thorough indoctrination by the EEO Officer, covering all major aspects of the contractor's EEO obligations within thirty days following their reporting for duty with the contractor.

c. All personnel who are engaged in direct recruitment for the project will be instructed by the EEO Officer in the contractor's procedures for locating and hiring minorities and women.

d. Notices and posters setting forth the contractor's EEO policy will be placed in areas readily accessible to employees, applicants for employment and potential employees.

e. The contractor's EEO policy and the procedures to implement such policy will be brought to the attention of employees by means of meetings, employee handbooks, or other appropriate means.

4. Recruitment: When advertising for employees, the contractor will include in all advertisements for employees the notation: "An Equal Opportunity Employer." All such advertisements will be placed in publications having a large circulation among minorities and women in the area from which the project work force would normally be derived.

a. The contractor will, unless precluded by a valid bargaining agreement, conduct systematic and direct recruitment through public and private employee referral sources likely to yield qualified minorities and women. To meet this requirement, the contractor will identify sources of potential minority group employees and establish with such identified sources procedures whereby minority and women applicants may be referred to the contractor for employment consideration.

b. In the event the contractor has a valid bargaining agreement providing for exclusive hiring hall referrals, the contractor is expected to observe the provisions of that agreement to the extent that the system meets the contractor's compliance with EEO contract provisions. Where implementation of such an agreement has the effect of discriminating against minorities or women, or obligates the contractor to do the same, such implementation violates Federal nondiscrimination provisions.

c. The contractor will encourage its present employees to refer minorities and women as applicants for employment. Information and procedures with regard to referring such applicants will be discussed with employees.

5. Personnel Actions: Wages, working conditions, and employee benefits shall be established and administered, and personnel actions of every type, including hiring, upgrading, promotion, transfer, demotion, layoff, and termination, shall be taken without regard to race, color, religion, sex, sexual orientation, gender identity, national origin, age or disability. The following procedures shall be followed:

a. The contractor will conduct periodic inspections of project sites to ensure that working conditions and employee facilities do not indicate discriminatory treatment of project site personnel.

b. The contractor will periodically evaluate the spread of wages paid within each classification to determine any evidence of discriminatory wage practices.

c. The contractor will periodically review selected personnel actions in depth to determine whether there is evidence of discrimination. Where evidence is found, the contractor will promptly take corrective action. If the review indicates that the discrimination may extend beyond the actions reviewed, such corrective action shall include all affected persons.

d. The contractor will promptly investigate all complaints of alleged discrimination made to the contractor in connection with its obligations under this contract, will attempt to resolve such complaints, and will take appropriate corrective action

within a reasonable time. If the investigation indicates that the discrimination may affect persons other than the complainant, such corrective action shall include such other persons. Upon completion of each investigation, the contractor will inform every complainant of all of their avenues of appeal.

6. Training and Promotion:

a. The contractor will assist in locating, qualifying, and increasing the skills of minorities and women who are applicants for employment or current employees. Such efforts should be aimed at developing full journey level status employees in the type of trade or job classification involved.

b. Consistent with the contractor's work force requirements and as permissible under Federal and State regulations, the contractor shall make full use of training programs (i.e., apprenticeship and on-the-job training programs for the geographical area of contract performance). In the event a special provision for training is provided under this contract, this subparagraph will be superseded as indicated in the special provision. The contracting agency may reserve training positions for persons who receive welfare assistance in accordance with 23 U.S.C. 140(a).

c. The contractor will advise employees and applicants for employment of available training programs and entrance requirements for each.

d. The contractor will periodically review the training and promotion potential of employees who are minorities and women and will encourage eligible employees to apply for such training and promotion.

7. Unions: If the contractor relies in whole or in part upon unions as a source of employees, the contractor will use good faith efforts to obtain the cooperation of such unions to increase opportunities for minorities and women. 23 CFR 230.409. Actions by the contractor, either directly or through a contractor's association acting as agent, will include the procedures set forth below:

a. The contractor will use good faith efforts to develop, in cooperation with the unions, joint training programs aimed toward qualifying more minorities and women for membership in the unions and increasing the skills of minorities and women so that they may qualify for higher paying employment.

b. The contractor will use good faith efforts to incorporate an EEO clause into each union agreement to the end that such union will be contractually bound to refer applicants without regard to their race, color, religion, sex, sexual orientation, gender identity, national origin, age, or disability.

c. The contractor is to obtain information as to the referral practices and policies of the labor union except that to the extent such information is within the exclusive possession of the labor union and such labor union refuses to furnish such information to the contractor, the contractor shall so certify to the contracting agency and shall set forth what efforts have been made to obtain such information.

d. In the event the union is unable to provide the contractor with a reasonable flow of referrals within the time limit set forth in the collective bargaining agreement, the contractor will, through independent recruitment efforts, fill the employment vacancies without regard to race, color, religion, sex, sexual orientation, gender identity, national origin, age, or disability; making full efforts to obtain qualified and/or qualifiable minorities and women. The failure of a union to provide

sufficient referrals (even though it is obligated to provide exclusive referrals under the terms of a collective bargaining agreement) does not relieve the contractor from the requirements of this paragraph. In the event the union referral practice prevents the contractor from meeting the obligations pursuant to Executive Order 11246, as amended, and these special provisions, such contractor shall immediately notify the contracting agency.

8. Reasonable Accommodation for Applicants /

Employees with Disabilities: The contractor must be familiar with the requirements for and comply with the Americans with Disabilities Act and all rules and regulations established thereunder. Employers must provide reasonable accommodation in all employment activities unless to do so would cause an undue hardship.

9. Selection of Subcontractors, Procurement of Materials and Leasing of Equipment:

The contractor shall not discriminate on the grounds of race, color, religion, sex, sexual orientation, gender identity, national origin, age, or disability in the selection and retention of subcontractors, including procurement of materials and leases of equipment. The contractor shall take all necessary and reasonable steps to ensure nondiscrimination in the administration of this contract.

a. The contractor shall notify all potential subcontractors, suppliers, and lessors of their EEO obligations under this contract.

b. The contractor will use good faith efforts to ensure subcontractor compliance with their EEO obligations.

10. Assurances Required:

a. The requirements of 49 CFR Part 26 and the State DOT's FHWA-approved Disadvantaged Business Enterprise (DBE) program are incorporated by reference.

b. 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 DOT-assisted contracts. 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:

- (1) Withholding monthly progress payments;
- (2) Assessing sanctions;
- (3) Liquidated damages; and/or
- (4) Disqualifying the contractor from future bidding as non-responsible.

c. The Title VI and nondiscrimination provisions of U.S. DOT Order 1050.2A at Appendixes A and E are incorporated by reference. 49 CFR Part 21.

11. Records and Reports: The contractor shall keep such records as necessary to document compliance with the EEO requirements. Such records shall be retained for a period of three years following the date of the final payment to the contractor for all contract work and shall be available at reasonable times and places for inspection by authorized representatives of the contracting agency and the FHWA.

a. The records kept by the contractor shall document the following:

(1) The number and work hours of minority and non-minority group members and women employed in each work classification on the project;

(2) The progress and efforts being made in cooperation with unions, when applicable, to increase employment opportunities for minorities and women; and

(3) The progress and efforts being made in locating, hiring, training, qualifying, and upgrading minorities and women.

b. The contractors and subcontractors will submit an annual report to the contracting agency each July for the duration of the project indicating the number of minority, women, and non-minority group employees currently engaged in each work classification required by the contract work. This information is to be reported on [Form FHWA-1391](#). The staffing data should represent the project work force on board in all or any part of the last payroll period preceding the end of July. If on-the-job training is being required by special provision, the contractor will be required to collect and report training data. The employment data should reflect the work force on board during all or any part of the last payroll period preceding the end of July.

