

# 160

**Letting March 6, 2020**

## **Notice to Bidders, Specifications and Proposal**



**Contract No. 61G30  
COOK County  
Section 17-00281-00-RS (Evanston)  
Route FAU 1334 (Howard Street)  
Project CJ5G-950 ()  
District 1 Construction Funds**

Prepared by

Checked by

F

(Printed by authority of the State of Illinois)



- 1. TIME AND PLACE OF OPENING BIDS.** Electronic bids are to be submitted to the electronic bidding system (iCX-Integrated Contractors Exchange). All bids must be submitted to the iCX system prior to 10:00 a.m. March 6, 2020 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. 61G30  
COOK County  
Section 17-00281-00-RS (Evanston)  
Project CJ5G-950 ()  
Route FAU 1334 (Howard Street)  
District 1 Construction Funds**

**Resurfacing, sidewalk construction, curb & gutter, watermain replacement, roadway lighting and traffic signal modernization on Howard Street from Sacramento Avenue to Cellan Avenue in Evanston.**

- 3. INSTRUCTIONS TO BIDDERS.** (a) This Notice, the invitation for bids, proposal and letter of award shall, together with all other documents in accordance with Article 101.09 of the Standard Specifications for Road and Bridge Construction, become part of the contract. Bidders are cautioned to read and examine carefully all documents, to make all required inspections, and to inquire or seek explanation of the same prior to submission of a bid.  
  
(b) State law, and, if the work is to be paid wholly or in part with Federal-aid funds, Federal law requires the bidder to make various certifications as a part of the proposal and contract. By execution and submission of the proposal, the bidder makes the certification contained therein. A false or fraudulent certification shall, in addition to all other remedies provided by law, be a breach of contract and may result in termination of the contract.
- 4. AWARD CRITERIA AND REJECTION OF BIDS.** This contract will be awarded to the lowest responsive and responsible bidder considering conformity with the terms and conditions established by the Department in the rules, Invitation for Bids and contract documents. The issuance of plans and proposal forms for bidding based upon a prequalification rating shall not be the sole determinant of responsibility. The Department reserves the right to determine responsibility at the time of award, to reject any or all proposals, to readvertise the proposed improvement, and to waive technicalities.

By Order of the  
Illinois Department of Transportation

Omer Osman,  
Acting Secretary

INDEX  
FOR  
SUPPLEMENTAL SPECIFICATIONS  
AND RECURRING SPECIAL PROVISIONS

Adopted January 1, 2020

This index contains a listing of SUPPLEMENTAL SPECIFICATIONS, frequently used RECURRING SPECIAL PROVISIONS, and LOCAL ROADS AND STREETS RECURRING SPECIAL PROVISIONS.

ERRATA Standard Specifications for Road and Bridge Construction (Adopted 4-1-16) (Revised 1-1-20)

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## BDE SPECIAL PROVISIONS

The following special provisions indicated by an "X" are applicable to this contract. An \* indicates a new or revised special provision for the letting.

<u>File Name</u>	<u>Pg.</u>		<u>Special Provision Title</u>	<u>Effective</u>	<u>Revised</u>
80099			Accessible Pedestrian Signals (APS)	April 1, 2003	Jan. 1, 2014
80274			Aggregate Subgrade Improvement	April 1, 2012	April 1, 2016
80192			Automated Flagger Assistance Device	Jan. 1, 2008	
80173			Bituminous Materials Cost Adjustments	Nov. 2, 2006	Aug. 1, 2017
* 80246			Bituminous Surface Treatment with Fog Seal	Jan. 1, 2020	
80241			Bridge Demolition Debris	July 1, 2009	
50261			Building Removal-Case I (Non-Friable and Friable Asbestos)	Sept. 1, 1990	April 1, 2010
50481			Building Removal-Case II (Non-Friable Asbestos)	Sept. 1, 1990	April 1, 2010
50491			Building Removal-Case III (Friable Asbestos)	Sept. 1, 1990	April 1, 2010
50531			Building Removal-Case IV (No Asbestos)	Sept. 1, 1990	April 1, 2010
* 80425			Cape Seal	Jan. 1, 2020	
80384	611	X	Compensable Delay Costs	June 2, 2017	April 1, 2019
80198			Completion Date (via calendar days)	April 1, 2008	
80199			Completion Date (via calendar days) Plus Working Days	April 1, 2008	
80293			Concrete Box Culverts with Skews > 30 Degrees and Design Fills ≤ 5 Feet	April 1, 2012	July 1, 2016
80311			Concrete End Sections for Pipe Culverts	Jan. 1, 2013	April 1, 2016
80277			Concrete Mix Design – Department Provided	Jan. 1, 2012	April 1, 2016
80261	615	X	Construction Air Quality – Diesel Retrofit	June 1, 2010	Nov. 1, 2014
80387			Contrast Preformed Plastic Pavement Marking	Nov. 1, 2017	
80029	618	X	Disadvantaged Business Enterprise Participation	Sept. 1, 2000	Mar. 2, 2019
80402	628	X	Disposal Fees	Nov. 1, 2018	
80378	630	X	Dowel Bar Inserter	Jan. 1, 2017	Jan. 1, 2018
80405			Elastomeric Bearings	Jan. 1, 2019	
* 80421	637	X	Electric Service Installation	Jan. 1, 2020	
80415	639	X	Emulsified Asphalts	Aug. 1, 2019	
* 80423	642	X	Engineer's Field Office Laboratory	Jan. 1, 2020	
80388	645	X	Equipment Parking and Storage	Nov. 1, 2017	
80229			Fuel Cost Adjustment	April 1, 2009	Aug. 1, 2017
80417			Geotechnical Fabric for Pipe Underdrains and French Drains	Nov. 1, 2019	
80420			Geotextile Retaining Walls	Nov. 1, 2019	
80304			Grooving for Recessed Pavement Markings	Nov. 1, 2012	Nov. 1, 2017
* 80422			High Tension Cable Median Barrier Reflectors	Jan. 1, 2020	
80416			Hot-Mix Asphalt – Binder and Surface Course	July 2, 2019	Nov. 1, 2019
80398			Hot-Mix Asphalt – Longitudinal Joint Sealant	Aug. 1, 2018	Nov. 1, 2019
* 80406			Hot-Mix Asphalt – Mixture Design Verification and Production (Modified for I-FIT Data Collection)	Jan. 1, 2019	Jan. 2, 2020
80347			Hot-Mix Asphalt – Pay for Performance Using Percent Within Limits – Jobsite Sampling	Nov. 1, 2014	July 2, 2019
80383			Hot-Mix Asphalt – Quality Control for Performance	April 1, 2017	July 2, 2019
80411			Luminaires, LED	April 1, 2019	
80393	646	X	Manholes, Valve Vaults, and Flat Slab Tops	Jan. 1, 2018	Mar. 1, 2019
80045			Material Transfer Device	June 15, 1999	Aug. 1, 2014
80418			Mechanically Stabilized Earth Retaining Walls	Nov. 1, 2019	
* 80424			Micro-Surfacing and Slurry Sealing	Jan. 1, 2020	
80165			Moisture Cured Urethane Paint System	Nov. 1, 2006	Jan. 1, 2010
80412			Obstruction Warning Luminaires, LED	Aug. 1, 2019	
80349			Pavement Marking Blackout Tape	Nov. 1, 2014	April 1, 2016
80371	648	X	Pavement Marking Removal	July 1, 2016	
80389	649	X	Portland Cement Concrete	Nov. 1, 2017	
80359			Portland Cement Concrete Bridge Deck Curing	April 1, 2015	Nov. 1, 2019

<u>File Name</u>	<u>Pg.</u>	<u>Special Provision Title</u>	<u>Effective</u>	<u>Revised</u>
80300		Preformed Plastic Pavement Marking Type D - Inlaid	April 1, 2012	April 1, 2016
80328	650	X Progress Payments	Nov. 2, 2013	
34261		Railroad Protective Liability Insurance	Dec. 1, 1986	Jan. 1, 2006
80157		Railroad Protective Liability Insurance (5 and 10)	Jan. 1, 2006	
* 80306		Reclaimed Asphalt Pavement (RAP) and Reclaimed Asphalt Shingles (RAS)	Nov. 1, 2012	Jan. 2, 2020
* 80407	651	X Removal and Disposal of Regulated Substances	Jan. 1, 2019	Jan. 1, 2020
80419		Silt Fence, Ground Stabilization and Riprap Filter Fabric	Nov. 1, 2019	
80395		Sloped Metal End Section for Pipe Culverts	Jan. 1, 2018	
80340		Speed Display Trailer	April 2, 2014	Jan. 1, 2017
80127		Steel Cost Adjustment	April 2, 2014	Aug. 1, 2017
80408		Steel Plate Beam Guardrail Manufacturing	Jan. 1, 2019	
80413		Structural Timber	Aug. 1, 2019	
80397	662	X Subcontractor and DBE Payment Reporting	April 2, 2018	
80391	663	X Subcontractor Mobilization Payments	Nov. 2, 2017	April 1, 2019
80317		Surface Testing of Hot-Mix Asphalt Overlays	Jan. 1, 2013	Aug. 1, 2019
80298	664	X Temporary Pavement Marking	April 1, 2012	April 1, 2017
80403		Traffic Barrier Terminal, Type 1 Special	Nov. 1, 2018	
80409	667	X Traffic Control Devices – Cones	Jan. 1, 2019	
* 80410		Traffic Spotters	Jan. 1, 2019	
20338	668	X Training Special Provisions	Oct. 15, 1975	
80318		Traversable Pipe Grate for Concrete End Sections	Jan. 1, 2013	Jan. 1, 2018
80288	671	X Warm Mix Asphalt	Jan. 1, 2012	April 1, 2016
80302	673	X Weekly DBE Trucking Reports	June 2, 2012	April 2, 2015
80414		Wood Fence Sight Screen	Aug. 1, 2019	
80071		Working Days	Jan. 1, 2002	

The following special provisions are in the 2020 Supplemental Specifications and Recurring Special Provisions.

<u>File Name</u>	<u>Special Provision Title</u>	<u>New Location(s)</u>	<u>Effective</u>	<u>Revised</u>
80404	Coarse Aggregate Quality for Micro-Surfacing and Cape Seals	Article 1004.01(b)	Jan. 1, 2019	
80392	Lights on Barricades	Articles 701.16, 701.17(c)(2) & 603.07	Jan. 1, 2018	
80336	Longitudinal Joint and Crack Patching	Check Sheet #36	April 1, 2014	April 1, 2016
80400	Mast Arm Assembly and Pole	Article 1077.03(b)	Aug. 1, 2018	
80394	Metal Flared End Section for Pipe Culverts	Articles 542.07(c) and 542.11	Jan. 1, 2018	April 1, 2018
80390	Payments to Subcontractors	Article 109.11	Nov. 2, 2017	April 1, 2017

**STATE OF ILLINOIS**

**SPECIAL PROVISIONS**

The following Special Provisions supplement the specifications listed in the table below which apply to and govern the proposed improvement designated as Section 17-00281-00-B, Project Number CJ5G (950), Contract Number 61G30 and in case of conflict with any part or parts of said specifications, the said Special Provisions shall take precedence and govern.

<b>SPECIFICATION</b>	<b>ADOPTED/DATED</b>
<b>Standard Specifications for Road and Bridge Construction</b>	April 1, 2016
<b>Manual on Uniform Traffic Control Devices for Streets and Highways</b>	2009 Edition with Revisions 1 and 2
<b>Illinois Manual On Uniform Traffic Control Devices for Streets And Highways" (ILMUTCD)</b>	Current Edition
<b>Supplemental Specifications and Recurring Special Provisions</b> (indicated on the Check Sheet included herein)	January 1, 2020
<b>Manual of Test Procedure of Materials</b>	Current
<b>Standard Specifications for Water &amp; Sewer Main Construction in Illinois</b>	7 <sup>th</sup> Edition, 2014
<b>Standard Specifications for Traffic Control Items (SSTCI)</b>	Current
<b>Americans with Disabilities Act of 1990 Accessibility Guidelines</b>	Current
<b>"Draft" Rehabilitation Act of 1973 (Section 504)</b>	Current
<b>Public Rights-Of-Way Accessibility Guidelines</b>	Current
<b>CDOT Rules and Regulations for Construction in the Public Way</b>	Current

Section / Article references refer to the Standard Specification.

**LOCATION OF IMPROVEMENT**

The Howard Street corridor improvement project is located on the border of the City of Evanston and the City of Chicago in Cook County, Illinois. The project limits are from 1,300 feet west of Dodge Ave/California Ave (FAU 2840) to 400 feet east of Custer

Ave/Damen Ave (FAU 2816). The gross and net length of the project is 7,000 feet (1.33 miles).

### **DESCRIPTION OF IMPROVEMENT**

The proposed Howard Street corridor improvement project is a roadway rehabilitation project. The roadway will be resurfaced, transit operations will be improved, watermain will be upgraded and streetscape elements will be incorporated to the commercial areas within the project limits.

The work consists of HMA resurfacing, combination curb and gutter, sidewalk, water main replacement, roadway lighting and modernization of traffic signals, as well as all incidental and collateral work necessary to complete the project as shown on the plans and described herein.

### **ARTICLE 105.09 – LAYOUT PAINT**

In addition to the requirements of Article 105.09 of the Standard Specifications, the CONTRACTOR shall furnish (included in the cost of mobilization) white, pink or purple pavement marking paint in aerosol cans, for use by the ENGINEER. The CONTRACTOR and SUBCONTRACTORS shall only use these same colors for their own markings, therefore, not using J.U.L.I.E. utility colors.

### **ARTICLE 107.09 - SPECIAL CONDITIONS**

All coordination to occur through ENGINEER.

**Signage.** All street signage removed for construction must be consolidated and stored at a central location on site. This location must be forwarded to Engineer for her use. Once substantial completion is reached, the Contractor must coordinate with Engineer to reinstall street signage in a timely manner.

**CTA Signage.** All CTA signage must be removed and reinstalled by CTA Personnel. Coordinate with Ron Weslow at 312-681-4217.

**LAZ Parking Signage and pay boxes.** All signage must be removed and reinstalled by LAZ Parking Personnel. Coordinate (locations, anchorage, schedule, etc.) with Kevin O'Hara at 312-550-0382 or [kohara@lazparking.com](mailto:kohara@lazparking.com).

**Advertising benches.** Advertising benches that are present within the project must be removed before construction and replaced in the same location after completion. The

Contractor must contact either the owner of the bench, or Wright Advertising (708-652-6020) for removal and replacement of the bench. This work will be included in the cost of SIDEWALK REMOVAL.

**AVAILABLE REPORTS**

No project specific reports were prepared.

When applicable, the following checked reports and record information is available for Bidders' reference upon request:

- Record structural plans
- Preliminary Site Investigation (PSI)
- Preliminary Environmental Site Assessment (PESA)
- Soils/Geotechnical Report
- Boring Logs
- Pavement Cores
- Location Drainage Study (LDS)
- Hydraulic Report
- Noise Analysis
- Other: CCDD Report

Those seeking these reports should request access from:

Sat Nagar, P.E. Senior Civil Engineer  
City of Evanston Engineering and Public Works Department  
2100 Ridge Avenue  
Evanston, IL 60201  
847-866.2967  
[SNagar@cityofevanston.org](mailto:SNagar@cityofevanston.org)

## **INTERIM COMPLETION DATE**

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

"When interim completion dates are specified, the Contractor shall substantially complete all contract items deemed necessary by Engineer to safely open the roadway to traffic on or before the specified date. The Special Provision for Failure to Complete the Work on Time shall apply to the interim completion dates.

Interim completion dates are independent from other phases.

The allowable start dates and interim completion dates are as follows:

- STAGE 1: (HOWARD STREET – HARTREY/SACRAMENTO TO CALLAN/WINCHESTER):
  - ANTICIPATED START **JULY 5, 2020**
  - STAGE 1 PHASE 1 COMPLETION DATE – **AUGUST 25, 2020**
  - STAGE 1 PHASE 2 COMPLETION DATE: **SEPTEMBER 30, 2020**
  - PATCHING COMPLETION DATE: **OCTOBER 15, 2020**  
Patching to commence within 10 working days of completion of tie-ins.

Stage 1 - Phase 1 – Work shall be performed along Howard Avenue between Hartrey Avenue to Dodge Avenue. This work shall include setting up traffic control, all drainage, water main, roadway patching and related work as shown on the plans.

Stage 1 – Phase 2 - Work shall be performed along Howard Avenue between Asbury Avenue to Ridge Boulevard. This work shall include setting up traffic control, all drainage, water main, roadway patching and related work as shown on the plans.

- STAGE 2 AND 3: (HOWARD STREET – HARTREY/SACRAMENTO TO CALLAN/WINCHESTER):
  - START DATE **APRIL 5, 2021**
  - STAGE 2 PHASE 1, 2, 3 (STA. 58+60 TO STA. 86+00)  
**APRIL 5, 2021 – COMPLETION DATE MAY 26, 2021**
  - STAGE 2 PHASE 1, 2, 3 (STA. 86+00 TO STA. 107+90)  
**JUNE 1, 2021 – COMPLETION DATE JULY 30, 2021**
  - STAGE 2 PHASE 1, 2, 3 (STA. 107+90 TO 124+90)  
**AUGUST 2, 2021 – COMPLETION DATE SEPTEMBER 17, 2021**
  - STAGE 2 PHASE 3 – **SEPTEMBER 13, 2021 – COMPETION DATE OCTOBER 11, 2021**
  - COMPLETION DATE: **OCTOBER 11, 2021**

Stage 2 – Phase 1, 2, 3 – (STA. 58+60 TO STA. 86+00) – Work shall be performed along both sides of Howard Street between Hartrey Avenue to 700 feet west of Asbury Avenue. Staging shall follow the MOT plans. This work shall include setting up traffic control, curb and gutter removal and replacement, sidewalk removal and replacement, roadway improvements, bump outs, streetscape improvements, lighting and traffic signal improvements.

Stage 2 – Phase 1, 2, 3 – (STA. 86+00 TO STA. 107+90) – Work shall be performed along both sides of Howard Street between 700 feet west of Asbury Avenue to Ridge Avenue. Staging shall follow the MOT plans. This work shall include setting up traffic control, curb and gutter removal and replacement, sidewalk removal and replacement, roadway improvements, bump outs, streetscape improvements, street lighting and traffic signal improvements.

Stage 2 – Phase 1, 2, 3 – (STA. 107+90 TO STA. 124+90) – Work shall be performed along both sides of Howard Street between Ridge Avenue to Callan Avenue. Staging shall follow the MOT plans. This work shall include setting up traffic control, curb and gutter removal and replacement, sidewalk removal and replacement, roadway improvements, bump outs, streetscape improvements, street lighting and traffic signal improvements.

Stage 2 – Phase 3 – Work shall be performed along Howard Street from Hartrey Avenue to Callan Avenue. This work shall include setting up traffic control, construction of deferred bump outs, roadway grinding, base patching, binder course and roadway resurfacing as shown on the plans. Roadway striping shall be included as part of this stage and must be completed by October 11, 2021.



**COMPLETION DATE**

The completion date for this project is **OCTOBER 11, 2021**.

Ten (10) working days after the completion date are allowed for cleanup and punch list items.

**FAILURE TO COMPLETE THE WORK ON TIME**

Should the Contractor fail to complete the work on or before the completion date and/or the interim date as specified in the Special Provision for "INTERIM COMPLETION DATE" and "COMPLETION DATE", or within such extended time as may have been allowed by the Department, the Contractor shall be liable to the Department in the amount of **\$2,300.00**, not as a penalty but as liquidated damages, for each calendar day or a portion thereof of overrun in the contract time or such extended time as may have been allowed.

In fixing the damages as set out herein, the desire is to establish a certain mode of calculation for the work since the Department's actual loss, in the event of delay, cannot be predetermined, would be difficult of ascertainment, and a matter of argument and unprofitable litigation. This said mode is an equitable rule for measurement of the Department's actual loss and fairly takes into account the loss of use of the roadway if the project is delayed in completion. The Department shall not be required to provide any actual loss in order to recover these liquidated damages provided herein, as said damages are very difficult to ascertain. Furthermore, no provision of this clause shall be construed as a penalty, as such is not the intention of the parties.

A calendar day is every day shown on the calendar and starts at 12:00 midnight and ends at the following 12:00 midnight, twenty-four hours later.

**ADJUSTMENTS AND RECONSTRUCTIONS (D-1)**

Effective: March 15, 2011

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-1 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-1 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-1 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-1 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.”

**AGGREGATE SURFACE COURSE FOR TEMPORARY ACCESS (D-1)**

Effective: April 1, 2001

Revised: January 2, 2007

Revise Article 402.10 of the Standard Specifications to read:

**“402.10 For Temporary Access.** The contractor shall construct and maintain aggregate surface course for temporary access to private entrances, commercial entrances and roads according to Article 402.07 and as directed by the Engineer.

The aggregate surface course shall be constructed to the dimensions and grades specified below, except as modified by the plans or as directed by the Engineer.

- (a) Private Entrance. The minimum width shall be 12 ft (3.6 m). The minimum compacted thickness shall be 6 in. (150 mm). The maximum grade shall be eight percent, except as required to match the existing grade.
- (b) Commercial Entrance. The minimum width shall be 24 ft (7.2 m). The minimum compacted thickness shall be 9 in. (230 mm). The maximum grade shall be six percent, except as required to match the existing grade.
- (c) Road. The minimum width shall be 24 ft (7.2 m). The minimum compacted thickness shall be 9 in. (230 mm). The grade and elevation shall be the same as the removed pavement, except as required to meet the grade of any new pavement constructed.

Maintaining the temporary access shall include relocating and/or regrading the aggregate surface coarse for any operation that may disturb or remove the temporary access. The same type and gradation of material used to construct the temporary access shall be used to maintain it.

When use of the temporary access is discontinued, the aggregate shall be removed and utilized in the permanent construction or disposed of according to Article 202.03.”

Add the following to Article 402.12 of the Standard Specifications:

“Aggregate surface course for temporary access will be measured for payment as each for every private entrance, commercial entrance or road constructed for the purpose of temporary access. If a residential drive, commercial entrance, or road is to be constructed under multiple stages, the aggregate needed to construct the second or subsequent stages will not be measured for payment but shall be included in the cost per each of the type specified.”

Revise the second paragraph of Article 402.13 of the Standard Specifications to read:

“Aggregate surface course for temporary access will be paid for at the contract unit price per each for TEMPORARY ACCESS (PRIVATE ENTRANCE), TEMPORARY ACCESS (COMMERCIAL ENTRANCE) or TEMPORARY ACCESS (ROAD).

Partial payment of the each amount bid for temporary access, of the type specified, will be paid according to the following schedule:

- (a) Upon construction of the temporary access, sixty percent of the contract unit price per each, of the type constructed, will be paid.
- (b) Subject to the approval of the Engineer for the adequate maintenance and removal of the temporary access, the remaining forty percent of the pay item will be paid upon the permanent removal of the temporary access.”

**COARSE AGGREGATE FOR BACKFILL, TRENCH BACKFILL AND BEDDING (D-1)**

Effective: November 1, 2011  
Revised: November 1, 2013

This work shall be according to Section 1004.05 of the Standard Specifications except for the following:

Reclaimed Asphalt Pavement (RAP) maybe blended with gravel, crushed gravel, crushed stone crushed concrete, crushed slag, chats, crushed sand stone or wet bottom boiler slag. The RAP used shall be according to the current Bureau of Materials and Physical Research Policy Memorandum, "Reclaimed Asphalt Pavement (RAP) for Aggregate Applications". The RAP shall be uniformly graded and shall pass the 1.0 in. (25 mm) screen. When RAP is blended with any of the coarse aggregate listed above, the blending shall be done mechanically with calibrated feeders. The feeders shall have an accuracy of  $\pm 2.0$  percent of the actual quantity of material delivered. The final blended product shall not contain more than 40 percent by weight RAP.

The coarse aggregate listed above shall meet CA 6 and CA 10 gradations prior to being blended with the processed and uniformly graded RAP. Gradation deleterious count shall not exceed 10% of total RAP and 5% of other by total weight.

**DRAINAGE AND INLET PROTECTION UNDER TRAFFIC (D1)**

Effective: April 1, 2011  
 Revised: April 2, 2011

Add the following to Article 603.02 of the Standard Specifications:

- “(i) Temporary Hot-Mix Asphalt (HMA) Ramp (Note 1) ..... 1030
- “(j) Temporary Rubber Ramps (Note 2)

Note 1. The HMA shall have maximum aggregate size of 3/8 in. (95 mm).

Note 2. The rubber material shall be according to the following.

Property	Test Method	Requirement
Durometer Hardness, Shore A	ASTM D 2240	75 ±15
Tensile Strength, psi (kPa)	ASTM D 412	300 (2000) min
Elongation, percent	ASTM D 412	90 min
Specific Gravity	ASTM D 792	1.0 - 1.3
Brittleness, °F (°C)	ASTM D 746	-40 (-40)”

Revise Article 603.07 of the Standard Specifications 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.

When castings are under traffic before the final surfacing operation has been started, properly sized temporary ramps shall be placed around the drainage and/or utility castings according to the following methods.

- (a) Temporary Asphalt Ramps. Temporary hot-mix asphalt ramps shall be placed around the casting, flush with its surface and decreasing to a featheredge in a distance of 2 ft (600 mm) around the entire surface of the casting.
- (b) Temporary Rubber Ramps. Temporary rubber ramps shall only be used on roadways with permanent posted speeds of 40 mph or less and when the height of the casting to be protected meets the proper sizing requirements for the rubber ramps as shown below.

Dimension	Requirement
Inside Opening	Outside dimensions of casting + 1 in. (25 mm)
Thickness at inside edge	Height of casting $\pm$ 1/4 in. (6 mm)
Thickness at outside edge	1/4 in. (6 mm) max.
Width, measured from inside opening to outside edge	8 1/2 in. (215 mm) min

Placement shall be according to the manufacturer's specifications.

Temporary ramps for castings shall remain in place until surfacing operations are undertaken within the immediate area of the structure. Prior to placing the surface course, the temporary ramp shall be removed. Excess material shall be disposed of according to Article 202.03."



**EMBANKMENT II (D-1)**

Effective: March 1, 2011

Revised: November 1, 2013

**Description.** This work shall be according to Section 205 of the Standard Specifications except for the following.

Material. Reclaimed asphalt shall not be used within the ground water table or as a fill if ground water is present. The RAP used shall be according to the current Bureau of Materials and Physical Research Policy Memorandum, "Reclaimed Asphalt Pavement (RAP) for Aggregate Applications". Gradation deleterious count shall not exceed 10% of total RAP and 5% of other by total weight.

**CONSTRUCTION REQUIREMENTS**

Samples. Embankment material shall be sampled and tested before use. The contractor shall identify embankment sources, and provide equipment as the Engineer requires, for the collection of samples from those sources. Samples will be furnished to the Geotechnical Engineer a minimum of three weeks prior to use in order that laboratory tests for compaction can be performed. Embankment material placement cannot begin until tests are completed.

Placing Material. In addition to Article 202.03, broken concrete, reclaimed asphalt with no expansive aggregate, or uncontaminated dirt and sand generated from construction or demolition activities shall be placed in 6 inches (150 mm) lifts and disked with the underlying lift until a uniform homogenous material is formed. This process also applies to the overlaying lifts. The disk must have a minimum blade diameter of 24 inches (600 mm).

When embankments are to be constructed on hillsides or existing slopes that are steeper than 3H:1V, steps shall be keyed into the existing slope by stepping and benching as shown in the plans or as directed by the Engineer.

Compaction. Soils classification for moisture content control will be determined by the Soils Inspector using visual field examination techniques and the IDH Textural Classification Chart.

When tested for density in place each lift shall have a maximum moisture content as follows.

- a) A maximum of 110 percent of the optimum moisture for all forms of clay soils.
- b) A maximum of 105 percent of the optimum moisture for all forms of clay loam soils.

Stability. The requirement for embankment stability in article 205.04 will be measured with a Dynamic Cone Penetrometer (DCP) according to the test method in the IDOT Geotechnical Manual. The penetration rate must be equal or less than 1.5 inches (38 mm) per blow.

**Basis of Payment.** This work will not be paid separately but will be considered as included in the various items of excavation.

**FRICTION AGGREGATE (D-1)**

Effective: January 1, 2011  
 Revised: November 1, 2019

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> <sup>5/</sup> : 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> <sup>5/</sup> : Gravel Crushed Gravel Carbonate Crushed Stone Crystalline Crushed Stone Crushed Sandstone Crushed Slag (ACBF) Crushed Steel Slag <sup>1/</sup> Crushed Concrete
HMA High ESAL Low ESAL	Binder IL-19.0 or IL-19.0L  SMA Binder	<u>Allowed Alone or in Combination</u> <sup>5/ 6/</sup> : Crushed Gravel Carbonate Crushed Stone <sup>2/</sup> Crystalline Crushed Stone Crushed Sandstone Crushed Slag (ACBF) Crushed Concrete <sup>3/</sup>

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

Use	Mixture	Aggregates Allowed	
		75% Dolomite <sup>2/</sup>	Crushed Sandstone, Crushed Slag (ACBF), Crushed Steel Slag, or Crystalline Crushed Stone
		75% Crushed Gravel <sup>2/</sup> or Crushed Concrete <sup>3/</sup>	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> <sup>5/ 6/</sup> :	
		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 <sup>2/</sup> , Crushed Concrete <sup>3/</sup> , or Dolomite <sup>2/</sup>	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. In SMA Ndesign 50, carbonate crushed stone shall not be blended with any of the other aggregates allowed alone in Ndesign 50 SMA binder or Ndesign 50 SMA surface.
- 3/ Crushed concrete will not be permitted in SMA mixes.
- 4/ Crushed steel slag shall not be used as leveling 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.”

**GROUND TIRE RUBBER (GTR) MODIFIED ASPHALT BINDER (D-1)**

Effective: June 26, 2006  
 Revised: April 1, 2016

Add the following to the end of article 1032.05 of the Standard Specifications:

“(c) Ground Tire Rubber (GTR) Modified Asphalt Binder. A quantity of 10.0 to 14.0 percent GTR (Note 1) shall be blended by dry unit weight with a PG 64-28 to make a GTR 70-28 or a PG 58-28 to make a GTR 64-28. The base PG 64-28 and PG 58-28 asphalt binders shall meet the requirements of Article 1032.05(a). Compatible polymers may be added during production. The GTR modified asphalt binder shall meet the requirements of the following table.