III. NONSEGREGATED FACILITIES

This provision is applicable to all Federal-aid construction contracts and to all related construction subcontracts of more than \$10,000. 41 CFR 60-1.5.

As prescribed by 41 CFR 60-1.8, the contractor must ensure that facilities provided for employees are provided in such a manner that segregation on the basis of race, color, religion, sex, sexual orientation, gender identity, or national origin cannot result. The contractor may neither require such segregated use by written or oral policies nor tolerate such use by employee custom. The contractor's obligation extends further to ensure that its employees are not assigned to perform their services at any location under the contractor's control where the facilities are segregated. The term "facilities" includes waiting rooms, work areas, restaurants and other eating areas, time clocks, restrooms, washrooms, locker rooms and other storage or dressing areas, parking lots, drinking fountains, recreation or entertainment areas, transportation, and housing provided for employees. The contractor shall provide separate or single-user restrooms and necessary dressing or sleeping areas to assure privacy between sexes.

IV. DAVIS-BACON AND RELATED ACT PROVISIONS

This section is applicable to all Federal-aid construction projects exceeding \$2,000 and to all related subcontracts and lower-tier subcontracts (regardless of subcontract size), in accordance with 29 CFR 5.5. The requirements apply to all projects located within the right-of-way of a roadway that is functionally classified as Federal-aid highway. 23 U.S.C. 113. This excludes roadways functionally classified as local roads or rural minor collectors, which are exempt. 23 U.S.C. 101. Where applicable law requires that projects be treated as a project on a Federal-aid highway, the provisions of this subpart will apply regardless of the location of the project. Examples include: Surface Transportation Block Grant Program projects funded under 23 U.S.C. 133 [excluding recreational trails projects], the Nationally Significant Freight and Highway

Projects funded under 23 U.S.C. 117, and National Highway Freight Program projects funded under 23 U.S.C. 167.

The following provisions are from the U.S. Department of Labor regulations in 29 CFR 5.5 "Contract provisions and related matters" with minor revisions to conform to the FHWA- 1273 format and FHWA program requirements.

1. Minimum wages (29 CFR 5.5)

a. *Wage rates and fringe benefits.* All laborers and mechanics employed or working upon the site of the work (or otherwise working in construction or development of the project under a development statute), will be paid unconditionally and not less often than once a week, and without subsequent deduction or rebate on any account (except such payroll deductions as are permitted by regulations issued by the Secretary of Labor under the Copeland Act ([29 CFR part 3](#))), the full amount of basic hourly wages and bona fide fringe benefits (or cash equivalents thereof) due at time of payment computed at rates not less than those contained in the wage determination of the Secretary of Labor which is attached hereto and made a part hereof, regardless of any contractual relationship which may be alleged to exist between the contractor and such laborers and mechanics. As provided in paragraphs (d) and (e) of 29 CFR 5.5, the appropriate wage determinations are effective by operation of law even if they have not been attached to the contract. Contributions made or costs reasonably anticipated for bona fide fringe benefits under the Davis-Bacon Act ([40 U.S.C. 3141\(2\)\(B\)](#)) on behalf of laborers or mechanics are considered wages paid to such laborers or mechanics, subject to the provisions of paragraph 1.e. of this section; also, regular contributions made or costs incurred for more than a weekly period (but not less often than quarterly) under plans, funds, or programs which cover the particular weekly period, are deemed to be constructively made or incurred during such weekly period. Such laborers and mechanics must be paid the appropriate wage rate and fringe benefits on the wage determination for the classification(s) of work actually performed, without regard to skill, except as provided in paragraph 4. of this section. Laborers or mechanics performing work in more than one classification may be compensated at the rate specified for each classification for the time actually worked therein: *Provided*, That the employer's payroll records accurately set forth the time spent in each classification in which work is performed. The wage determination (including any additional classifications and wage rates conformed under paragraph 1.c. of this section) and the Davis-Bacon poster (WH-1321) must be posted at all times by the contractor and its subcontractors at the site of the work in a prominent and accessible place where it can be easily seen by the workers.

b. *Frequently recurring classifications.* (1) In addition to wage and fringe benefit rates that have been determined to be prevailing under the procedures set forth in [29 CFR part 1](#), a wage determination may contain, pursuant to § 1.3(f), wage and fringe benefit rates for classifications of laborers and mechanics for which conformance requests are regularly submitted pursuant to paragraph 1.c. of this section, provided that:

(i) The work performed by the classification is not performed by a classification in the wage determination for which a prevailing wage rate has been determined;

(ii) The classification is used in the area by the construction industry; and

(iii) The wage rate for the classification bears a reasonable relationship to the prevailing wage rates contained in the wage determination.

(2) The Administrator will establish wage rates for such classifications in accordance with paragraph 1.c.(1)(iii) of this section. Work performed in such a classification must be paid at no less than the wage and fringe benefit rate listed on the wage determination for such classification.

c. *Conformance.* (1) The contracting officer must require that any class of laborers or mechanics, including helpers, which is not listed in the wage determination and which is to be employed under the contract be classified in conformance with the wage determination. Conformance of an additional classification and wage rate and fringe benefits is appropriate only when the following criteria have been met:

(i) The work to be performed by the classification requested is not performed by a classification in the wage determination; and

(ii) The classification is used in the area by the construction industry; and

(iii) The proposed wage rate, including any bona fide fringe benefits, bears a reasonable relationship to the wage rates contained in the wage determination.

(2) The conformance process may not be used to split, subdivide, or otherwise avoid application of classifications listed in the wage determination.

(3) If the contractor and the laborers and mechanics to be employed in the classification (if known), or their representatives, and the contracting officer agree on the classification and wage rate (including the amount designated for fringe benefits where appropriate), a report of the action taken will be sent by the contracting officer by email to DBAconformance@dol.gov. The Administrator, or an authorized representative, will approve, modify, or disapprove every additional classification action within 30 days of receipt and so advise the contracting officer or will notify the contracting officer within the 30-day period that additional time is necessary.

(4) In the event the contractor, the laborers or mechanics to be employed in the classification or their representatives, and the contracting officer do not agree on the proposed classification and wage rate (including the amount designated for fringe benefits, where appropriate), the contracting officer will, by email to DBAconformance@dol.gov, refer the questions, including the views of all interested parties and the recommendation of the contracting officer, to the Administrator for determination. The Administrator, or an authorized representative, will issue a determination within 30 days of receipt and so advise the contracting officer or will notify the contracting officer within the 30-day period that additional time is necessary.