Test	Asphalt Grade GTR 70-28	Asphalt Grade GTR 64-28
Flash Point (C.O.C.), AASHTO T 48, °F (°C), min.	450 (232)	450 (232)
Rotational Viscosity, AASHTO T 316 @ 275 °F (135 °C), Poises, Pa·s, max.	30 (3)	30 (3)
Softening Point, AASHTO T 53, °F (°C), min.	135 (57)	130 (54)
Elastic Recovery, ASTM D 6084, Procedure A (sieve waived) @ 77 °F, (25 °C), aged, ss, 100 mm elongation, 5 cm/min., cut immediately, %, min.	65	65

Note 1. GTR shall be produced from processing automobile and/or light truck tires by the ambient grinding method. GTR shall not exceed 1/16 in. (2 mm) in any dimension and shall contain no free metal particles or other 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, 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

Add the following to the end of Note 1. 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 must be capable of providing continuous mechanical mixing throughout by continuous agitation and 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  $\pm 0.40$  percent.”

Revise 1030.02(c) of the Standard Specifications to read:

“(c) RAP Materials (Note 5) .....1031”

Add the following note to 1030.02 of the Standard Specifications:

Note 5. When using reclaimed asphalt pavement and/or reclaimed asphalt shingles, the maximum asphalt binder replacement percentage shall be according to the most recent special provision for recycled materials.

**HOT-MIX ASPHALT BINDER AND SURFACE COURSE (D-1)**

Effective: November 1, 2019  
 Revised: February 1, 2020

Description. This work shall consist of constructing a hot-mix asphalt (HMA) binder and/or surface course on a prepared base. Work shall be according to Sections 406 and 1030 of the Standard Specifications, except as modified herein.

Materials. 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 <sup>1/</sup>
	SMA 12.5 <sup>2/</sup>	CA 13 <sup>4/</sup> , CA 14, or CA 16
	SMA 9.5 <sup>2/</sup>	CA 13 <sup>3/4/</sup> or CA 16 <sup>3/</sup>
	IL-9.5	CA 16
	IL-9.5FG	CA 16
HMA Low ESAL	IL-19.0L	CA 11 <sup>1/</sup>
	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 stone sand, slag sand, or steel slag sand meeting the FA/FM 20 gradation 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 Supplemental Specifications to read:

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



HMA Nomenclature. 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 Article 1030.02 of the Standard Specifications and Supplemental Specifications to read:

**“1030.02 Materials.** Materials shall be according to the following.

Item	Article/Section
(a) Coarse Aggregate .....	1004.03
(b) Fine Aggregate .....	1003.03
(c) RAP Material .....	1031
(d) Mineral Filler .....	1011
(e) Hydrated Lime .....	1012.01
(f) Slaked Quicklime (Note 1)	
(g) Performance Graded Asphalt Binder (Note 2) .....	1032
(h) Fibers (Note 3)	
(i) Warm Mix Asphalt (WMA) Technologies (Note 4)	

Note 1. Slaked quicklime shall be according to ASTM C 5.

Note 2. 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. The elastic recovery shall be a minimum of 80.

Note 3. 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 1 or Type 2. Material shall meet requirements noted herein and the actual dosage rate will be determined by the Engineer.

Note 4. Warm mix additives or foaming processes shall be selected from the Department’s Qualified Producer List, “Technologies for the Production of Warm Mix Asphalt (WMA)”.

Mixture Design. Revise Article 1030.04(a)(1) of the Standard Specifications and the Supplemental Specifications to read:

High ESAL, MIXTURE COMPOSITION (% PASSING) <sup>1/</sup>											
Sieve Size	IL-19.0 mm		SMA 12.5		SMA 9.5		IL-9.5mm		IL-4.75 mm		
	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
3/8 in. (9.5 mm)				65	90	100	90	100		100
#4 (4.75 mm)	40	60	20	30	36	50	34	69	90	100
#8 (2.36 mm)	20	42	16	24 <sup>4/</sup>	16	32 <sup>4/</sup>	34 <sup>5/</sup>	52 <sup>2/</sup>	70	90
#16 (1.18 mm)	15	30					10	32	50	65
#30 (600 μm)			12	16	12	18				
#50 (300 μm)	6	15					4	15	15	30
#100 (150 μm)	4	9					3	10	10	18
#200 (75 μm)	3	6	7.0	9.0 <sup>3/</sup>	7.5	9.5 <sup>3/</sup>	4	6	7	9 <sup>3/</sup>
#635 (20 μm)			≤ 3.0		≤ 3.0					
Ratio Dust/Asphalt Binder		1.0		1.5		1.5		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 Ndesign = 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.

Revise Article 1030.04(b)(1) of the Standard Specifications to read:

“(1) High ESAL Mixtures. The target value for the air voids of the HMA shall be 4.0 percent, for IL-4.75 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.

VOLUMETRIC REQUIREMENTS High ESAL				
	Voids in the Mineral Aggregate (VMA), % minimum			Voids Filled with Asphalt Binder (VFA), %
Ndesign	IL-19.0; Stabilized Subbase IL- 19.0	IL-9.5	IL-4.75 <sup>1/</sup>	
50	13.5	15.0	18.5	65 – 78 <sup>2/</sup>
70			65 - 75	
90				

1/ Maximum draindown for IL-4.75 shall be 0.3 percent.

2/ VFA for IL-4.75 shall be 72-85 percent.”

Revise the table in Article 1030.04(b)(3) to read:

“VOLUMETRIC REQUIREMENTS, SMA 12.5 <sup>1/</sup> and SMA 9.5 <sup>1/</sup>			
Ndesign	Design Air Voids Target %	Voids in the Mineral Aggregate (VMA), % min.	Voids Filled with Asphalt (VFA), %
80 <sup>4/</sup>	3.5	17.0 <sup>2/</sup>	75 - 83
		16.0 <sup>3/</sup>	

1/ Maximum draindown shall be 0.3 percent. The draindown shall be determined at the JMF asphalt binder content at the mixing temperature plus 30 °F.

2/ Applies when specific gravity of coarse aggregate is  $\geq 2.760$ .

3/ Applies when specific gravity of coarse aggregate is  $< 2.760$ .

- 4/ Blending of different types of aggregate will not be permitted.  
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.

Add to the end of Article 1030.05 (d) (2) a. of the Standard Specifications:

“During production, the Contractor shall test SMA mixtures for draindown according to AASHTO T305 at a frequency of 1 per day of production.”

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.”

Quality Control/Quality Assurance (QC/QA). Revise the third paragraph of Article 1030.05(d)(3) 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.”

Add the following paragraphs to the end of Article 1030.05(d)(3):

“Longitudinal joint density testing shall be performed at each random density test location. Longitudinal joint testing shall be located at a distance equal to the lift thickness or a minimum of 4 in. (100 mm), from each pavement edge (i.e. for a 5 in. (125 mm) lift the near edge of the density gauge or core barrel shall be within 5 in. (125 mm) from the edge of pavement). Longitudinal joint density testing shall be performed using either a correlated nuclear gauge or cores.

- a. Confined Edge. Each confined edge density shall be represented by a one-minute nuclear density reading or a core density and shall be included in the average of density readings or core densities taken across the mat which represents the Individual Test.

- b. Unconfined Edge. Each unconfined edge joint density shall be represented by an average of three one-minute density readings or a single core density at the given density test location and shall meet the density requirements specified herein. The three one-minute readings shall be spaced 10 ft (3 m) apart longitudinally along the unconfined pavement edge and centered at the random density test location.

When a longitudinal joint sealant (LJS) is applied, longitudinal joint density testing will not be required on the joint(s) sealed.”

Revise the second table in Article 1030.05(d)(4) and its notes to read:

“DENSITY CONTROL LIMITS			
Mixture Composition	Parameter	Individual Test (includes confined edges)	Unconfined Edge Joint Density, minimum
IL-4.75	Ndesign = 50	93.0 – 97.4 % <sup>1/</sup>	91.0%
IL-9.5FG	Ndesign = 50 - 90	93.0 – 97.4 %	91.0%
IL-9.5	Ndesign = 90	92.0 – 96.0 %	90.0%
IL-9.5, IL-9.5L,	Ndesign < 90	92.5 – 97.4 %	90.0%
IL-19.0	Ndesign = 90	93.0 – 96.0 %	90.0%
IL-19.0, IL-19.0L	Ndesign < 90	93.0 <sup>2/</sup> – 97.4 %	90.0%
SMA	Ndesign = 80	93.5 – 97.4 %	91.0%

1/ Density shall be determined by cores or by correlated, approved thin lift nuclear gauge.

2/ 92.0 % when placed as first lift on an unimproved subgrade.”

Equipment. Add the following to Article 1101.01 of the Standard Specifications:

- “(h) Oscillatory Roller. The oscillatory roller shall be self-propelled and provide a smooth operation when starting, stopping, or reversing directions. The oscillatory roller shall be able to operate in a mode that will provide tangential impact force with or without vertical impact force by using at least one drum. The oscillatory roller shall be equipped with water tanks and sprinkling devices, or other approved methods, which shall be used to wet the drums to prevent material pickup. The drum(s) amplitude and frequency of the tangential and vertical impact force shall be approximately the same in each direction and meet the following requirements:

- (1) The minimum diameter of the drum(s) shall be 42 in. (1070 mm);
- (2) The minimum length of the drum(s) shall be 57 in. (1480 mm);
- (3) The minimum unit static force on the drum(s) shall be 125 lb/in. (22 N/m); and
- (4) The minimum force on the oscillatory drum shall be 18,000 lb (80 kN)."

Construction Requirements.

Add the following to Article 406.03 of the Standard Specifications:

"(j) Oscillatory Roller .....1101.01"

Revise the third paragraph of Article 406.05(a) to read:

"All depressions of 1 in. (25 mm) or more in the surface of the existing pavement shall be filled with binder. At locations where heavy disintegration and deep spalling exists, the area shall be cleaned of all loose and unsound material, tacked, and filled with binder (hand method)."

Revise Article 406.05(c) to read.

"(c) Binder (Hand Method). Binder placed other than with a finishing machine will be designated as binder (hand method) and shall be compacted with a roller to the satisfaction of the Engineer. Hand tamping will be permitted when approved by the Engineer."

Revise the special conditions for mixture IL-4.75 in Article 406.06(b)(2)e. to read:

"e. The mixture shall be overlaid within 5 days of being placed."

Revise Article 406.06(d) to read:

"(d) Lift Thickness. The minimum compacted lift thickness for HMA binder and surface courses shall be as follows.

MINIMUM COMPACTED LIFT THICKNESS	
Mixture Composition	Thickness, in. (mm)
IL-4.75	3/4 (19) - over HMA surfaces <sup>1/</sup>
	1 (25) - over PCC surfaces <sup>1/</sup>
IL-9.5FG	1 1/4 (32)
IL-9.5, IL-9.5L	1 1/2 (38)
SMA 9.5	1 3/4 (45)
SMA 12.5	2 (51)
IL-19.0, IL-19.0L	2 1/4 (57)

1/ The maximum compacted lift thickness for mixture IL-4.75 shall be 1 1/4 in. (32 mm).”

Revise Table 1 and Note 3/ of Table 1 in Article 406.07(a) of the Standard Specifications to read:

"TABLE 1 - MINIMUM ROLLER REQUIREMENTS FOR HMA				
	Breakdown Roller (one of the following)	Intermediate Roller	Final Roller (one or more of the following)	Density Requirement
Binder and Surface <sup>1/</sup>	V <sub>D</sub> , P <sup>3/</sup> , T <sub>B</sub> , 3W, O <sub>T</sub> , O <sub>B</sub>	P <sup>3/</sup> , O <sub>T</sub> , O <sub>B</sub>	V <sub>S</sub> , T <sub>B</sub> , T <sub>F</sub> , O <sub>T</sub>	As specified in Articles: 1030.05(d)(3), (d)(4), and (d)(7).
IL-4.75 and SMA <sup>4/ 5/</sup>	T <sub>B</sub> , 3W, O <sub>T</sub>	--	T <sub>F</sub> , 3W, O <sub>T</sub>	
Bridge Decks <sup>2/</sup>	T <sub>B</sub>	--	T <sub>F</sub>	As specified in Articles 582.05 and 582.06.

3/ A vibratory roller (V<sub>D</sub>) or oscillatory roller (O<sub>T</sub> or O<sub>B</sub>) may be used in lieu of the pneumatic-tired roller on mixtures containing polymer modified asphalt binder.”

Add the following to EQUIPMENT DEFINITION in Article 406.07(a) contained in the Errata of the Supplemental Specifications:

“O<sub>T</sub> - Oscillatory roller, tangential impact mode. Maximum speed is 3.0 mph (4.8 km/h) or 264 ft/min (80 m/min).



O<sub>B</sub> - Oscillatory roller, tangential and vertical impact mode, operated at a speed to produce not less than 10 vertical impacts/ft (30 impacts/m).”

Delete last sentence of the second paragraph of Article 1102.01(a) (4) b. 2.

Add to the end of Article 1102.01 (a) (4) b. 2.:

“As an option, collected dust (baghouse) may be used in lieu of manufactured mineral filler according to the following:

(a.) Sufficient collected dust (baghouse) is available for production of the SMA mix for the entire project.

(b.) A mix design was prepared based on collected dust (baghouse).

Revise Article 1030.04 (d) of the Standard Specifications to read:

“(d) Verification Testing. High ESAL, IL-4.75, and SMA mix designs submitted for verification will be tested to ensure that the resulting mix designs will pass the required criteria for the Hamburg Wheel Test (IL mod AASHTO T-324) and the Tensile Strength Test (IL mod AASHTO T-283). The Department will perform a verification test on gyratory specimens compacted by the Contractor. If the mix fails the Department’s verification test, the Contractor shall make the necessary changes to the mix and resubmit compacted specimens to the Department for verification. If the mix fails again, the mix design will be rejected.

All new mix designs will be required to be tested, prior to submittal for Department verification and shall meet the following requirements:

(1) Hamburg Wheel Test criteria. The maximum allowable rut depth shall be 0.5 in. (12.5 mm). The minimum number of wheel passes at the 0.5 in. (12.5 mm) rut depth criteria shall be based on the high temperature binder grade of the mix as specified in the mix requirements table of the plans.

Illinois Modified AASHTO T 324 Requirements <sup>1/</sup>

Asphalt Binder Grade	# Repetitions	Max Rut Depth (mm)
PG 70 -XX (or higher)	20,000	12.5
PG 64 -XX (or lower)	10,000	12.5

- 1/ When produced at temperatures of  $275 \pm 5$  °F ( $135 \pm 3$  °C) or less, loose Warm Mix Asphalt shall be oven aged at  $270 \pm 5$  °F ( $132 \pm 3$  °C) for two hours prior to gyratory compaction of Hamburg Wheel specimens.

Note: For SMA Designs (N-80) the maximum rut depth is 6.0 mm at 20,000 repetitions.

For IL 4.75mm Designs (N-50) the maximum rut depth is 9.0mm at 15,000 repetitions.

- (2) Tensile Strength Criteria. The minimum allowable conditioned tensile strength shall be 60 psi (415 kPa) for non-polymer modified performance graded (PG) asphalt binder and 80 psi (550 kPa) for polymer modified PG asphalt binder. The maximum allowable unconditioned tensile strength shall be 200 psi (1380 kPa)."

Production Testing. Revise first paragraph of Article 1030.06(a) of the Standard Specifications to read:

"(a) High ESAL, IL-4.75, WMA, and SMA Mixtures. For each contract, a 300 ton (275 metric tons) test strip, except for SMA mixtures it will be 400 ton (363 metric ton), will be required at the beginning of HMA production for each mixture at the beginning of 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."

Add the following after the sixth paragraph in Article 1030.06 (a) of the Standard Specifications:

"The Hamburg Wheel test shall also be conducted on all HMA mixtures from a sample taken within the first 500 tons (450 metric tons) on the first day of production or during start up with a split reserved for the Department. The mix sample shall be tested according to the Illinois Modified AASHTO T 324 and shall meet the requirements specified herein. Mix production shall not exceed 1500 tons (1350 metric tons) or one day's production, whichever comes first, until the testing is completed and the mixture is found to be in conformance. The requirement to cease mix production may be waived if the plant produced mixture demonstrates conformance prior to start of mix production for a contract. If the mixture fails to meet the Hamburg Wheel criteria, no further mixture will be accepted until the Contractor takes such action as is necessary to furnish a mixture meeting the criteria"

Method of Measurement:

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<sub>mb</sub>.”

Basis of Payment. Replace the second through the fifth paragraphs of Article 406.14 with the following:

“HMA binder and surface courses will be paid for at the contract unit price per ton (metric ton) for MIXTURE FOR CRACKS, JOINTS, AND FLANGEWAYS; HOT-MIX ASPHALT BINDER COURSE (HAND METHOD), of the N<sub>design</sub> specified; HOT-MIX ASPHALT BINDER COURSE, of the mixture composition and N<sub>design</sub> specified; HOT-MIX ASPHALT SURFACE COURSE, of the mixture composition, friction aggregate, and N<sub>design</sub> specified; POLYMERIZED HOT-MIX ASPHALT BINDER COURSE (HAND METHOD), of the N<sub>design</sub> specified; POLYMERIZED HOT-MIX ASPHALT BINDER COURSE, of the mixture composition and N<sub>design</sub> specified; POLYMERIZED HOT-MIX ASPHALT SURFACE COURSE, of the mixture composition, friction aggregate, and N<sub>design</sub> specified; POLYMERIZED HOT-MIX ASPHALT BINDER COURSE, STONE MATRIX ASPHALT, of the mixture composition and N<sub>design</sub> specified; POLYMERIZED HOT-MIX ASPHALT SURFACE COURSE, STONE MATRIX ASPHALT, of the mixture composition, friction aggregate, and N<sub>design</sub> specified.”

**MAINTENANCE OF ROADWAYS (D-1)**

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.

**PUBLIC CONVENIENCE AND SAFETY (D-1)**

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.”

**RECLAIMED ASPHALT PAVEMENT AND RECLAIMED ASPHALT SHINGLES (D-1)**

Effective: November 1, 2012

Revise: November 1, 2019

Revise Section 1031 of the Standard Specifications to read:

**“SECTION 1031. RECLAIMED ASPHALT PAVEMENT AND RECLAIMED ASPHALT SHINGLES**

**1031.01 Description.** Reclaimed asphalt pavement and reclaimed asphalt shingles shall be according to the following.

- (a) Reclaimed Asphalt Pavement (RAP). RAP is the material resulting from cold milling or crushing an existing hot-mix asphalt (HMA) pavement. RAP will be considered processed FRAP after completion of both crushing and screening to size. The Contractor shall supply written documentation that the RAP originated from routes or airfields under federal, state, or local agency jurisdiction.
- (b) Reclaimed Asphalt Shingles (RAS). Reclaimed asphalt shingles (RAS). RAS is from the processing and grinding of preconsumer or post-consumer shingles. RAS shall be a clean and uniform material with a maximum of 0.5 percent unacceptable material, as defined in Central Bureau of Materials Policy Memorandum, “Reclaimed Asphalt Shingle (RAS) Sources”, by weight of RAS. All RAS used shall come from a Central Bureau of Materials approved processing facility where it shall be ground and processed to 100 percent passing the 3/8 in. (9.5 mm) sieve and 90 percent passing the #4 (4.75 mm) sieve. RAS shall meet the testing requirements specified herein. In addition, RAS shall meet the following Type 1 or Type 2 requirements.
  - (1) Type 1. Type 1 RAS shall be processed, preconsumer asphalt shingles salvaged from the manufacture of residential asphalt roofing shingles.
  - (2) Type 2. Type 2 RAS shall be processed post-consumer shingles only, salvaged from residential, or four unit or less dwellings not subject to the National Emission Standards for Hazardous Air Pollutants (NESHAP).

**1031.02 Stockpiles.** RAP and RAS stockpiles shall be according to the following.

- (a) RAP Stockpiles. The Contractor shall construct individual, sealed RAP stockpiles meeting one of the following definitions. Additional processed RAP (FRAP) shall be stockpiled in a separate working pile, as designated in the QC Plan, and only added to the sealed stockpile when test results for the working pile are complete and are found to meet tolerances specified herein for the original sealed FRAP stockpile. Stockpiles shall be sufficiently separated to prevent intermingling at the

base. All stockpiles (including unprocessed RAP and FRAP) shall be identified by signs indicating the type as listed below (i.e. "Non- Quality, FRAP -#4 or Type 2 RAS", etc...).

- (1) Fractionated RAP (FRAP). FRAP shall consist of RAP from Class I, HMA (High and Low ESAL) or equivalent mixtures. The coarse aggregate in FRAP shall be crushed aggregate and may represent more than one aggregate type and/or quality, but shall be at least C quality. All FRAP shall be processed prior to testing and sized into fractions with the separation occurring on or between the #4 (4.75 mm) and 1/2 in. (12.5 mm) sieves. Agglomerations shall be minimized such that 100 percent of the RAP in the coarse fraction shall pass the maximum sieve size specified for the mixture composition of the mix design.
- (2) Restricted FRAP (B quality) stockpiles shall consist of RAP from Class I, HMA (High ESAL), or HMA (High ESAL). If approved by the Engineer, the aggregate from a maximum 3.0 in. (75 mm) single combined pass of surface/binder milling will be classified as B quality. All millings from this application will be processed into FRAP as described previously.
- (3) Conglomerate. Conglomerate RAP stockpiles shall consist of RAP from Class I, HMA (High and Low ESAL) or equivalent mixtures. The coarse aggregate in this RAP shall be crushed aggregate and may represent more than one aggregate type and/or quality, but shall be at least C quality. This RAP may have an inconsistent gradation and/or asphalt binder content prior to processing. All conglomerate RAP shall be processed (FRAP) prior to testing. Conglomerate RAP stockpiles shall not contain steel slag or other expansive material as determined by the Department.
- (4) Conglomerate "D" Quality (DQ). Conglomerate DQ RAP stockpiles shall consist of RAP from HMA shoulders, bituminous stabilized subbases or HMA (Low ESAL)/HMA (Low ESAL) IL-19.0L binder mixture. The coarse aggregate in this RAP may be crushed or round but shall be at least D quality. This RAP may have an inconsistent gradation and/or asphalt binder content. Conglomerate DQ RAP stockpiles shall not contain steel slag or other expansive material as determined by the Department.
- (5) Non-Quality. RAP stockpiles that do not meet the requirements of the stockpile categories listed above shall be classified as "Non-Quality".

RAP or FRAP containing contaminants, such as earth, brick, sand, concrete, sheet asphalt, bituminous surface treatment (i.e. chip seal), pavement fabric, joint sealants, plant cleanout etc., will be unacceptable unless the contaminants are

removed to the satisfaction of the Engineer. Sheet asphalt shall be stockpiled separately.

- (b) RAS Stockpiles. Type 1 and Type 2 RAS shall be stockpiled separately and shall be sufficiently separated to prevent intermingling at the base. Each stockpile shall be signed indicating what type of RAS is present.

However, a RAS source may submit a written request to the Department for approval to blend mechanically a specified ratio of Type 1 RAS with Type 2 RAS. The source will not be permitted to change the ratio of the blend without the Department prior written approval. The Engineer's written approval will be required, to mechanically blend RAS with any fine aggregate produced under the AGCS, up to an equal weight of RAS, to improve workability. The fine aggregate shall be "B Quality" or better from an approved Aggregate Gradation Control System source. The fine aggregate shall be one that is approved for use in the HMA mixture and accounted for in the mix design and during HMA production.

Records identifying the shingle processing facility supplying the RAS, RAS type, and lot number shall be maintained by project contract number and kept for a minimum of three years.

**1031.03 Testing.** FRAP and RAS testing shall be according to the following.

- (a) FRAP Testing. When used in HMA, the FRAP shall be sampled and tested either during processing or after stockpiling. It shall also be sampled during HMA production.

(1) During Stockpiling. For testing during stockpiling, washed extraction samples shall be run at the minimum frequency of one sample per 500 tons (450 metric tons) for the first 2000 tons (1800 metric tons) and one sample per 2000 tons (1800 metric tons) thereafter. A minimum of five tests shall be required for stockpiles less than 4000 tons (3600 metric tons).

(2) Incoming Material. For testing as incoming material, washed extraction samples shall be run at a minimum frequency of one sample per 2000 tons (1800 metric tons) or once per week, whichever comes first.

(3) After Stockpiling. For testing after stockpiling, the Contractor shall submit a plan for approval to the District proposing a satisfactory method of sampling and testing the RAP/FRAP pile either in-situ or by restockpiling. The sampling plan shall meet the minimum frequency required above and detail the procedure used to obtain representative samples throughout the pile for testing.

Before extraction, each field sample of FRAP, shall be split to obtain two samples of test sample size. One of the two test samples from the final split shall be



- labeled and stored for Department use. The Contractor shall extract the other test sample according to Department procedure. The Engineer reserves the right to test any sample (split or Department-taken) to verify Contractor test results.
- (b) RAS Testing. RAS shall be sampled and tested during stockpiling according to Central Bureau of Materials Policy Memorandum, "Reclaimed Asphalt Shingle (RAS) Sources". The Contractor shall also sample as incoming material at the HMA plant.
- (1) During Stockpiling. Washed extraction and testing for unacceptable materials shall be run at the minimum frequency of one sample per 200 tons (180 metric tons) for the first 1000 tons (900 metric tons) and one sample per 1000 tons (900 metric tons) thereafter. A minimum of five samples are required for stockpiles less than 1000 tons (900 metric tons). Once a  $\leq 1000$  ton (900 metric ton), five-sample/test stockpile has been established it shall be sealed. Additional incoming RAS shall be in a separate working pile as designated in the Quality Control plan and only added to the sealed stockpile when the test results of the working pile are complete and are found to meet the tolerances specified herein for the original sealed RAS stockpile.
- (2) Incoming Material. For testing as incoming material at the HMA plant, washed extraction shall be run at the minimum frequency of one sample per 250 tons (227 metric tons). A minimum of five samples are required for stockpiles less than 1000 tons (900 metric tons). The incoming material test results shall meet the tolerances specified herein.

The Contractor shall obtain and make available all test results from start of the initial stockpile sampled and tested at the shingle processing facility in accordance with the facility's QC Plan.

Before extraction, each field sample shall be split to obtain two samples of test sample size. One of the two test samples from the final split shall be labeled and stored for Department use. The Contractor shall extract the other test sample according to Department procedures. The Engineer reserves the right to test any sample (split or Department-taken) to verify Contractor test results.

**1031.04 Evaluation of Tests.** Evaluation of test results shall be according to the following.

- (a) Evaluation of FRAP Test Results. All test results shall be compiled to include asphalt binder content, gradation and, when applicable (for slag),  $G_{mm}$ . A five test average of results from the original pile will be used in the mix designs. Individual extraction test results run thereafter, shall be compared to the average used for the mix design, and will be accepted if within the tolerances listed below.

Parameter	FRAP
No. 4 (4.75 mm)	± 6 %
No. 8 (2.36 mm)	± 5 %
No. 30 (600 μm)	± 5 %
No. 200 (75 μm)	± 2.0 %
Asphalt Binder	± 0.3 %
G <sub>mm</sub>	± 0.03 <sup>1/</sup>

1/ For stockpile with slag or steel slag present as determined in the current Manual of Test Procedures Appendix B 21, "Determination of Reclaimed Asphalt Pavement Aggregate Bulk Specific Gravity".

If any individual sieve and/or asphalt binder content tests are out of the above tolerances when compared to the average used for the mix design, the FRAP stockpile shall not be used in Hot-Mix Asphalt unless the FRAP representing those tests is removed from the stockpile. All test data and acceptance ranges shall be sent to the District for evaluation.

The Contractor shall maintain a representative moving average of five tests to be used for Hot-Mix Asphalt production.

With the approval of the Engineer, the ignition oven may be substituted for extractions according to the ITP, "Calibration of the Ignition Oven for the Purpose of Characterizing Reclaimed Asphalt Pavement (RAP)" or Illinois Modified AASHTO T-164-11, Test Method A.

(b) Evaluation of RAS Test Results. All of the test results, with the exception of percent unacceptable materials, shall be compiled and averaged for asphalt binder content and gradation. A five test average of results from the original pile will be used in the mix designs. Individual test results run thereafter, when compared to the average used for the mix design, will be accepted if within the tolerances listed below.

Parameter	RAS
No. 8 (2.36 mm)	± 5 %
No. 16 (1.18 mm)	± 5 %
No. 30 (600 μm)	± 4 %
No. 200 (75 μm)	± 2.5 %
Asphalt Binder Content	± 2.0 %

If any individual sieve and/or asphalt binder content tests are out of the above tolerances when compared to the average used for the mix design, the RAS shall

not be used in Hot-Mix Asphalt unless the RAS representing those tests is removed from the stockpile. All test data and acceptance ranges shall be sent to the District for evaluation.

- (c) Quality Assurance by the Engineer. The Engineer may witness the sampling and splitting conduct assurance tests on split samples taken by the Contractor for quality control testing a minimum of once a month.

The overall testing frequency will be performed over the entire range of Contractor samples for asphalt binder content and gradation. The Engineer may select any or all split samples for assurance testing. The test results will be made available to the Contractor as soon as they become available.

The Engineer will notify the Contractor of observed deficiencies.

Differences between the Contractor's and the Engineer's split sample test results will be considered acceptable if within the following limits.

Test Parameter	Acceptable Limits of Precision	
	FRAP	RAS
% Passing: <sup>1/</sup>		
1 / 2 in.	5.0%	
No. 4	5.0%	
No. 8	3.0%	4.0%
No. 30	2.0%	4.0%
No. 200	2.2%	4.0%
Asphalt Binder Content	0.3%	3.0%
G <sub>mm</sub>	0.030	

1/ Based on washed extraction.

In the event comparisons are outside the above acceptable limits of precision, the Engineer will immediately investigate.

- (d) Acceptance by the Engineer. Acceptable of the material will be based on the validation of the Contractor's quality control by the assurance process.

**1031.05 Quality Designation of Aggregate in RAP and FRAP.**

- (a) RAP. The aggregate quality of the RAP for homogeneous, conglomerate, and conglomerate "D" quality stockpiles shall be set by the lowest quality of coarse aggregate in the RAP stockpile and are designated as follows.

- (1) RAP from Class I, HMA (High ESAL), or (Low ESAL) IL-9.5L surface mixtures are designated as containing Class B quality coarse aggregate.
  - (2) RAP from HMA (Low ESAL) IL-19.0L binder mixture is designated as Class D quality coarse aggregate.
  - (3) RAP from Class I, HMA (High ESAL) binder mixtures, bituminous base course mixtures, and bituminous base course widening mixtures are designated as containing Class C quality coarse aggregate.
  - (4) RAP from bituminous stabilized subbase and BAM shoulders are designated as containing Class D quality coarse aggregate.
- (b) FRAP. If the Engineer has documentation of the quality of the FRAP aggregate, the Contractor shall use the assigned quality provided by the Engineer.