(5) The contracting officer must promptly notify the contractor of the action taken by the Wage and Hour Division

under paragraphs 1.c.(3) and (4) of this section. The contractor must furnish a written copy of such determination to each affected worker or it must be posted as a part of the wage determination. The wage rate (including fringe benefits where appropriate) determined pursuant to paragraph 1.c.(3) or (4) of this section must be paid to all workers performing work in the classification under this contract from the first day on which work is performed in the classification.

d. *Fringe benefits not expressed as an hourly rate.*

Whenever the minimum wage rate prescribed in the contract for a class of laborers or mechanics includes a fringe benefit which is not expressed as an hourly rate, the contractor may either pay the benefit as stated in the wage determination or may pay another bona fide fringe benefit or an hourly cash equivalent thereof.

e. *Unfunded plans.* If the contractor does not make payments to a trustee or other third person, the contractor may consider as part of the wages of any laborer or mechanic the amount of any costs reasonably anticipated in providing bona fide fringe benefits under a plan or program, *Provided*, That the Secretary of Labor has found, upon the written request of the contractor, in accordance with the criteria set forth in § 5.28, that the applicable standards of the Davis-Bacon Act have been met. The Secretary of Labor may require the contractor to set aside in a separate account assets for the meeting of obligations under the plan or program.

f. *Interest.* In the event of a failure to pay all or part of the wages required by the contract, the contractor will be required to pay interest on any underpayment of wages.

2. Withholding (29 CFR 5.5)

a. *Withholding requirements.* The contracting agency may, upon its own action, or must, upon written request of an authorized representative of the Department of Labor, withhold or cause to be withheld from the contractor so much of the accrued payments or advances as may be considered necessary to satisfy the liabilities of the prime contractor or any subcontractor for the full amount of wages and monetary relief, including interest, required by the clauses set forth in this section for violations of this contract, or to satisfy any such liabilities required by any other Federal contract, or federally assisted contract subject to Davis-Bacon labor standards, that is held by the same prime contractor (as defined in § 5.2). The necessary funds may be withheld from the contractor under this contract, any other Federal contract with the same prime contractor, or any other federally assisted contract that is subject to Davis-Bacon labor standards requirements and is held by the same prime contractor, regardless of whether the other contract was awarded or assisted by the same agency, and such funds may be used to satisfy the contractor liability for which the funds were withheld. In the event of a contractor's failure to pay any laborer or mechanic, including any apprentice or helper working on the site of the work all or part of the wages required by the contract, or upon the contractor's failure to submit the required records as discussed in paragraph 3.d. of this section, the contracting agency may on its own initiative and after written notice to the contractor, take such action as may be necessary to cause the suspension of any further payment, advance, or guarantee of funds until such violations have ceased.

b. *Priority to withheld funds.* The Department has priority to funds withheld or to be withheld in accordance with paragraph

2.a. of this section or Section V, paragraph 3.a., or both, over claims to those funds by:

- (1) A contractor's surety(ies), including without limitation performance bond sureties and payment bond sureties;
- (2) A contracting agency for its procurement costs;
- (3) A trustee(s) (either a court-appointed trustee or a U.S. trustee, or both) in bankruptcy of a contractor, or a contractor's bankruptcy estate;
- (4) A contractor's assignee(s);
- (5) A contractor's successor(s); or
- (6) A claim asserted under the Prompt Payment Act, [31 U.S.C. 3901–3907](#).

3. Records and certified payrolls (29 CFR 5.5)

a. Basic record requirements (1) Length of record retention. All regular payrolls and other basic records must be maintained by the contractor and any subcontractor during the course of the work and preserved for all laborers and mechanics working at the site of the work (or otherwise working in construction or development of the project under a development statute) for a period of at least 3 years after all the work on the prime contract is completed.

(2) *Information required.* Such records must contain the name; Social Security number; last known address, telephone number, and email address of each such worker; each worker's correct classification(s) of work actually performed; hourly rates of wages paid (including rates of contributions or costs anticipated for bona fide fringe benefits or cash equivalents thereof of the types described in [40 U.S.C. 3141\(2\)\(B\)](#) of the Davis-Bacon Act); daily and weekly number of hours actually worked in total and on each covered contract; deductions made; and actual wages paid.

(3) *Additional records relating to fringe benefits.* Whenever the Secretary of Labor has found under paragraph 1.e. of this section that the wages of any laborer or mechanic include the amount of any costs reasonably anticipated in providing benefits under a plan or program described in [40 U.S.C. 3141\(2\)\(B\)](#) of the Davis-Bacon Act, the contractor must maintain records which show that the commitment to provide such benefits is enforceable, that the plan or program is financially responsible, and that the plan or program has been communicated in writing to the laborers or mechanics affected, and records which show the costs anticipated or the actual cost incurred in providing such benefits.

(4) *Additional records relating to apprenticeship.* Contractors with apprentices working under approved programs must maintain written evidence of the registration of apprenticeship programs, the registration of the apprentices, and the ratios and wage rates prescribed in the applicable programs.

b. Certified payroll requirements (1) Frequency and method of submission. The contractor or subcontractor must submit weekly, for each week in which any DBA- or Related Acts-covered work is performed, certified payrolls to the contracting

agency. The prime contractor is responsible for the submission of all certified payrolls by all subcontractors. A contracting agency or prime contractor may permit or require contractors to submit certified payrolls through an electronic system, as long as the electronic system requires a legally valid electronic signature; the system allows the contractor, the contracting agency, and the Department of Labor to access the certified payrolls upon request for at least 3 years after the work on the prime contract has been completed; and the contracting agency or prime contractor permits other methods of submission in situations where the contractor is unable or limited in its ability to use or access the electronic system.

(2) *Information required.* The certified payrolls submitted must set out accurately and completely all of the information required to be maintained under paragraph 3.a.(2) of this section, except that full Social Security numbers and last known addresses, telephone numbers, and email addresses must not be included on weekly transmittals. Instead, the certified payrolls need only include an individually identifying number for each worker (e.g., the last four digits of the worker's Social Security number). The required weekly certified payroll information may be submitted using Optional Form WH-347 or in any other format desired. Optional Form WH-347 is available for this purpose from the Wage and Hour Division website at <https://www.dol.gov/sites/dolgov/files/WHDLegacy/files/wh347.pdf> or its successor website. It is not a violation of this section for a prime contractor to require a subcontractor to provide full Social Security numbers and last known addresses, telephone numbers, and email addresses to the prime contractor for its own records, without weekly submission by the subcontractor to the contracting agency.

(3) *Statement of Compliance.* Each certified payroll submitted must be accompanied by a "Statement of Compliance," signed by the contractor or subcontractor, or the contractor's or subcontractor's agent who pays or supervises the payment of the persons working on the contract, and must certify the following:

(i) That the certified payroll for the payroll period contains the information required to be provided under paragraph 3.b. of this section, the appropriate information and basic records are being maintained under paragraph 3.a. of this section, and such information and records are correct and complete;

(ii) That each laborer or mechanic (including each helper and apprentice) working on the contract during the payroll period has been paid the full weekly wages earned, without rebate, either directly or indirectly, and that no deductions have been made either directly or indirectly from the full wages earned, other than permissible deductions as set forth in [29 CFR part 3](#); and

(iii) That each laborer or mechanic has been paid not less than the applicable wage rates and fringe benefits or cash equivalents for the classification(s) of work actually performed, as specified in the applicable wage determination incorporated into the contract.

(4) *Use of Optional Form WH-347.* The weekly submission of a properly executed certification set forth on the reverse side of Optional Form WH-347 will satisfy the requirement for submission of the "Statement of Compliance" required by paragraph 3.b.(3) of this section.

(5) *Signature.* The signature by the contractor, subcontractor, or the contractor's or subcontractor's agent must be an original handwritten signature or a legally valid electronic signature.