If the quality is not known, the quality shall be determined as follows. Fractionated RAP stockpiles containing plus #4 (4.75 mm) sieve coarse aggregate shall have a maximum tonnage of 5,000 tons (4,500 metric tons). The Contractor shall obtain a representative sample witnessed by the Engineer. The sample shall be a minimum of 50 lb (25 kg). The sample shall be extracted according to Illinois Modified AASHTO T 164 by a consultant laboratory prequalified by the Department for the specified testing. The consultant laboratory shall submit the test results along with the recovered aggregate to the District Office. The cost for this testing shall be paid by the Contractor. The District will forward the sample to the Central Bureau of Materials Aggregate Lab for MicroDeval Testing, according to ITP 327. A maximum loss of 15.0 percent will be applied for all HMA applications. The fine aggregate portion of the fractionated RAP shall not be used in any HMA mixtures that require a minimum of "B" quality aggregate or better, until the coarse aggregate fraction has been determined to be acceptable thru a MicroDeval Testing.

**1031.06 Use of FRAP and/or RAS in HMA.** The use of FRAP and/or RAS shall be a Contractor's option when constructing HMA in all contracts.

- (a) FRAP. The use of FRAP in HMA shall be as follows.
- (1) Coarse Aggregate Size (after extraction). The coarse aggregate in all FRAP shall be equal to or less than the nominal maximum size requirement for the HMA mixture to be produced.
  - (2) Steel Slag Stockpiles. FRAP stockpiles containing steel slag or other expansive material, as determined by the Department, shall be homogeneous

and will be approved for use in HMA (High ESAL and Low ESAL) mixtures regardless of lift or mix type.

- (3) Use in HMA Surface Mixtures (High and Low ESAL). FRAP stockpiles for use in HMA surface mixtures (High and Low ESAL) shall have coarse aggregate that is Class B quality or better. FRAP shall be considered equivalent to limestone for frictional considerations unless produced/screened to minus 3/8 inch.
- (4) Use in HMA Binder Mixtures (High and Low ESAL), HMA Base Course, and HMA Base Course Widening. FRAP stockpiles for use in HMA binder mixtures (High and Low ESAL), HMA base course, and HMA base course widening shall be FRAP in which the coarse aggregate is Class C quality or better.
- (5) Use in Shoulders and Subbase. FRAP stockpiles for use in HMA shoulders and stabilized subbase (HMA) shall be FRAP, Restricted FRAP, conglomerate, or conglomerate DQ.
- (b) RAS. RAS meeting Type 1 or Type 2 requirements will be permitted in all HMA applications as specified herein.
- (c) FRAP and/or RAS Usage Limits. Type 1 or Type 2 RAS may be used alone or in conjunction with FRAP in HMA mixtures up to a maximum of 5.0% by weight of the total mix.

When FRAP is used alone or FRAP is used in conjunction with RAS, the percent of virgin asphalt binder replacement (ABR) shall not exceed the amounts indicated in the table below for a given N Design.

Max Asphalt Binder Replacement for FRAP with RAS Combination

HMA Mixtures <i>1/ 2/ 4/</i>	Maximum % ABR		
Ndesign	Binder <sup>5/</sup>	Surface <sup>5/</sup>	Polymer Modified <sub>3/</sub>
30L	50	40	30
50	40	35	30
70	40	30	30
90	40	30	30
SMA			30
IL-4.75			40

- 1/ For Low ESAL HMA shoulder and stabilized subbase, the percent asphalt binder replacement shall not exceed 50 % of the total asphalt binder in the mixture.
- 2/ When the binder replacement exceeds 15 % for all mixes, except for SMA and IL-4.75, the high and low virgin asphalt binder grades shall each be reduced by one grade (i.e. 25 % binder replacement using a virgin asphalt binder grade of PG64-22 will be reduced to a PG58-28). When constructing full depth HMA and the ABR is less than 15 %, the required virgin asphalt binder grade shall be PG64-28.
- 3/ When the ABR for SMA or IL-4.75 is 15 % or less, the required virgin asphalt binder shall be SBS PG76-22 and the elastic recovery shall be a minimum of 80. When the ABR for SMA or IL-4.75 exceeds 15%, the virgin asphalt binder grade shall be SBS PG70-28 and the elastic recovery shall be a minimum of 80.
- 4/ When FRAP or RAS is used alone, the maximum percent asphalt binder replacement designated on the table shall be reduced by 10 %.
- 5/ When the mix has Illinois Flexibility Index Test (I-FIT) requirements, the maximum percent asphalt binder replacement designated on the table may be increased by 5%.

**1031.07 HMA Mix Designs.** At the Contractor's option, HMA mixtures may be constructed utilizing RAP/FRAP and/or RAS material meeting the detailed requirements specified herein.

(a) FRAP and/or RAS. FRAP and /or RAS mix designs shall be submitted for verification. If additional FRAP or RAS stockpiles are tested and found to be within tolerance, as defined under "Evaluation of Tests" herein, and meet all requirements herein, the additional FRAP or RAS stockpiles may be used in the original design at the percent previously verified.

(b) RAS. Type 1 and Type 2 RAS are not interchangeable in a mix design. The RAP, FRAP and RAS stone specific gravities ( $G_{sb}$ ) shall be according to the "Determination of Aggregate Bulk (Dry) Specific Gravity ( $G_{sb}$ ) or Reclaimed Asphalt Pavement (RAP) and Reclaimed Asphalt Shingles (RAS)" procedure in the Department's Manual of Test Procedures for Materials.

**1031.08 HMA Production.** HMA production utilizing FRAP and/or RAS shall be as follows.

A scalping screen, gator, crushing unit, or comparable sizing device approved by the Engineer shall be used in the RAS and FRAP feed system to remove or reduce oversized and agglomerated material.

If during mix production, corrective actions fail to maintain FRAP, RAS or QC/QA test results within control tolerances or the requirements listed herein, the Contractor shall cease production of the mixture containing FRAP or RAS and conduct an investigation that may require a new mix design.

- (a) FRAP. The coarse aggregate in all FRAP used shall be equal to or less than the nominal maximum size requirement for the HMA mixture being produced.
- (b) RAS. RAS shall be incorporated into the HMA mixture either by a separate weight depletion system or by using the RAP weigh belt. Either feed system shall be interlocked with the aggregate feed or weigh system to maintain correct proportions for all rates of production and batch sizes. The portion of RAS shall be controlled accurately to within  $\pm 0.5$  percent of the amount of RAS utilized. When using the weight depletion system, flow indicators or sensing devices shall be provided and interlocked with the plant controls such that the mixture production is halted when RAS flow is interrupted.
- (c) HMA Plant Requirements. HMA plants utilizing FRAP and/or RAS shall be capable of automatically recording and printing the following information.

(1) Dryer Drum Plants.

- a. Date, month, year, and time to the nearest minute for each print.
- b. HMA mix number assigned by the Department.
- c. Accumulated weight of dry aggregate (combined or individual) in tons (metric tons) to the nearest 0.1 ton (0.1 metric ton).
- d. Accumulated dry weight of RAS and FRAP in tons (metric tons) to the nearest 0.1 ton (0.1 metric ton).
- e. Accumulated mineral filler in revolutions, tons (metric tons), etc. to the nearest 0.1 unit.
- f. Accumulated asphalt binder in gallons (liters), tons (metric tons), etc. to the nearest 0.1 unit.

- g. Residual asphalt binder in the RAS and FRAP material as a percent of the total mix to the nearest 0.1 percent.
- h. Aggregate RAS and FRAP moisture compensators in percent as set on the control panel. (Required when accumulated or individual aggregate and RAS and FRAP are printed in wet condition.)
- i. When producing mixtures with FRAP and/or RAS, a positive dust control system shall be utilized.
- j. Accumulated mixture tonnage.
- k. Dust Removed (accumulated to the nearest 0.1 ton)

(2) Batch Plants.

- a. Date, month, year, and time to the nearest minute for each print.
- b. HMA mix number assigned by the Department.
- c. Individual virgin aggregate hot bin batch weights to the nearest pound (kilogram).
- d. Mineral filler weight to the nearest pound (kilogram).
- f. RAS and FRAP weight to the nearest pound (kilogram).
- g. Virgin asphalt binder weight to the nearest pound (kilogram).
- h. Residual asphalt binder in the RAS and FRAP material as a percent of the total mix to the nearest 0.1 percent.

The printouts shall be maintained in a file at the plant for a minimum of one year or as directed by the Engineer and shall be made available upon request. The printing system will be inspected by the Engineer prior to production and verified at the beginning of each construction season thereafter.

**1031.09 RAP in Aggregate Surface Course and Aggregate Wedge Shoulders, Type B.** The use of RAP or FRAP in aggregate surface course and aggregate shoulders shall be as follows.

- (a) Stockpiles and Testing. RAP stockpiles may be any of those listed in Article 1031.02, except “Non-Quality” and “FRAP”. The testing requirements of Article 1031.03 shall not apply. RAP used shall be according to the current Central Bureau of Materials Policy Memorandum, “Reclaimed Asphalt Pavement (RAP) for Aggregate Applications”.



- (b) Gradation. The RAP material shall meet the gradation requirements for CA 6 according to Article 1004.01(c), except the requirements for the minus No. 200 (75  $\mu$ m) sieve shall not apply. The sample for the RAP material shall be air dried to constant weight prior to being tested for gradation.”

**STATUS OF UTILITIES (D-1)**

Effective: June 1, 2016  
 Revised: January 1, 2020

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

**UTILITIES TO BE ADJUSTED**

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

No conflicts to be resolved.

The following contact information is what was used during the preparation of the plans as provided by the Agency/Company responsible for resolution of the conflict.

<b>Agency/Company Responsible to Resolve Conflict</b>	<b>Name of contact</b>	<b>Address</b>	<b>Phone</b>	<b>e-mail address</b>
AT&T (Distribution)	Steve Larson	1000 Commerce Drive Oak Brook, IL 60523	630- 573- 5450	g11629@att.com
AT&T (T-TCG)	Bruce Knight	4513 Western Avenue Lisle, IL 60532	331- 302- 9341	bk367y@att.com

AT&T (Illinois/SBC)	Allison Wisniewski		708- 396- 8090	
Comcast	Martha Gieras	688 Industrial Drive Elmhurst, IL 60123	224- 229- 5862	Martha_gieras@cable.comcast.com
ComEd	Lisa Argast (Evanston) John O'brien (CDOT)	1500 Franklin Blvd Libertyville, IL 60048	630- 576- 7094  630- 437- 2463	<a href="mailto:Lisa.mavity@comed.com">Lisa.mavity@comed.com</a>
Metropolitan Water Reclamation District	Hanif Munshi (COE)  Amanullah Shaikh (CDOT)	100 East Erie Street Chicago, IL 60611	312- 351- 3184  312- 751- 3199	<a href="mailto:munshim@mwrdd.org">munshim@mwrdd.org</a> (COE)
Nicor	Bruce Koppang	1844 Ferry Road Naperville, IL 60563	630- 388- 3046	bkoppan@southernco.com
Crown Castle Fiber	Fiber-Dig- Team	2000 Corporate Drive, Canonsburg, Pennsylvania 15317	724- 416- 2842	Fiber.dig@crowncastle.com
City of Evanston	Mark Varner	2100 Ridge Ave., Evanston, IL 60201	847- 448- 8080	mvarner@cityofevanston.com
MCI-Verizon Business Team	Investigation Team	400 International Parkway, Richardson, TX 75081	972- 729- 6322	investigations@verizon.com
Wide Open West	Terrance House		630- 770- 4956	

Peoples Gas	Cezar Papa		312-240-7327	Cezar.papa@peoplesgasdelivery.com
CTR – CDWM Water	Grazyan Lewandowska		312-894-4472	
CDOT-Electrical Operations	Antonio Bautista		312-746-8180	
CTA – Traffic	Joseph Osowski		312-681-4151	
CTA – Engineering	Brian Howard		312-922-0508	
CDOT – Forestry	Joseph McCarthy		312-746-5254	

**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.

Stage 1

<b>STAGE / LOCATION</b>	<b>TYPE</b>	<b>DESCRIPTION</b>	<b>OWNER</b>	<b>ACTION</b>
54+88 7.8 LT	Underground Utility	Underground crossing with watermain	Electrical (Chicago)	Protect from damage by contractor during construction.
60+62 6.5 LT	Underground Utility	Underground crossing with watermain	ComCast	Protect from damage by contractor during construction.

65+56 8.5 LT	Underground Utility	Underground crossing with watermain	Sunesys	Protect from damage by contractor during construction.
66+86 8.5 LT	Underground Utility	Underground crossing with watermain	Electrical (Chicago)	Protect from damage by contractor during construction.
92+51 18.3 LT	Underground Utility	Underground crossing with watermain	Electrical (Chicago)	Protect from damage by contractor during construction.
92+76 14.7 LT	Underground Utility	Underground crossing with watermain	ComEd	Protect from damage by contractor during construction.
93+25 16.6 LT	Underground Utility	Underground crossing with watermain	Electrical (Chicago)	Protect from damage by contractor during construction.
102+34, 3.7 RT To 104+78, 3.0 RT	Underground Utility	Underground crossing with watermain	ComEd	Protect from damage by contractor during construction.
106+82 1.5 RT	Underground Utility	Underground crossing with watermain	Verizon	Protect from damage by contractor during construction.
107+53 23.1 LT	Underground Utility	Underground crossing with watermain	Electrical (Chicago)	Protect from damage by contractor during construction.

Stage 2

No conflicts to be resolved.

Phase 3

No conflicts to be resolved.

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

<b>Agency/Company Responsible to Resolve Conflict</b>	<b>Name of contact</b>	<b>Address</b>	<b>Phone</b>	<b>e-mail address</b>
AT&T (Distribution)	Janet Ahern	1000 Commerce Drive Oak Brook, IL 60523	630-573-6414	ja1763@att.com
AT&T (T-TCG)	Bruce Knight	4513 Western Avenue Lisle, IL 60532	331-302-9341	bk367y@att.com
Comcast	Robert Stoll	688 Industrial Drive Elmhurst, IL 60123	630-600-6213	
ComEd	Peter Kratzer	1500 Franklin Blvd Libertyville, IL 60048	708-518-6209	peter.kratzer@comed.com
Metropolitan Water Reclamation District	Hanif Munshi	100 East Erie Street Chicago, IL 60611	312-351-3184	munshim@mwrdd.org
Nicor	Bruce Koppang	1844 Ferry Road Naperville, IL 60563	630-388-3046	bkoppang@southernco.com
Northwest Water Commission	Robert Toben	1525 N Wolf Road Des Plaines, IL 60016	847-635-0777	rtoben@northwestwater.org
Sunesys	Russell Doersch	1200 Roosevelt Rd Suite 400 Glen Ellyn, IL 60137	734-417-4800	rdoersch@sunesys.com

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 Department's contractor is responsible for contacting J.U.L.I.E. prior to all excavation work.

**STORM SEWER ADJACENT TO OR CROSSING WATER MAIN (D-1)**

Effective: February 1, 1996  
Revised: January 1, 2007

**Description.** This work consists of constructing storm sewer adjacent to or crossing a water main, at the locations shown on the plans. The material and installation requirements shall be according to the latest edition of the “Standard Specifications for Water and Sewer Main Construction in Illinois”, and the applicable portions of Section 550 of the Standard Specifications; which may include concrete collars and encasing pipe with seals if required.

**Materials.** Pipe materials shall meet the requirements of Sections 40 and 41-2.01 of the “Standard Specifications for Water and Sewer Main Construction in Illinois”, except PVC pipe will not be allowed. Ductile-Iron pipe shall meet the minimum requirements for Thickness Class 50.

Encasing of standard type storm sewer, according to the details for “Water and Sewer Separation Requirements (Vertical Separation)” in the “STANDARD DRAWINGS” Division of the “Standard Specifications for Water and Sewer Main Construction in Illinois”, may be used for storm sewers crossing water mains.

**Basis of Payment.** This work will be paid according to Article 550.10 of the Standard Specifications, except the pay item shall be STORM SEWER (WATER MAIN REQUIREMENTS), of the diameter specified.



**TEMPORARY INFORMATION SIGNING (D-1)**

Effective: November 13, 1996

Revised: January 2, 2007

**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:

	<b><u>Item</u></b>	<b><u>Article/Section</u></b>
a.)	Sign Base (Notes 1 & 2)	1090
b.)	Sign Face (Note 3)	1091
c.)	Sign Legends	1092
d.)	Sign Supports	1093
e.)	Overlay Panels (Note 4)	1090.02

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

Note 2. Type A sheeting can be used on the plywood base.

Note 3. All sign faces shall be Type A except all orange signs shall meet the requirements of Article 1106.01.

Note 4. 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 sign structures or sign panels shall be approved by the Engineer. Any damage to the existing signs due to the Contractor's operations shall be repaired or signs replaced, as determined by the Engineer, at the Contractor's expense.

Signs which are placed on overhead bridge structures shall be fastened to the handrail with stainless steel bands. These signs shall rest on the concrete parapet where possible. The Contractor shall furnish mounting details for approval by the Engineer.

**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.

**TRAFFIC CONTROL AND PROTECTION (ARTERIALS) (D-1)**

Effective: February 1, 1996  
Revised: March 1, 2011

**Description.** Specific traffic control plan details and Special Provisions have been prepared for this contract. This work shall include all labor, materials, transportation, handling and incidental work necessary to furnish, install, maintain and remove all traffic control devices required as indicated in the plans and as approved by the Engineer.

When traffic is to be directed over a detour route, the Contractor shall furnish, erect, maintain and remove all applicable traffic control devices along the detour route according to the details shown in the plans.

**Method of Measurement.** All traffic control (except Traffic Control and Protection (Expressways)) and temporary pavement markings) indicated on the traffic control plan details and specified in the Special Provisions will be measured for payment on a lump sum basis.

**Basis of Payment.** All traffic control and protection will be paid for at the contract lump sum price for TRAFFIC CONTROL AND PROTECTION, (SPECIAL).

Temporary pavement markings will be paid for separately unless shown on a Standard.

**WINTERIZED TEMPORARY ACCESS (D-1)**

Effective: January 1, 2012  
Revised: March 5, 2012

**Description.** This work shall consist of constructing, maintaining and removing winterized temporary access for private and commercial entrances and side roads designed for use throughout the winter months.

**Materials.** Materials shall be according to the following.

ITEM	ARTICLE/SECTION
Hot-Mix Asphalt	1030

**Construction Requirements**

For projects lasting longer than one construction season, the Contractor shall construct and maintain temporary access composed of an HMA surface course over an existing aggregate temporary access. The Contractor shall install the winterized temporary access prior to winter shut down at the direction of the Engineer. The top 2" of the existing aggregate temporary access should be removed and replaced with 2" of Hot-Mix Asphalt. Compensation will be given for the winterized temporary access at the time of the installation of the Hot-Mix Asphalt surface course.

HMA Surface Course. The Hot-Mix Asphalt surface course shall be 2 in. thick when compacted. HMA Surface Course, Mix "D", N50 shall be used except as modified by the plans or as directed by the Engineer. This work shall be constructed in accordance with the applicable portions of Section 406 of the Standard Specifications and as directed by the Engineer. The material shall conform to the applicable portions of Section 1030 of the Standard Specifications.

The winterized temporary access shall be constructed to the dimensions and grades of the existing aggregate temporary access.

Maintaining the winterized temporary access shall include repairing the HMA surface course after any operation that may disturb or remove the winterized temporary access to the satisfaction of the Engineer.

When use of the winterized temporary access is discontinued, the winterized temporary access shall be removed according to Article 440.03 of the Standard Specifications. The material shall be disposed of according to Article 202.03 of the Standard Specifications or may be utilized in the permanent construction with the approval of the Engineer.

**Method of Measurement.** Winterized temporary access for private and commercial entrances and roads will be measured for payment at the contract unit price per square

yard for every private entrance, commercial entrance or road constructed for the purpose of winterized temporary access.

**Basis of Payment.** Winterized temporary access for private and commercial entrances and roads will be paid for at the contract unit price per square yard for TEMPORARY ACCESS (WINTERIZE) as specified in the plans.

Partial payment of the square yard amount bid for each winterized temporary access will be paid according to the following schedule:

- (a) Upon construction of the winterized temporary access, sixty percent of the contract unit price per square yard will be paid.
- (b) Subject to the approval of the Engineer for the adequate maintenance and removal of the winterized temporary access, the remaining forty percent of the pay item will be paid upon the permanent removal of the temporary access.

**KEEPING ARTERIAL ROADWAYS OPEN TO TRAFFIC**

Effective: January 22, 2003  
Revised: January 1, 2007

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, and the State Standards.

Daily arterial lane closures shall be in accordance with the Standard Specifications, Highway Standards and the direction of the Engineer. The Contractor shall request and gain approval from the Illinois Department of Transportation's Arterial Traffic Control Supervisor at (847-705-4470) seventy-two (72) hours in advance of all long term (24 hrs. or longer) lane closures.

Arterial lane closures will only be permitted during the **off-peak** traffic volume hours. **Peak traffic volume hours are defined as weekdays (Monday through Friday) from 6:00 AM to 8:00 AM and 4:00 PM to 6:00 PM.**

Full closure of any arterial lanes will only be permitted for a maximum period of 15 minutes during the **off-peak** traffic volume hours. During full roadway closures, the Contractor will be required to reduce the roadway to only one open traffic lane in the affected direction of travel using the appropriate State Standard. Police forces shall be notified and requested to close the remaining lane to facilitate the necessary work activities. The Contractor shall notify the District One Arterial Traffic Control Supervisor at (847) 705-4470 seventy-two (72) hours in advance of the proposed road closure.

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.

**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 2.

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 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.

## **TRAFFIC CONTROL PLAN**

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.

### List of Highway Standards:

701006-05	OFF ROAD OPERATION – 2 LANE 2 WAY –15 FEET TO EDGE OF PAVEMENT
701011-04	OFF ROAD MOVING OPERATIONS, 2L, 2W, DAY ONLY
701101-05	OFF ROAD OPERATION – MULTI LANE – LESS THAN 15 FEET TO EDGE OF PAVEMENT
701301-04	LANE CLOSURE 2 LANE 2 WAY – SHORT TIME OPERATIONS
701311-03	LANE CLOSURE 2 LANE 2 WAY – MOVING OPERATION DAYTIME ONLY
701427-05	LANE CLOSURE, MULTILANE, INTERMITTENT OR MOVING OPER., FOR SPEEDS $\leq$ 40 MPH
701501-06	URBAN LANE CLOSURE, 2 LANE 2 WAY UNDIVIDED
701502-09	URBAN LANE CLOSURE, 2 L, 2 W, WITH BIDIRECTIONAL LEFT TURN LANE
701606-10	URBAN SINGLE LANE CLOSURE, MULTILANE, 2W WITH MOUNTABLE MEDIAN
701611-01	URBAN HALF ROAD CLOSURE, MULTILANE, 2W WITH MOUNTABLE MEDIAN
701701-10	URBAN LANE CLOSURE, MULTILANE INTERSECTION
701801-06	SIDEWALK CORNER OR CROSSWALK CLOSURE
701901-08	TRAFFIC CONTROL DEVICES

### Details:

District Detail TC-10: Traffic Control and Protection for Side Roads, Intersections and Driveways

District Detail TC-13: District 1 Typical Pavement Markings

District Detail TC-14: Traffic Control and Protection at Turn Bays (to Remain Open to Traffic)

District Detail TC-16: Short Term Pavement Marking Letters and Symbols  
District Detail TC-22: Arterial Road Information Sign  
District Detail TC-26: Driveway Entrance Signing

Special Provisions:

Keeping Arterial Roadways Open To Traffic (Lane Closures Only)  
Pavement Marking Removal (BDE)  
Traffic Control and Protection, (Special)  
Maintenance of Roadways  
LRS3 Work Zone Traffic Control Surveillance  
Public Convenience and Safety (D1)  
Temporary Information Signing  
Equipment Parking and Storage (BDE)  
Temporary Pavement Marking (BDE)  
Traffic Control Devices - Cones (BDE)

The work shall be accomplished such that the streets will be left open to local traffic at the end of each working day.

It will also be necessary for the Contractor to provide advance written notice to residents, police, fire, school districts and trash haulers when access to any street and/or driveway will be temporarily closed or limited. At least one lane access must be provided to all commercial property at all times. Notices shall be delivered 24 hours prior to any temporary closures and shall provide a re-entrance date to the residents. Notices shall be reviewed and approved by the Engineer prior to issuance.

During construction, the Contractor shall provide lighted barricades, flagmen and other temporary protection where necessary for public safety at all times. Should traffic protection be determined to be inadequate by the Engineer, the Village will take the necessary actions to protect the public, and the cost of this work will be charged to the Contractor.

**Method of Measurement.** This work will not be measured for payment.

**Basis of Payment.** This work will be considered included in the contract lump sum price for TRAFFIC CONTROL AND PROTECTION, (SPECIAL).

**TRENCH BACKFILL**

**Description.** Work under this item shall be performed in accordance with applicable portions of Sections 208, of the “Standard Specifications”, except as herein modified.

The trench depth is the depth from the subgrade to the top of service and any required bedding. Any trench backfill required in excess of the quantity established above, including bedding material, shall be included in the cost of the TRENCH BACKFILL.

**EXPLORATION TRENCH 48" DEPTH**

**EXPLORATION TRENCH 72" DEPTH**

**Description.** These items of work shall be performed as directed by the ENGINEER in conformance with applicable provisions of Sections 213 of the Standard Specifications for Road and Bridge Construction, except that farm underdrains shall be taken out and all utilities shall be included.

In addition to Section 213, vacuum excavation is to be included under these pay items.

**Basis of Payment.** This work will be paid for at the contract unit price foot for EXPLORATION TRENCH 48" DEPTH or EXPLORATION TRENCH 72" DEPTH.

**CONTINUOUSLY REINFORCED PORTLAND CEMENT CONCRETE PAVEMENT 10”**

**Description.** Work performed under this item shall be in accordance with Section 420 of the Standard Specifications and as detailed in the plans, that are included herein. These items consist of constructing a bus pad pavement composed of Portland cement concrete with reinforcement, constructed on a prepared subbase as shown on the plans.

**General Requirements.** Do not place concrete on soft, muddy, or frozen subgrade or subbase. Grade, compact, trim and finish the subgrade or subbase according to Section 301. The minimum width of the prepared subgrade or subbase must be according to the cross sections as shown on the plans.

Construct joints of type and dimensions, and at the locations required on the plans. Construct joints in accordance with Article 420.05 in the Standard Specifications. Any dowel bars and reinforcement bars used in the pavement for jointing will be considered included in the cost of this item. Seal joints before the pavement is opened to traffic, including construction traffic, and as soon after the curing period as possible.

Materials are to meet the requirements of Sections 1020, 1006, 1050, and 1051 of the Standard Specifications.

The sequence of finish operations is as follows: strike off, consolidation, screed, longitudinal floating, straightedge, edging, and final finish. Pavement shall be tined in accordance with Article 420.09 (e) (1). The primary purpose of the consolidation and finishing operations is to produce a satisfactory surface. If this provision is not being complied with, or modifications need to be made to the operations to assure a satisfactory surface, the paving operations will be stopped by the Engineer and the Contractor will not be permitted to proceed until satisfactory results are assured.

The Contractor must protect the pavement and its appurtenances against both public traffic and traffic caused by the Contractor's own employees and agents. The Contractor will be required to repair any damage to the pavement occurring prior to final acceptance or be required to replace the pavement, in a manner acceptable to the Engineer. No additional payment will be allowed for repair or replacement of pavement damaged in this manner.

Included in the cost of this item is compliance with IDOT Recurring Special Provision check sheet # 25: Quality Control / Quality Assurance of Concrete Mixtures.

HIGH-EARLY-STRENGTH PORTLAND CEMENT CONCRETE must achieve a minimum flexural strength of 3500 psi within 3 days of placement.

Apply a protective coat of Penetrating Silane Sealer: Water-Repellant, penetrating alkyl alkoxy silane sealer to all exposed concrete surfaces. Sealer will be incidental to the cost of any concrete pay item and must follow the following characteristics:

1. Not less than 40% solids content by weight.
2. Clear, colorless, does not affect color of substrate.

The following products are available for use:

- A. Silvento Inc. "Chem-Trete BSM 40"
- B. L & M Construction Chemicals "Pentane/40"
- C. Sonneborn "Sonosheid Penetrating Sealer 40"
- D. Hydrozo, Enviroseal 40 Clear Water Repellent Sealer

Application of the sealer must comply with the manufacturer's recommendations. THE USE OF LINSEED OIL WILL NOT BE PERMITTED.

**Method of Measurement.** CONTINUOUSLY REINFORCED PORTLAND CEMENT CONCRETE PAVEMENT 10" will be measured for payment in place and the area computed in square yards. The length will be measured along the centerline of the surface of each roadway. The width will be the width of pavement as shown on the plans.

**Basis of Payment.** This work will be paid for at the contract unit price per square yard for CONTINUOUSLY REINFORCED PORTLAND CEMENT CONCRETE PAVEMENT 10" which price includes payment for all labor, material, and equipment necessary to complete the work described above, including any dowel bars and reinforcement bars used in the pavement for jointing and protective coat.

**PORTLAND CEMENT CONCRETE DRIVEWAY PAVEMENT, 8 INCH**

**PORTLAND CEMENT CONCRETE ALLEY PAVEMENT, 8 INCH**

**Description.** Work under this item shall be performed according to Section 423 of the IDOT Standard Specifications for Road and Bridge Construction, except as herein modified.

**Materials.** The mix shall be designed according to Section 3.0 of the IDOT QC/QA PCC Level III Technician Manual. High early strength concrete shall achieve a minimum compressive strength of 3,500 psi within 3 days of placement.

**Basis of Payment.** This work will be paid for at the contract unit price per square yard for PORTLAND CEMENT CONCRETE DRIVEWAY PAVEMENT, 8 INCH and PORTLAND CEMENT CONCRETE ALLEY PAVEMENT, 8 INCH.



**PORTLAND CEMENT CONCRETE SIDEWALK 5 INCH**  
**PORTLAND CEMENT CONCRETE SIDEWALK 8 INCH, (SPECIAL)**

**Description.** Work under this item shall be performed according to Section 424 of the IDOT Standard Specifications for Road and Bridge Construction, except as herein modified.