(6) *Falsification.* The falsification of any of the above certifications may subject the contractor or subcontractor to civil or criminal prosecution under [18 U.S.C. 1001](#) and [31 U.S.C. 3729](#).

(7) *Length of certified payroll retention.* The contractor or subcontractor must preserve all certified payrolls during the course of the work and for a period of 3 years after all the work on the prime contract is completed.

c. *Contracts, subcontracts, and related documents.* The contractor or subcontractor must maintain this contract or subcontract and related documents including, without limitation, bids, proposals, amendments, modifications, and extensions. The contractor or subcontractor must preserve these contracts, subcontracts, and related documents during the course of the work and for a period of 3 years after all the work on the prime contract is completed.

d. *Required disclosures and access (1) Required record disclosures and access to workers.* The contractor or subcontractor must make the records required under paragraphs 3.a. through 3.c. of this section, and any other documents that the contracting agency, the State DOT, the FHWA, or the Department of Labor deems necessary to determine compliance with the labor standards provisions of any of the applicable statutes referenced by § 5.1, available for inspection, copying, or transcription by authorized representatives of the contracting agency, the State DOT, the FHWA, or the Department of Labor, and must permit such representatives to interview workers during working hours on the job.

(2) *Sanctions for non-compliance with records and worker access requirements.* If the contractor or subcontractor fails to submit the required records or to make them available, or refuses to permit worker interviews during working hours on the job, the Federal agency may, after written notice to the contractor, sponsor, applicant, owner, or other entity, as the case may be, that maintains such records or that employs such workers, take such action as may be necessary to cause the suspension of any further payment, advance, or guarantee of funds. Furthermore, failure to submit the required records upon request or to make such records available, or to permit worker interviews during working hours on the job, may be grounds for debarment action pursuant to § 5.12. In addition, any contractor or other person that fails to submit the required records or make those records available to WHD within the time WHD requests that the records be produced will be precluded from introducing as evidence in an administrative proceeding under [29 CFR part 6](#) any of the required records that were not provided or made available to WHD. WHD will take into consideration a reasonable request from the contractor or person for an extension of the time for submission of records. WHD will determine the reasonableness of the request and may consider, among other things, the location of the records and the volume of production.

(3) *Required information disclosures.* Contractors and subcontractors must maintain the full Social Security number and last known address, telephone number, and email address

of each covered worker, and must provide them upon request to the contracting agency, the State DOT, the FHWA, the contractor, or the Wage and Hour Division of the Department of Labor for purposes of an investigation or other compliance action.

4. Apprentices and equal employment opportunity (29 CFR 5.5)

a. *Apprentices (1) Rate of pay.* Apprentices will be permitted to work at less than the predetermined rate for the work they perform when they are employed pursuant to and individually registered in a bona fide apprenticeship program registered with the U.S. Department of Labor, Employment and Training Administration, Office of Apprenticeship (OA), or with a State Apprenticeship Agency recognized by the OA. A person who is not individually registered in the program, but who has been certified by the OA or a State Apprenticeship Agency (where appropriate) to be eligible for probationary employment as an apprentice, will be permitted to work at less than the predetermined rate for the work they perform in the first 90 days of probationary employment as an apprentice in such a program. In the event the OA or a State Apprenticeship Agency recognized by the OA withdraws approval of an apprenticeship program, the contractor will no longer be permitted to use apprentices at less than the applicable predetermined rate for the work performed until an acceptable program is approved.

(2) *Fringe benefits.* Apprentices must be paid fringe benefits in accordance with the provisions of the apprenticeship program. If the apprenticeship program does not specify fringe benefits, apprentices must be paid the full amount of fringe benefits listed on the wage determination for the applicable classification. If the Administrator determines that a different practice prevails for the applicable apprentice classification, fringe benefits must be paid in accordance with that determination.

(3) *Apprenticeship ratio.* The allowable ratio of apprentices to journeymen on the job site in any craft classification must not be greater than the ratio permitted to the contractor as to the entire work force under the registered program or the ratio applicable to the locality of the project pursuant to paragraph 4.a.(4) of this section. Any worker listed on a payroll at an apprentice wage rate, who is not registered or otherwise employed as stated in paragraph 4.a.(1) of this section, must be paid not less than the applicable wage rate on the wage determination for the classification of work actually performed. In addition, any apprentice performing work on the job site in excess of the ratio permitted under this section must be paid not less than the applicable wage rate on the wage determination for the work actually performed.

(4) *Reciprocity of ratios and wage rates.* Where a contractor is performing construction on a project in a locality other than the locality in which its program is registered, the ratios and wage rates (expressed in percentages of the journeyworker's hourly rate) applicable within the locality in which the construction is being performed must be observed. If there is no applicable ratio or wage rate for the locality of the project, the ratio and wage rate specified in the contractor's registered program must be observed.

b. *Equal employment opportunity.* The use of apprentices and journeymen under this part must be in conformity with

the equal employment opportunity requirements of Executive Order 11246, as amended, and [29 CFR part 30](#).

c. Apprentices and Trainees (programs of the U.S. DOT).

Apprentices and trainees working under apprenticeship and skill training programs which have been certified by the Secretary of Transportation as promoting EEO in connection with Federal-aid highway construction programs are not subject to the requirements of paragraph 4 of this Section IV. 23 CFR 230.111(e)(2). The straight time hourly wage rates for apprentices and trainees under such programs will be established by the particular programs. The ratio of apprentices and trainees to journeyworkers shall not be greater than permitted by the terms of the particular program.

5. Compliance with Copeland Act requirements. The contractor shall comply with the requirements of 29 CFR part 3, which are incorporated by reference in this contract as provided in 29 CFR 5.5.

6. Subcontracts. The contractor or subcontractor must insert FHWA-1273 in any subcontracts, along with the applicable wage determination(s) and such other clauses or contract modifications as the contracting agency may by appropriate instructions require, and a clause requiring the subcontractors to include these clauses and wage determination(s) in any lower tier subcontracts. The prime contractor is responsible for the compliance by any subcontractor or lower tier subcontractor with all the contract clauses in this section. In the event of any violations of these clauses, the prime contractor and any subcontractor(s) responsible will be liable for any unpaid wages and monetary relief, including interest from the date of the underpayment or loss, due to any workers of lower-tier subcontractors, and may be subject to debarment, as appropriate. 29 CFR 5.5.

7. Contract termination: debarment. A breach of the contract clauses in 29 CFR 5.5 may be grounds for termination of the contract, and for debarment as a contractor and a subcontractor as provided in 29 CFR 5.12.

8. Compliance with Davis-Bacon and Related Act requirements. All rulings and interpretations of the Davis-Bacon and Related Acts contained in 29 CFR parts 1, 3, and 5 are herein incorporated by reference in this contract as provided in 29 CFR 5.5.

9. Disputes concerning labor standards. As provided in 29 CFR 5.5, disputes arising out of the labor standards provisions of this contract shall not be subject to the general disputes clause of this contract. Such disputes shall be resolved in accordance with the procedures of the Department of Labor set forth in 29 CFR parts 5, 6, and 7. Disputes within the meaning of this clause include disputes between the contractor (or any of its subcontractors) and the contracting agency, the U.S. Department of Labor, or the employees or their representatives.

10. Certification of eligibility. a. By entering into this contract, the contractor certifies that neither it nor any person or firm who has an interest in the contractor's firm is a person or firm ineligible to be awarded Government contracts by virtue of [40 U.S.C. 3144\(b\)](#) or § 5.12(a).

b. No part of this contract shall be subcontracted to any person or firm ineligible for award of a Government contract by virtue of [40 U.S.C. 3144\(b\)](#) or § 5.12(a).

c. The penalty for making false statements is prescribed in the U.S. Code, Title 18 Crimes and Criminal Procedure, [18 U.S.C. 1001](#).

11. Anti-retaliation. It is unlawful for any person to discharge, demote, intimidate, threaten, restrain, coerce, blacklist, harass, or in any other manner discriminate against, or to cause any person to discharge, demote, intimidate, threaten, restrain, coerce, blacklist, harass, or in any other manner discriminate against, any worker or job applicant for:

a. Notifying any contractor of any conduct which the worker reasonably believes constitutes a violation of the DBA, Related Acts, this part, or [29 CFR part 1](#) or [3](#);

b. Filing any complaint, initiating or causing to be initiated any proceeding, or otherwise asserting or seeking to assert on behalf of themselves or others any right or protection under the DBA, Related Acts, this part, or [29 CFR part 1](#) or [3](#);

c. Cooperating in any investigation or other compliance action, or testifying in any proceeding under the DBA, Related Acts, this part, or [29 CFR part 1](#) or [3](#); or

d. Informing any other person about their rights under the DBA, Related Acts, this part, or [29 CFR part 1](#) or [3](#).

V. CONTRACT WORK HOURS AND SAFETY STANDARDS ACT

Pursuant to 29 CFR 5.5(b), the following clauses apply to any Federal-aid construction contract in an amount in excess of \$100,000 and subject to the overtime provisions of the Contract Work Hours and Safety Standards Act. These clauses shall be inserted in addition to the clauses required by 29 CFR 5.5(a) or 29 CFR 4.6. As used in this paragraph, the terms laborers and mechanics include watchpersons and guards.

1. Overtime requirements. No contractor or subcontractor contracting for any part of the contract work which may require or involve the employment of laborers or mechanics shall require or permit any such laborer or mechanic in any workweek in which he or she is employed on such work to work in excess of forty hours in such workweek unless such laborer or mechanic receives compensation at a rate not less than one and one-half times the basic rate of pay for all hours worked in excess of forty hours in such workweek. 29 CFR 5.5.

2. Violation; liability for unpaid wages; liquidated damages. In the event of any violation of the clause set forth in paragraph 1. of this section the contractor and any subcontractor responsible therefor shall be liable for the unpaid wages and interest from the date of the underpayment. In addition, such contractor and subcontractor shall be liable to the United States (in the case of work done under contract for the District of Columbia or a territory, to such District or to such territory), for liquidated damages. Such liquidated damages shall be computed with respect to each individual laborer or

mechanic, including watchpersons and guards, employed in violation of the clause set forth in paragraph 1. of this section, in the sum currently provided in 29 CFR 5.5(b)(2)* for each calendar day on which such individual was required or permitted to work in excess of the standard workweek of forty hours without payment of the overtime wages required by the clause set forth in paragraph 1. of this section.

* \$31 as of January 15, 2023 (See 88 FR 88 FR 2210) as may be adjusted annually by the Department of Labor, pursuant to the Federal Civil Penalties Inflation Adjustment Act of 1990.

3. Withholding for unpaid wages and liquidated damages

a. *Withholding process.* The FHWA or the contracting agency may, upon its own action, or must, upon written request of an authorized representative of the Department of Labor, withhold or cause to be withheld from the contractor so much of the accrued payments or advances as may be considered necessary to satisfy the liabilities of the prime contractor or any subcontractor for any unpaid wages; monetary relief, including interest; and liquidated damages required by the clauses set forth in this section on this contract, any other Federal contract with the same prime contractor, or any other federally assisted contract subject to the Contract Work Hours and Safety Standards Act that is held by the same prime contractor (as defined in § 5.2). The necessary funds may be withheld from the contractor under this contract, any other Federal contract with the same prime contractor, or any other federally assisted contract that is subject to the Contract Work Hours and Safety Standards Act and is held by the same prime contractor, regardless of whether the other contract was awarded or assisted by the same agency, and such funds may be used to satisfy the contractor liability for which the funds were withheld.

b. *Priority to withheld funds.* The Department has priority to funds withheld or to be withheld in accordance with Section IV paragraph 2.a. or paragraph 3.a. of this section, or both, over claims to those funds by:

- (1) A contractor's surety(ies), including without limitation performance bond sureties and payment bond sureties;
- (2) A contracting agency for its repurchase costs;
- (3) A trustee(s) (either a court-appointed trustee or a U.S. trustee, or both) in bankruptcy of a contractor, or a contractor's bankruptcy estate;
- (4) A contractor's assignee(s);
- (5) A contractor's successor(s); or
- (6) A claim asserted under the Prompt Payment Act, [31 U.S.C. 3901](#)–3907.

4. Subcontracts. The contractor or subcontractor must insert in any subcontracts the clauses set forth in paragraphs 1. through 5. of this section and a clause requiring the subcontractors to include these clauses in any lower tier subcontracts. The prime contractor is responsible for compliance by any subcontractor or lower tier subcontractor with the clauses set forth in paragraphs 1. through 5. In the

event of any violations of these clauses, the prime contractor and any subcontractor(s) responsible will be liable for any unpaid wages and monetary relief, including interest from the date of the underpayment or loss, due to any workers of lower-tier subcontractors, and associated liquidated damages and may be subject to debarment, as appropriate.

5. Anti-retaliation. It is unlawful for any person to discharge, demote, intimidate, threaten, restrain, coerce, blacklist, harass, or in any other manner discriminate against, or to cause any person to discharge, demote, intimidate, threaten, restrain, coerce, blacklist, harass, or in any other manner discriminate against, any worker or job applicant for:

a. Notifying any contractor of any conduct which the worker reasonably believes constitutes a violation of the Contract Work Hours and Safety Standards Act (CWHSSA) or its implementing regulations in this part;

b. Filing any complaint, initiating or causing to be initiated any proceeding, or otherwise asserting or seeking to assert on behalf of themselves or others any right or protection under CWHSSA or this part;

c. Cooperating in any investigation or other compliance action, or testifying in any proceeding under CWHSSA or this part; or

d. Informing any other person about their rights under CWHSSA or this part.

VI. SUBLETTING OR ASSIGNING THE CONTRACT

This provision is applicable to all Federal-aid construction contracts on the National Highway System pursuant to 23 CFR 635.116.

1. The contractor shall perform with its own organization contract work amounting to not less than 30 percent (or a greater percentage if specified elsewhere in the contract) of the total original contract price, excluding any specialty items designated by the contracting agency. Specialty items may be performed by subcontract and the amount of any such specialty items performed may be deducted from the total original contract price before computing the amount of work required to be performed by the contractor's own organization (23 CFR 635.116).

a. The term "perform work with its own organization" in paragraph 1 of Section VI refers to workers employed or leased by the prime contractor, and equipment owned or rented by the prime contractor, with or without operators. Such term does not include employees or equipment of a subcontractor or lower tier subcontractor, agents of the prime contractor, or any other assignees. The term may include payments for the costs of hiring leased employees from an employee leasing firm meeting all relevant Federal and State regulatory requirements. Leased employees may only be included in this term if the prime contractor meets all of the following conditions: (based on longstanding interpretation)

(1) the prime contractor maintains control over the supervision of the day-to-day activities of the leased employees;

(2) the prime contractor remains responsible for the quality of the work of the leased employees;

- (3) the prime contractor retains all power to accept or exclude individual employees from work on the project; and
- (4) the prime contractor remains ultimately responsible for the payment of predetermined minimum wages, the submission of payrolls, statements of compliance and all other Federal regulatory requirements.

b. "Specialty Items" shall be construed to be limited to work that requires highly specialized knowledge, abilities, or equipment not ordinarily available in the type of contracting organizations qualified and expected to bid or propose on the contract as a whole and in general are to be limited to minor components of the overall contract. 23 CFR 635.102.