**Materials.** The mix shall be designed according to Section 3.0 of the IDOT QC/QA PCC Level III Technician Manual. High-early strength concrete shall achieve a minimum compressive strength of 3,500 psi within 3 days of placement.

**Construction Requirements.** This work shall be constructed according to current City of Chicago Department of Transportation ADA Standards. Construction of ADA ramps are included in PORTLAND CEMENT CONCRETE SIDEWALK 8 INCH, (SPECIAL).

**Method of Measurement.** The work for PORTLAND CEMENT CONCRETE SIDEWALK 8 INCH, (SPECIAL) includes the side curbs, side flares, level landing area, ramps and the sidewalk constructed between adjacent ramps within the corner radius.

**Basis of Payment.** This work will be paid for at the contract unit price per square foot for PORTLAND CEMENT CONCRETE SIDEWALK 5 INCH and PORTLAND CEMENT CONCRETE SIDEWALK 8 INCH (SPECIAL).

## **DETECTABLE WARNINGS**

**Description.** This work shall consist of furnishing and installing prefabricated “red” linear and radial detectable warning panels from approved material suppliers in the new Portland Cement Concrete (PCC) sidewalk at locations as directed by the ENGINEER. The detectable warning panels shall be the “cast-in-place” model.

**Materials.** Approved material suppliers are as follows:

- a. Armor-Tile Tactile Systems. [www.armor-tile.com](http://www.armor-tile.com)
- b. ADA Solutions. [www.adatile.com](http://www.adatile.com) (Composite Panel Paver System)
- c. Detectile Corporation. [www.detectile.com](http://www.detectile.com)

The Contractor shall be responsible for furnishing the specified number of detectable warning panels from the approved list of material suppliers. Prior to purchasing the detectable warnings, the Contractor shall submit for review and approval by the ENGINEER the proposed product information consisting of the following:

- a. Manufacturer’s certification stating the product is fully compliant with the ADAAG.
- b. Manufacturer’s five year warranty.
- c. Manufacturer’s specifications including the required materials, equipment, and installation procedures. Products that are colored shall be colored their entire thickness.
- d. Color chart (“red” color to be determined by the ENGINEER).
- e. Sample Product Panel (24”x48” linear, 24”x48” radial).

Any damaged panel shall be rejected and shall be replaced at no additional expense to the Owner.

**Construction Requirements.** The Contractor shall install the panels in accordance with the manufacturer’s recommendations and details. The panels shall be installed during the construction of the new PCC sidewalk and shall be an integral part of the walking surface. The top of the panel shall be flush with the surface of the sidewalk and only the actual domes shall project above the walking surface.

The detectable warning panels shall be installed at curb ramps, medians and pedestrian refuge islands, at-grade railroad crossings, transit platform edges, and other locations where pedestrians are required to cross a hazardous vehicular way.

Detectable warnings shall also be installed at alleys and commercial entrances when permanent traffic control devices are present.

**Method of Measurement and Basis of Payment.** This work will be measured and paid for at the contract unit price per square foot for DETECTABLE WARNINGS which work includes furnishing and installing the detectable warning per the manufacturer's recommendations and as described herein.

## **DETECTABLE WARNINGS (SPECIAL)**

**Description.** Work under this item shall consist of installing linear and radial cast iron detectable warning tiles on ADA curb ramps as shown on the plans and according to the latest Chicago Department of Transportation ADA Standards. Work shall be performed according to Section 424 of the IDOT Standard Specifications for Road and Bridge Construction, except as herein modified.

**Materials.** Detectable warning tiles shall be cast gray iron and shall be provided by a Manufacturer approved by the City of Chicago Department of Transportation. A list of approved Manufacturers of cast iron detectable warning tiles is available on the City of Chicago Department of Transportation website under Construction Guidelines/Standards.

The cast iron detectable warning tiles shall be of uniform quality, free from surface defects and shall be provided with an untreated, natural surface finish as directed by the Engineer.

**Construction Requirements.** The detectable warning system shall be installed in fresh concrete and shall comply with the City of Chicago Department of Transportation Regulations for Openings, Construction and Repair in the Public Way, Appendix B, ADA Standards. The equipment and installation procedures shall be according to the Manufacturer's specifications.

The Contractor shall install the detectable warning system flush with adjacent concrete, and resulting in a snug fit between tiles to limit water infiltration around the perimeter of the system and between tiles, as directed by the Commissioner.

**QC/QA Requirements.** A Manufacturer's written certification that the material complies with these specifications shall be provided to the Engineer.

**Method of Measurement.** This work will be measured for payment in place in square feet.

**Basis of Payment.** This work will be paid for at the contract unit price per square foot for DETECTABLE WARNING (SPECIAL).

**TEMPORARY FENCE (SPECIAL)**

**Description.** This item of work shall consist of the equipment, material and labor to provide and install a temporary fence as described on the landscaping plans for tree protection in the City of Chicago side.

Note that 3 inches of hardwood mulch is to be included and will not be paid for separately.

**Method of Measurement and Basis of Payment.** This work will be paid for at the contract unit per foot TEMPORARY FENCE (SPECIAL).

## **TEMPORARY SIDEWALK**

**Description.** This work shall consist of providing pedestrian access within the project limits to and from adjacent properties and at street crosswalks. This work shall include all temporary access walks and ramps needed to maintain access until the walkway is fully restored.

**Construction Requirements.** Temporary sidewalk shall consist of either Hot-Mix Asphalt N50 Surface or Portland Cement Concrete as directed by the ENGINEER. Temporary sidewalk shall be constructed within ADA and MUTCD requirements.

The Contractor will be responsible for the observation and protection of temporary accesses at all times throughout the duration of the project. The Contractor shall also be responsible for the installation and maintenance of signage and other items to provide safe pedestrian access.

When the Engineer has determined that a temporary access walk is no longer required, it shall be promptly removed by the Contractor. Removal of temporary HMA or PCC sidewalk will be included in the cost of this pay item.

**Method of Measurement.** This work will be measured per square feet at a specific location as directed by the Engineer. Work and materials needed to maintain temporary access walks and ramps shall not be measured for payment.

**Basis of Payment.** This item will be paid for at the contract unit price per square feet for TEMPORARY SIDEWALK, which price shall be payment in full for all labor, materials, equipment, tools and incidentals required to construct furnish, modify and remove the temporary access walks and ramps at a specific location for the various construction stages.

## **TEMPORARY SIDEWALK RAMP**

**Description.** This work shall consist of providing pedestrian access within the project limits to and from adjacent properties and at street crosswalks. This work shall include all temporary access walks and ramps needed to maintain access until the walkway is fully restored.

**Construction Requirements.** Temporary access walks and ramps shall be wood frame and plywood constructed within ADA and MUTCD requirements.

The Contractor shall submit shop drawings for plywood walkways and ramps to the Engineer for review and approval prior to construction. The Contractor will be responsible for the observation and protection of temporary accesses at all times throughout the duration of the project. The Contractor shall also be responsible for the installation and maintenance of signage and other items to provide safe pedestrian access.

When the Engineer has determined that a temporary access walk or ramp is no longer required, it shall be promptly relocated by the Contractor or removed from the project site.

**Method of Measurement.** This work will be measured for payment in place in units of each temporary sidewalk ramp furnished and installed at a specific location as directed by the Engineer. Work and materials needed to maintain and repair the temporary access walks and ramps shall not be measured for payment. Moving or modifying the temporary access walks and ramps during later construction stages shall not be measured for payment, regardless of the number of times it must be moved or modified.

**Basis of Payment.** This item will be paid for at the contract unit price per each for TEMPORARY SIDEWALK RAMP, which price shall be payment in full for all labor, materials, equipment, tools and incidentals required to construct furnish, repair, transport, modify and remove the temporary access walks and ramps at a specific location for the various construction stages.

**TEMPORARY PAVEMENT (VARIABLE DEPTH)**

**Description.** This work shall consist of providing required temporary pavement when needed within the project limits to provide for standard travel lanes. This will include material, equipment and labor. Removal of temporary pavement to be included.

**Basis of Payment.** This item will be paid for at the contract unit price per ton for TEMPORARY PAVEMENT (VARIABLE DEPTH), which price shall be payment in full for all labor, materials, equipment, tools and incidentals required to construct furnish, repair, transport, modify and remove the temporary pavement.



**CLASS C PATCHES, TYPE I, 9 INCH (SPECIAL)**

**CLASS C PATCHES, TYPE II, 9 INCH (SPECIAL)**

**CLASS C PATCHES, TYPE III, 9 INCH (SPECIAL)**

**CLASS C PATCHES, TYPE IV, 9 INCH (SPECIAL)**

**Description.** This item of work shall consist of the equipment, material and labor to install PCC patches for the water main and sewer installation per the detail shown in the plans. Saw cutting, tie bars, installation of tie bars and all associated work is included.

**Method of Measurement and Basis of Payment:** This work will be paid for at the contract unit per square yard CLASS C PATCHES, TYPE I, 9 INCH (SPECIAL), CLASS C PATCHES, TYPE I, 9 INCH (SPECIAL), CLASS C PATCHES, TYPE II, 9 INCH (SPECIAL), CLASS C PATCHES, TYPE III, 9 INCH (SPECIAL), CLASS C PATCHES, TYPE IV, 9 INCH (SPECIAL)

**WASHOUT BASIN**

**Description.** This item shall consist of constructing and maintaining a washout basin for concrete trucks and other construction vehicles.

**Basis of Payment:** This item will be paid for at the contract unit price per lump sum for WASHOUT BASIN. The price shall include general maintenance and removal of all construction debris and all material, labor, tools, equipment, disposal of surplus material, and incidentals necessary to complete this item of work.

**BRICK SIDEWALK REMOVAL**

**Description.** This item of work shall consist of the equipment, material and labor to remove existing sidewalk bricks and subbase underneath.

**Method of Measurement and Basis of Payment:** This work will be paid for at the contract unit per square foot BRICK SIDEWALK REMOVAL.

## **WATER MAIN INSTALLATION SEQUENCE**

The Contactor shall follow the sequencing as described below for the water main installation.

### **HOWARD STREET FROM ASBURY AVE/WESTERN AVE TO RIDGE AVE/BLVD**

The proposed 8" and 6" water main (DIP, Class 52 Zinc) shall be installed on Howard Street from Asbury Ave/Western Ave to Ridge Ave/Blvd. This water main section will commence from Asbury Ave/Western Ave and will be constructed continuously east to Ridge Ave/Blvd.

Exploratory trenching should be performed on existing water main at proposed connection locations prior to the start of construction.

As indicated on the plans the initial work should be within a 4-hour shut-down window. ***All materials necessary to perform this task should be on the field at least 1 day prior to work on this task. Provide traffic protection for this assembly.***

As indicated on the plans, close existing water main valves at the Howard St and Asbury Ave/Western Ave intersection at approximate stations Sta. 92+48, Sta. 92+99 and Sta. 93+27 for isolation. (Plan Items 1, 2, & 3) Contractor shall install the proposed 6" x 8" x 8" tee at Sta. 92+58 (Plan Item 4). Install two 45° bends (Plan Items 5 & 6) followed with an 8" valve in vault at Sta. 92+67.5 (Plan Item 7)

At Sta. 92+98 install an 8" x 8" x 12" tee. (Plan Item 8)

Install two 45° bends (Plan Items 9 & 10).

At Sta. 94+00, install an 8" x 6" tee for the fire hydrant on the north side of Howard St. (Plan Item 11)

Install 20, 13 & 22 feet of proposed water-quality storm sewer at Sta. 94+38, Sta. 94+38 and Sta. 95+84. (Plan Items 12, 12A & 13)

At Sta. 96+81, install an 8" x 6" tee for the fire hydrant on the north side of Howard St. (Plan Item 14)

Install 16 feet (each) of proposed water-quality storm sewer at Sta. 97+57 and Sta. 99+75. (Plan Items 15 & 16)

At Sta. 101+20, install an 8" x 6" tee for the fire hydrant on the north side of Howard St. (Plan Item 17)

Install 6 feet of proposed water-quality storm sewer at Sta. 101+92 (Plan Item 18)

At Sta. 102+15 install a 45° bend followed by a 45° at Sta. 102+34. (Plan Items 19 & 21)

Install 27 feet of casing water main pipe at sewer crossing at Sta. 102+25. (Plan Item 20)

At Sta. 104+78, install an 8" x 6" tee for the fire hydrant on the north side of Howard St. (Plan Item 22)

At Sta. 107+11, install an 8" x 6" tee for the fire hydrant on the north side of Howard St. (Plan Item 23)

At Sta. 107+15 install a 45° bend. (Plan Item 24)

At Sta. 107+31 install an 8" in-line valve in vault. (Plan Item 25)

At this time, the new water main may be flushed, pressure tested and chlorinated.

After acceptance of the disinfection testing, the water services may be tapped.

Install a 45° bend and an 8" x 6" reducer to connect to the existing 6" water main on Howard Street. (Plan Item 26)

The existing 6" water main can be cut and capped at Sta. 92+61.5, Sta. 92+96, Sta. 93+01, Sta. 93+16 and Sta. 107+32 (Plan Items 27, 28, 29 & 30)

Remove existing fire hydrant at Sta. 96+77, Sta. 101+15, Sta. 104+84 and Sta. 108+26 (Plan Item 31, 32, 33, 34)

At this time, the new water mains may be flushed, pressure tested and chlorinated. After the acceptance of the disinfection testing, the water services may be tapped.

Sizes and locations shall be confirmed by the Contractor before installation. The following services and sizes should be transferred. The final connections to the existing water main as indicated on the plans may then be made. The existing water mains may be cut, filled with CLSM, and capped as indicated on the plans.

<b>Address</b>	<b>Size</b>	<b>Material/Comments</b>
<b>1909 Howard</b>	<b>1"</b>	<b>Lead</b>
<b>1911-1917 Howard</b>	<b>1.5"</b>	<b>Unknown</b>
<b>1919-1925 Howard</b>	<b>2"</b>	<b>Copper</b>

<b>2001-2015 Howard</b>	<b>3"</b>	<b>Cast Iron</b>
<b>101 Grey</b>	<b>1"</b>	<b>Unknown</b>
<b>103 Grey</b>	<b>1"</b>	<b>Unknown</b>
<b>105 Grey</b>	<b>1"</b>	<b>Copper</b>
<b>107 Grey</b>	<b>1"</b>	<b>Unknown</b>
<b>2101 Howard</b>	<b>1"</b>	<b>Lead</b>
<b>2105-2107 Howard</b>	<b>1"</b>	<b>Lead</b>
<b>2111 Howard</b>	<b>1.5"</b>	<b>Unknown</b>
<b>2113-2123 Howard</b>	<b>4"</b>	<b>Cast Iron</b>
<b>2125 Howard</b>	<b>1"</b>	<b>Lead</b>
<b>2131 Howard</b>	<b>1.5"</b>	<b>Copper</b>
<b>2135 Howard</b>	<b>1.5"</b>	<b>Copper</b>
<b>2137 Howard</b>	<b>1.5"</b>	<b>Copper</b>
<b>2141 Howard</b>	<b>1"</b>	<b>Lead</b>
<b>101-109 Hartrey</b>	<b>1.5"</b>	<b>Copper</b>
<b>1211 Howard</b>	<b>1"</b>	<b>Lead</b>
<b>1201 Howard</b>	<b>1"</b>	<b>Lead</b>
<b>1123-1125 Howard</b>	<b>1"</b>	<b>Lead</b>
<b>1101 Howard</b>	<b>1"</b>	<b>Lead</b>
<b>1101 Howard</b>	<b>1"</b>	<b>Copper</b>
<b>1029 Howard</b>	<b>1"</b>	<b>Lead</b>
<b>1015 Howard</b>	<b>1.5"</b>	<b>Copper</b>
<b>999 Howard</b>	<b>1</b>	<b>Lead</b>
<b>951-959 Howard</b>	<b>???</b>	<b>Unknown (Install 2")</b>

**HOWARD STREET FROM HARTERY AVENUE TO DODGE AVENUE**

DESIGNED AND PROVIDED BY COE

**DUCTILE IRON WATER MAIN 6”**

**DUCTILE IRON WATER MAIN 8”**

**FLUOROCARBON RUBBER (VITON) GASKET**

**Description.** This work consists of construction of Ductile Iron Pipe Water Main in accordance with Section 561 of Standard Specifications for Road and Bridge Construction (latest edition), except as revised herein. All ductile iron pipe shall be thickness class 52 and/or class 54 in accordance with AWWA Standard Specifications for Ductile Iron Pipe, centrifugally cast in Metal Molds for water or other Liquids - AWWA -C151 latest revision. The whole of the above Specifications shall apply. The pipe shall be furnished with push-on joints. All pipe shall be cement-mortar lined inside and bituminous-coated outside, in accordance with Sec. 51-8 - ANSI A21.51 (AWWA C104 and C151). All ductile iron pipe must be clearly marked by the manufacturer to indicate pipe classification or pipe thickness. Unmarked pipe will not be accepted.