2. Pursuant to 23 CFR 635.116(a), the contract amount upon which the requirements set forth in paragraph (1) of Section VI is computed includes the cost of material and manufactured products which are to be purchased or produced by the contractor under the contract provisions.

3. Pursuant to 23 CFR 635.116(c), the contractor shall furnish (a) a competent superintendent or supervisor who is employed by the firm, has full authority to direct performance of the work in accordance with the contract requirements, and is in charge of all construction operations (regardless of who performs the work) and (b) such other of its own organizational resources (supervision, management, and engineering services) as the contracting officer determines is necessary to assure the performance of the contract.

4. No portion of the contract shall be sublet, assigned or otherwise disposed of except with the written consent of the contracting officer, or authorized representative, and such consent when given shall not be construed to relieve the contractor of any responsibility for the fulfillment of the contract. Written consent will be given only after the contracting agency has assured that each subcontract is evidenced in writing and that it contains all pertinent provisions and requirements of the prime contract. (based on long-standing interpretation of 23 CFR 635.116).

5. The 30-percent self-performance requirement of paragraph (1) is not applicable to design-build contracts; however, contracting agencies may establish their own self-performance requirements. 23 CFR 635.116(d).

VII. SAFETY: ACCIDENT PREVENTION

This provision is applicable to all Federal-aid construction contracts and to all related subcontracts.

1. In the performance of this contract the contractor shall comply with all applicable Federal, State, and local laws governing safety, health, and sanitation (23 CFR Part 635). The contractor shall provide all safeguards, safety devices and protective equipment and take any other needed actions as it determines, or as the contracting officer may determine, to be reasonably necessary to protect the life and health of employees on the job and the safety of the public and to protect property in connection with the performance of the work covered by the contract. 23 CFR 635.108.

2. It is a condition of this contract, and shall be made a condition of each subcontract, which the contractor enters into pursuant to this contract, that the contractor and any subcontractor shall not permit any employee, in performance of the contract, to work in surroundings or under conditions which are unsanitary, hazardous or dangerous to his/her health or safety, as determined under construction safety and

health standards (29 CFR Part 1926) promulgated by the Secretary of Labor, in accordance with Section 107 of the Contract Work Hours and Safety Standards Act (40 U.S.C. 3704). 29 CFR 1926.10.

3. Pursuant to 29 CFR 1926.3, it is a condition of this contract that the Secretary of Labor or authorized representative thereof, shall have right of entry to any site of contract performance to inspect or investigate the matter of compliance with the construction safety and health standards and to carry out the duties of the Secretary under Section 107 of the Contract Work Hours and Safety Standards Act (40 U.S.C. 3704).

VIII. FALSE STATEMENTS CONCERNING HIGHWAY PROJECTS

This provision is applicable to all Federal-aid construction contracts and to all related subcontracts.

In order to assure high quality and durable construction in conformity with approved plans and specifications and a high degree of reliability on statements and representations made by engineers, contractors, suppliers, and workers on Federal-aid highway projects, it is essential that all persons concerned with the project perform their functions as carefully, thoroughly, and honestly as possible. Willful falsification, distortion, or misrepresentation with respect to any facts related to the project is a violation of Federal law. To prevent any misunderstanding regarding the seriousness of these and similar acts, Form FHWA-1022 shall be posted on each Federal-aid highway project (23 CFR Part 635) in one or more places where it is readily available to all persons concerned with the project:

18 U.S.C. 1020 reads as follows:

"Whoever, being an officer, agent, or employee of the United States, or of any State or Territory, or whoever, whether a person, association, firm, or corporation, knowingly makes any false statement, false representation, or false report as to the character, quality, quantity, or cost of the material used or to be used, or the quantity or quality of the work performed or to be performed, or the cost thereof in connection with the submission of plans, maps, specifications, contracts, or costs of construction on any highway or related project submitted for approval to the Secretary of Transportation; or

Whoever knowingly makes any false statement, false representation, false report or false claim with respect to the character, quality, quantity, or cost of any work performed or to be performed, or materials furnished or to be furnished, in connection with the construction of any highway or related project approved by the Secretary of Transportation; or

Whoever knowingly makes any false statement or false representation as to material fact in any statement, certificate, or report submitted pursuant to provisions of the Federal-aid Roads Act approved July 11, 1916, (39 Stat. 355), as amended and supplemented;

Shall be fined under this title or imprisoned not more than 5 years or both."

IX. IMPLEMENTATION OF CLEAN AIR ACT AND FEDERAL WATER POLLUTION CONTROL ACT (42 U.S.C. 7606; 2 CFR 200.88; EO 11738)

This provision is applicable to all Federal-aid construction contracts in excess of \$150,000 and to all related subcontracts. 48 CFR 2.101; 2 CFR 200.327.

By submission of this bid/proposal or the execution of this contract or subcontract, as appropriate, the bidder, proposer, Federal-aid construction contractor, subcontractor, supplier, or vendor agrees to comply with all applicable standards, orders or regulations issued pursuant to the Clean Air Act (42 U.S.C. 7401-7671q) and the Federal Water Pollution Control Act, as amended (33 U.S.C. 1251-1387). Violations must be reported to the Federal Highway Administration and the Regional Office of the Environmental Protection Agency. 2 CFR Part 200, Appendix II.

The contractor agrees to include or cause to be included the requirements of this Section in every subcontract, and further agrees to take such action as the contracting agency may direct as a means of enforcing such requirements. 2 CFR 200.327.

X. CERTIFICATION REGARDING DEBARMENT, SUSPENSION, INELIGIBILITY AND VOLUNTARY EXCLUSION

This provision is applicable to all Federal-aid construction contracts, design-build contracts, subcontracts, lower-tier subcontracts, purchase orders, lease agreements, consultant contracts or any other covered transaction requiring FHWA approval or that is estimated to cost \$25,000 or more – as defined in 2 CFR Parts 180 and 1200. 2 CFR 180.220 and 1200.220.

1. Instructions for Certification – First Tier Participants:

a. By signing and submitting this proposal, the prospective first tier participant is providing the certification set out below.

b. The inability of a person to provide the certification set out below will not necessarily result in denial of participation in this covered transaction. The prospective first tier participant shall submit an explanation of why it cannot provide the certification set out below. The certification or explanation will be considered in connection with the department or agency's determination whether to enter into this transaction. However, failure of the prospective first tier participant to furnish a certification or an explanation shall disqualify such a person from participation in this transaction. 2 CFR 180.320.

c. The certification in this clause is a material representation of fact upon which reliance was placed when the contracting agency determined to enter into this transaction. If it is later determined that the prospective participant knowingly rendered an erroneous certification, in addition to other remedies available to the Federal Government, the contracting agency may terminate this transaction for cause of default. 2 CFR 180.325.

d. The prospective first tier participant shall provide immediate written notice to the contracting agency to whom this proposal is submitted if any time the prospective first tier participant learns that its certification was erroneous when submitted or has become erroneous by reason of changed circumstances. 2 CFR 180.345 and 180.350.

e. The terms "covered transaction," "debarred," "suspended," "ineligible," "participant," "person," "principal," and "voluntarily excluded," as used in this clause, are defined in 2 CFR Parts 180, Subpart I, 180.900-180.1020, and 1200. "First Tier Covered Transactions" refers to any covered transaction between a recipient or subrecipient of Federal funds and a participant (such as the prime or general contract). "Lower Tier Covered Transactions" refers to any covered transaction under a First Tier Covered Transaction (such as subcontracts). "First Tier Participant" refers to the participant who has entered into a covered transaction with a recipient or subrecipient of Federal funds (such as the prime or general contractor). "Lower Tier Participant" refers any participant who has entered into a covered transaction with a First Tier Participant or other Lower Tier Participants (such as subcontractors and suppliers).

f. The prospective first tier participant agrees by submitting this proposal that, should the proposed covered transaction be entered into, it shall not knowingly enter into any lower tier covered transaction with a person who is debarred, suspended, declared ineligible, or voluntarily excluded from participation in this covered transaction, unless authorized by the department or agency entering into this transaction. 2 CFR 180.330.

g. The prospective first tier participant further agrees by submitting this proposal that it will include the clause titled "Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion-Lower Tier Covered Transactions," provided by the department or contracting agency, entering into this covered transaction, without modification, in all lower tier covered transactions and in all solicitations for lower tier covered transactions exceeding the \$25,000 threshold. 2 CFR 180.220 and 180.300.

h. A participant in a covered transaction may rely upon a certification of a prospective participant in a lower tier covered transaction that is not debarred, suspended, ineligible, or voluntarily excluded from the covered transaction, unless it knows that the certification is erroneous. 2 CFR 180.300; 180.320, and 180.325. A participant is responsible for ensuring that its principals are not suspended, debarred, or otherwise ineligible to participate in covered transactions. 2 CFR 180.335. To verify the eligibility of its principals, as well as the eligibility of any lower tier prospective participants, each participant may, but is not required to, check the System for Award Management website (<https://www.sam.gov/>). 2 CFR 180.300, 180.320, and 180.325.

i. Nothing contained in the foregoing shall be construed to require the establishment of a system of records in order to render in good faith the certification required by this clause. The knowledge and information of the prospective participant is not required to exceed that which is normally possessed by a prudent person in the ordinary course of business dealings.

j. Except for transactions authorized under paragraph (f) of these instructions, if a participant in a covered transaction knowingly enters into a lower tier covered transaction with a person who is suspended, debarred, ineligible, or voluntarily excluded from participation in this transaction, in addition to other remedies available to the Federal Government, the department or agency may terminate this transaction for cause or default. 2 CFR 180.325.

2. Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion – First Tier Participants:

a. The prospective first tier participant certifies to the best of its knowledge and belief, that it and its principals:

(1) Are not presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from participating in covered transactions by any Federal department or agency, 2 CFR 180.335;.

(2) Have not within a three-year period preceding this proposal been convicted of or had a civil judgment rendered against them for commission of fraud or a criminal offense in connection with obtaining, attempting to obtain, or performing a public (Federal, State, or local) transaction or contract under a public transaction; violation of Federal or State antitrust statutes or commission of embezzlement, theft, forgery, bribery, falsification or destruction of records, making false statements, or receiving stolen property, 2 CFR 180.800;

(3) Are not presently indicted for or otherwise criminally or civilly charged by a governmental entity (Federal, State or local) with commission of any of the offenses enumerated in paragraph (a)(2) of this certification, 2 CFR 180.700 and 180.800; and

(4) Have not within a three-year period preceding this application/proposal had one or more public transactions (Federal, State or local) terminated for cause or default. 2 CFR 180.335(d).

(5) Are not a corporation that has been convicted of a felony violation under any Federal law within the two-year period preceding this proposal (USDOT Order 4200.6 implementing appropriations act requirements); and

(6) Are not a corporation with any unpaid Federal tax liability that has been assessed, for which all judicial and administrative remedies have been exhausted, or have lapsed, and that is not being paid in a timely manner pursuant to an agreement with the authority responsible for collecting the tax liability (USDOT Order 4200.6 implementing appropriations act requirements).

b. Where the prospective participant is unable to certify to any of the statements in this certification, such prospective participant should attach an explanation to this proposal. 2 CFR 180.335 and 180.340.

* * * * *

3. Instructions for Certification - Lower Tier Participants:

(Applicable to all subcontracts, purchase orders, and other lower tier transactions requiring prior FHWA approval or estimated to cost \$25,000 or more - 2 CFR Parts 180 and 1200). 2 CFR 180.220 and 1200.220.

a. By signing and submitting this proposal, the prospective lower tier participant is providing the certification set out below.

b. The certification in this clause is a material representation of fact upon which reliance was placed when this transaction was entered into. If it is later determined that the prospective lower tier participant knowingly rendered an erroneous certification, in addition to other remedies available to the Federal Government, the department, or agency with which

this transaction originated may pursue available remedies, including suspension and/or debarment.

c. The prospective lower tier participant shall provide immediate written notice to the person to which this proposal is submitted if at any time the prospective lower tier participant learns that its certification was erroneous by reason of changed circumstances. 2 CFR 180.365.

d. The terms "covered transaction," "debarred," "suspended," "ineligible," "participant," "person," "principal," and "voluntarily excluded," as used in this clause, are defined in 2 CFR Parts 180, Subpart I, 180.900 – 180.1020, and 1200. You may contact the person to which this proposal is submitted for assistance in obtaining a copy of those regulations. "First Tier Covered Transactions" refers to any covered transaction between a recipient or subrecipient of Federal funds and a participant (such as the prime or general contractor). "Lower Tier Covered Transactions" refers to any covered transaction under a First Tier Covered Transaction (such as subcontracts). "First Tier Participant" refers to the participant who has entered into a covered transaction with a recipient or subrecipient of Federal funds (such as the prime or general contractor). "Lower Tier Participant" refers any participant who has entered into a covered transaction with a First Tier Participant or other Lower Tier Participants (such as subcontractors and suppliers).

e. The prospective lower tier participant agrees by submitting this proposal that, should the proposed covered transaction be entered into, it shall not knowingly enter into any lower tier covered transaction with a person who is debarred, suspended, declared ineligible, or voluntarily excluded from participation in this covered transaction, unless authorized by the department or agency with which this transaction originated. 2 CFR 1200.220 and 1200.332.

f. The prospective lower tier participant further agrees by submitting this proposal that it will include this clause titled "Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion-Lower Tier Covered Transaction," without modification, in all lower tier covered transactions and in all solicitations for lower tier covered transactions exceeding the \$25,000 threshold. 2 CFR 180.220 and 1200.220.

g. A participant in a covered transaction may rely upon a certification of a prospective participant in a lower tier covered transaction that is not debarred, suspended, ineligible, or voluntarily excluded from the covered transaction, unless it knows that the certification is erroneous. A participant is responsible for ensuring that its principals are not suspended, debarred, or otherwise ineligible to participate in covered transactions. To verify the eligibility of its principals, as well as the eligibility of any lower tier prospective participants, each participant may, but is not required to, check the System for Award Management website (<https://www.sam.gov>), which is compiled by the General Services Administration. 2 CFR 180.300, 180.320, 180.330, and 180.335.

h. Nothing contained in the foregoing shall be construed to require establishment of a system of records in order to render in good faith the certification required by this clause. The knowledge and information of participant is not required to exceed that which is normally possessed by a prudent person in the ordinary course of business dealings.

i. Except for transactions authorized under paragraph e of these instructions, if a participant in a covered transaction knowingly enters into a lower tier covered transaction with a person who is suspended, debarred, ineligible, or voluntarily

excluded from participation in this transaction, in addition to other remedies available to the Federal Government, the department or agency with which this transaction originated may pursue available remedies, including suspension and/or debarment. 2 CFR 180.325.

* * * * *

4. Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion--Lower Tier Participants:

a. The prospective lower tier participant certifies, by submission of this proposal, that neither it nor its principals:

(1) is presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from participating in covered transactions by any Federal department or agency, 2 CFR 180.355;

(2) is a corporation that has been convicted of a felony violation under any Federal law within the two-year period preceding this proposal (USDOT Order 4200.6 implementing appropriations act requirements); and

(3) is a corporation with any unpaid Federal tax liability that has been assessed, for which all judicial and administrative remedies have been exhausted, or have lapsed, and that is not being paid in a timely manner pursuant to an agreement with the authority responsible for collecting the tax liability. (USDOT Order 4200.6 implementing appropriations act requirements)

b. Where the prospective lower tier participant is unable to certify to any of the statements in this certification, such prospective participant should attach an explanation to this proposal.

* * * * *

XI. CERTIFICATION REGARDING USE OF CONTRACT FUNDS FOR LOBBYING

This provision is applicable to all Federal-aid construction contracts and to all related subcontracts which exceed \$100,000. 49 CFR Part 20, App. A.

1. The prospective participant certifies, by signing and submitting this bid or proposal, to the best of his or her knowledge and belief, that:

a. No Federal appropriated funds have been paid or will be paid, by or on behalf of the undersigned, to any person for influencing or attempting to influence an officer or employee of any Federal agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with the awarding of any Federal contract, the making of any Federal grant, the making of any Federal loan, the entering into of any cooperative agreement, and the extension, continuation, renewal, amendment, or modification of any Federal contract, grant, loan, or cooperative agreement.

b. If any funds other than Federal appropriated funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any Federal agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with this Federal contract, grant, loan, or

cooperative agreement, the undersigned shall complete and submit Standard Form-LLL, "Disclosure Form to Report Lobbying," in accordance with its instructions.

2. This certification is a material representation of fact upon which reliance was placed when this transaction was made or entered into. Submission of this certification is a prerequisite for making or entering into this transaction imposed by 31 U.S.C. 1352. Any person who fails to file the required certification shall be subject to a civil penalty of not less than \$10,000 and not more than \$100,000 for each such failure.

3. The prospective participant also agrees by submitting its bid or proposal that the participant shall require that the language of this certification be included in all lower tier subcontracts, which exceed \$100,000 and that all such recipients shall certify and disclose accordingly.

XII. USE OF UNITED STATES-FLAG VESSELS:

This provision is applicable to all Federal-aid construction contracts, design-build contracts, subcontracts, lower-tier subcontracts, purchase orders, lease agreements, or any other covered transaction. 46 CFR Part 381.

This requirement applies to material or equipment that is acquired for a specific Federal-aid highway project. 46 CFR 381.7. It is not applicable to goods or materials that come into inventories independent of an FHWA funded-contract.

When oceanic shipments (or shipments across the Great Lakes) are necessary for materials or equipment acquired for a specific Federal-aid construction project, the bidder, proposer, contractor, subcontractor, or vendor agrees:

1. To utilize privately owned United States-flag commercial vessels to ship at least 50 percent of the gross tonnage (computed separately for dry bulk carriers, dry cargo liners, and tankers) involved, whenever shipping any equipment, material, or commodities pursuant to this contract, to the extent such vessels are available at fair and reasonable rates for United States-flag commercial vessels. 46 CFR 381.7.

2. To furnish within 20 days following the date of loading for shipments originating within the United States or within 30 working days following the date of loading for shipments originating outside the United States, a legible copy of a rated, 'on-board' commercial ocean bill-of-lading in English for each shipment of cargo described in paragraph (b)(1) of this section to both the Contracting Officer (through the prime contractor in the case of subcontractor bills-of-lading) and to the Office of Cargo and Commercial Sealift (MAR-620), Maritime Administration, Washington, DC 20590. (MARAD requires copies of the ocean carrier's (master) bills of lading, certified onboard, dated, with rates and charges. These bills of lading may contain business sensitive information and therefore may be submitted directly to MARAD by the Ocean Transportation Intermediary on behalf of the contractor). 46 CFR 381.7.

**ATTACHMENT A - EMPLOYMENT AND MATERIALS
PREFERENCE FOR APPALACHIAN DEVELOPMENT HIGHWAY
SYSTEM OR APPALACHIAN LOCAL ACCESS**

ROAD CONTRACTS (23 CFR 633, Subpart B, Appendix B)
This provision is applicable to all Federal-aid projects funded under the Appalachian Regional Development Act of 1965.

1. During the performance of this contract, the contractor undertaking to do work which is, or reasonably may be, done as on-site work, shall give preference to qualified persons who regularly reside in the labor area as designated by the DOL wherein the contract work is situated, or the subregion, or the Appalachian counties of the State wherein the contract work is situated, except:

a. To the extent that qualified persons regularly residing in the area are not available.

b. For the reasonable needs of the contractor to employ supervisory or specially experienced personnel necessary to assure an efficient execution of the contract work.

c. For the obligation of the contractor to offer employment to present or former employees as the result of a lawful collective bargaining contract, provided that the number of nonresident persons employed under this subparagraph (1c) shall not exceed 20 percent of the total number of employees employed by the contractor on the contract work, except as provided in subparagraph (4) below.

2. The contractor shall place a job order with the State Employment Service indicating (a) the classifications of the laborers, mechanics and other employees required to perform the contract work, (b) the number of employees required in each classification, (c) the date on which the participant estimates such employees will be required, and (d) any other pertinent information required by the State Employment Service to complete the job order form. The job order may be placed with the State Employment Service in writing or by telephone. If during the course of the contract work, the information submitted by the contractor in the original job order is substantially modified, the participant shall promptly notify the State Employment Service.

3. The contractor shall give full consideration to all qualified job applicants referred to him by the State Employment Service. The contractor is not required to grant employment to any job applicants who, in his opinion, are not qualified to perform the classification of work required.

4. If, within one week following the placing of a job order by the contractor with the State Employment Service, the State Employment Service is unable to refer any qualified job applicants to the contractor, or less than the number requested, the State Employment Service will forward a certificate to the contractor indicating the unavailability of applicants. Such certificate shall be made a part of the contractor's permanent project records. Upon receipt of this certificate, the contractor may employ persons who do not normally reside in the labor area to fill positions covered by the certificate, notwithstanding the provisions of subparagraph (1c) above.

5. The provisions of 23 CFR 633.207(e) allow the contracting agency to provide a contractual preference for the use of mineral resource materials native to the Appalachian region.

6. The contractor shall include the provisions of Sections 1 through 4 of this Attachment A in every subcontract for work which is, or reasonably may be, done as on-site work.