All pipe laying and the making of all joints shall be done strictly in accordance with manufacturer's directions and in accordance with AWWA C600 "Installation of Ductile Iron Water Mains and Their Appurtenances". Mechanical joint fittings shall be spaced a minimum of 2 feet apart. The Contractor shall be responsible for achieving the watertightness specified. The method of handling and of placing pipe in the trench shall not damage the pipe. Pipe interiors shall be kept clean and the exposed ends of the pipe in the trench shall be closed by suitable watertight bulkheads at all times when pipe-laying is not actually in progress. Abrupt changes in pipe alignment shall be accomplished by use of appropriate fittings as shown on the Drawings. Wherever long horizontal or vertical curves are shown on the drawings, the pipe may be laid to such curves by uniformly deflecting the pipe joints along the arc of the curve to form a smooth radius. Pipe deflection shall not exceed one-half the maximum allowable joint deflection recommended by the pipe manufacturer. A temporary plug/cap or watertight protection is required for the end of pipe at the end of any working days and is considered included in the cost of WATER MAIN of the specified size.

Residents affected by the installation of new water services must be notified 24 hours in advance and 15 minutes prior to the shutoff. The Contractor must flush the new water service and make every effort to assure debris does not enter the existing portion of the water service as the new installation takes place. All water services shall be perpendicular to the new water main to the new round way and B Box. Provide pipe insulation if cover is less than 5-feet (included in the cost of various pay Items).

After all of the water services have been installed and are in service the Contractor will make the connection(s) to the existing water main(s) as indicated in the plans.

The Contractor shall notify the Utilities Department 48 hours in advance of initiating these connections to allow the Utilities Department sufficient time to notify residents of the water service interruption and schedule the necessary valve closures. Only Utilities Department personnel may operate existing valves in the distribution system.

The Contractor must be prepared to make these connections in a timely fashion. A maximum of four (4) hours will be allowed per shutdown to complete the connections to existing water mains. Because these connections cannot be pressure tested or chlorinated, the Contractor must swab all pipe and fittings with a 2% hypochlorite solution using a new, clean long-string mop and the new section of main must be pressurized prior to backfilling. The Contractor shall also swab and chlorinate water main sections as outlined above that branch off the "main line" water main that may be difficult to properly flush.

Wherever construction activities will disrupt water mains and/or individual water services, the Contractor shall develop a work plan for limiting the extent and duration of the disruption. This work plan shall be submitted to the City of Evanston Utilities Department for review and approval not less than two weeks before the planned disruption. No disruption will be permitted until said work plan has been reviewed and approved.

In addition, it is the responsibility of the Contractor to directly notify the City of Evanston Utilities Department, affected customers, and, if fire hydrants are affected, the City of Evanston Fire Department not less than 48-hours in advance of the start of the disruption, advising them of the planned time and duration of the disruption. Each disruption to the mainline system; an individual service; or, group of services, when they are being transferred to a new water main in a single, staged construction operation, shall be considered a separate occurrence, for which notification shall be provided. The Contractor shall also directly notify the City of Evanston Utilities Division not less than 48-hours in advance of mainline pressure-testing and disinfection operations. In cases where construction activities will require operation of water main valves, the City of Evanston Utilities Department will be responsible for the operation of the valves.

Prior to back filling the Contractor must install the appropriate sized MJ end cap on the open end of all of the abandoned water main. Concrete blocks shall be installed beneath all of the connection points between the old and new water mains.

The trench shall have a flat bottom conforming to the grade to which the pipe is to be laid, and provided with a minimum of 5-feet, 6-inches of cover. Provide pipe insulation if cover is less than 5-feet (included in the cost of WATER MAIN items). The width of trench excavation for all pipes shall be as shown on the Drawings. Along the proposed pipe alignments indicated on the Drawings, Contractor shall remove the surface materials only to such widths as will permit a trench to be excavated, which will afford sufficient room for efficient and proper construction. Where sidewalks, driveways,



pavements, and curb/gutter are encountered, care shall be taken to protect such against fracture or disturbance beyond these working limits.

Prior to the placement of all pipe, bedding shall be placed on the trench bottom, compacted and shaped to receive the pipe. The pipe shall be placed in bedding conforming to Section 1003 and as shown in the Drawings. Any part of the trench excavated below the grade shall be corrected with approved material, firmly compacted. In some instances, trees, shrubs, utilities, sidewalks and other obstructions may be encountered, the proximity of which may be a hindrance to open-cut excavation for installation of water mains and appurtenances. In such cases, the Contractor shall excavate by means of auger in order to protect such obstructions against damage. Augering work shall be performed in accordance with the clearances and procedures specified in Article 550.04.

The trench shall be excavated to the alignment and depth required and may be advanced up to 50 feet ahead of the pipe laying operation during working periods and up to 10 feet ahead of pipe laying operations during non-work periods. Trenching operations shall be terminated at the end of each day's work in locations that do not obstruct roadways, alleys or driveways. In general, the length of open trench shall not exceed 70 feet from the forward cut to the completely backfilled trench nor shall more than one street crossing be obstructed by the same trench at any one time. Open cut excavations shall be reduced to a maximum length of 30 feet for overnight protection.

Open-cut trenches shall be supported as required to fully protect life, existing utilities, adjacent structures, pavements, and the Work. Trench support is an integral part of the Contractor's means and methods. The Contractor shall employ the services of a registered (Illinois) Structural Engineer, registered (Illinois) Professional Engineer, Geotechnical Engineer, and other professionals as necessary to prepare designs of support systems. The support systems shall conform to Federal laws, State laws and municipal ordinances. The minimum protection shall conform to the recommendations in O.S.H.A. Safety and Health Standards for Construction. A sand box or trench shield may be used as permitted by O.S.H.A.

All fittings furnished shall be ductile iron conforming to AWWA Standard for Ductile Iron Compact Fittings C153, 350 psi rating. Fittings shall be mechanical joint and shall be equipped with Mega-Lug joint restraining glands. Restraining glands which rely on the bearing of screw-points on the water main wall shall not be utilized. All fittings shall be cement-mortar lined inside and bituminous-coated outside, in accordance with Sec. 51-8 - ANSI A21.51 (AWWA C104 and C151). All fittings shown on plans and necessary offsets due to any conflicts are included in unit price of these pay items.

Only one connection to the new water main, as approved by the Engineer and the City of Evanston Water and Sewer Division, shall be made to the present system prior to

pressure testing the new water main. The Contractor shall provide all temporary bulkheads / plugs required for testing.

The Contractor shall test the water main in sections as approved by the Engineer and the City of Evanston Water and Sewer Division. The test shall be made by closing valves and filling the lines slowly with water, care shall be used to see that all air is released during the filling of the water main. After the line or section has been completely filled, it shall be allowed to stand under slight pressure for sufficient time to allow the escape of air from any air pockets. During this period, the hydrants, valves and other connections shall be examined for leaks. If any are found, they shall be repaired prior to the start of the pressure / leak test.

The test shall consist of holding a pressure on the water main of 150 pounds per square inch (psi) for a period of at least two (2) hours. The pressure during the two hour test cannot vary by more than 5 psi for the duration of the test.

Leakage shall be defined as the quantity of water that must be supplied into the newly laid pipe or any valve section thereof to maintain pressure within 5 psi of the specified test pressure after the water main has been filled with water and the air has been expelled. This leakage will be calculated after the 2-hour test has been completed. The water necessary to bring the pressure up to 150 psi from a measured container shall be the amount of leakage. Leakage will equal the amount of water used from the container.

No pipe installation will be accepted if the leakage is greater than that determined by the following formula:

$$L = (S \times D \times \text{SQRT } P) / 133,200 \text{ In inch-pound units}$$

Where:

L = allowable leakage, in gallons per hour S = length of pipe tested, in feet

D = nominal diameter of the pipe, in inches

P = average test pressure during the leakage test, in psi (gauge)

Where it is not practical to pressure test the final connections to an existing water main, a visual inspection shall be carried out under normal working pressure before backfilling the trench. Any noticeable leakage shall be stopped and any defective pipe shall be replaced with new sections.

Upon completion of the newly laid water main, the water main shall be disinfected according to the American Water Works Association, Procedure Designation: AWWA C651.

The basic disinfection procedure consists of preventing contaminated materials from entering the water main during storage, construction or repair, removing, by flushing at a velocity of 2.5 ft/sec those materials that may have entered the water main, chlorinating any residual contamination that may remain, and flushing the chlorinated water from the main, protecting the existing distribution system from backflow due to hydrostatic pressure test and disinfection procedures, determining the bacteriological quality by laboratory test after disinfection, and final connection of the approved new water main to the active distribution system.

The Contractor shall provide all corporation cocks necessary for disinfection of the new water main. These corporation cocks shall be placed as necessary to facilitate testing and disinfection of the new water main, including chlorine application points and sample collecting points. These corporation cocks shall be located in valve vaults only, unless otherwise approved by the Engineer.

The new pipe shall be thoroughly flushed clean, at a velocity of 2.5 ft/sec and pressure tested before disinfection is attempted. All disinfecting work shall be done by the Contractor with the approval of the Engineer. Heavy particulates generally contain bacteria and prevent even very high chlorine concentrations from contacting and killing such organisms. It is therefore essential that the water main be thoroughly flushed before the final disinfection by chlorination is performed.

The method to be used for disinfecting the water main is referred to as the Continuous-Feed Method using Chlorine Gas. At a point not more than 10 feet downstream from the beginning of the new water main, water entering the new main shall receive a dose of chlorine fed at a constant rate such that the water will have not less than 50 milligrams per liter (mg/l) free chlorine at the discharge end. The chlorine solution must be distributed uniformly throughout the length of the water main being disinfected.

After the contact period of not less than 24 hours, the water main shall be flushed until chlorine concentration of the water leaving the new water main is no higher than that generally prevailing in the distribution system (under one milligram per liter (mg/l)).

If there is any possibility that the chlorinated water will cause damage to the environment, then a neutralizing chemical shall be applied to the water to be wasted to neutralize thoroughly the chlorine residual remaining in the water. This neutralizing chemical must be approved for that purpose.

After final flushing and before the new water main is connected to the City's water distribution system, two consecutive sets of acceptable samples (no bacteria growth), taken at least 24 hours apart, shall be collected from the new water main. The second days' sample will be collected using only the water main pressure, no water main valves will be open for this sample and no flushing will be permitted. At least one set of samples shall be collected from every 1,200 feet of the new water main, plus one set

from the end of the line, and at least one set from each branch or as required by the Owner.

Sampling for bacteriological analysis shall be collected in sterile bottles treated with sodium thiosulfate as required by Standard Methods for the Examination of Water and Wastewater. No hose or fire hydrant shall be used to collect samples. Corporation cocks may be installed in the water main with a copper tube gooseneck assembly to obtain samples. After samples have been collected, the gooseneck assemblies must be removed.

The City of Evanston will take the samples and perform the lab testing. For acceptance, two consecutive sets of samples, taken at 24 hour intervals, shall indicate bacteriologically satisfactory water.

If the initial disinfection fails to produce satisfactory bacteriological results, the new water main may be reflashed and shall be resampled. For each time the City must resample, the Contractor shall be assessed fees to cover City costs as outlined below. If these samples also fail to produce acceptable results, the water main shall be rechlorinated by the continuous feed method until satisfactory results are obtained.

Failure to follow this procedure during pressure and chlorination testing may result in unacceptable results and may require the Contractor to incur additional costs in re-testing and cause project completion delays

The interior of all mainline pipe, service pipe, fittings, valves, corporation stops, curb stops, and other water main or water service components which are likely to come in contact with potable water immediately after their installation or before chlorine-gas disinfection can be accomplished, shall be swabbed, soaked, or sprayed with a 2 percent hypochlorite solution before they are installed.

The Contractor shall provide all corporation cocks necessary for disinfecting the new pipeline. These corporation cocks shall be placed as necessary to facilitate testing and disinfection of the new water main, including chlorine application points and sample collecting points. These corporation cocks shall be located in valve vaults. The new pipeline shall be flushed clean before disinfection is attempted. All disinfecting work shall be done by the Contractor under the direction and with the cooperation of the Owner.

Contractors will be charged for each of the following additional tests when necessary because of Contractor's failure to pass the initial test:

Each Additional Pressure Test \$167.00

Each Additional Chlorination \$167.00

Each Additional Flushing and Sample Collection \$167.00

Each Additional Sample Analysis (laboratory fee) \$25.00

Contractor shall submit a work plan indicating the sequence of water main installation not less than ten (10) calendar days prior to the planned start of work. This work plan shall include information as to where and how the flushing, pressure testing, and disinfection of the new pipeline will be carried out in such manner that will cause the least amount of water service interruption to the water customers. The work plan must be approved by the Owner prior to installation of any water mains and shall conform to the following general sequences of installation listed.

**Hydrostatic Tests.** Hydrostatic tests will be performed according to Section 13 of the American Water Works Association Specifications, Designation: AWWA C600. The water main will be subjected to the hydrostatic pressure and leakage tests specified in the Special Provisions. Water for making the hydrostatic and leakage tests shall be furnished by the Contractor at his/her own expense and shall be of satisfactory bacteriological quality for drinking purposes.

Only one connection of the new pipeline, as approved by the Engineer, shall be made to the present system prior to pressure-testing the new pipeline. Contractor shall provide all temporary bulkheads/plugs required for testing. Contractor shall test the pipeline in sections as approved by Engineer. The test shall be made by closing valves and filling the lines slowly with water. Care shall be used to see that all air is released during the filling of the pipeline. After the line or section thereof, has been completely filled, it shall be allowed to stand under a slight pressure for sufficient time to allow the escape of air from any air pockets. During this period the hydrants, valves, and other connections shall be examined for leaks. If any are found, they shall be stopped prior to the pressure test.

**Method of Measurement.** This work shall be measured per lineal foot of DUCTILE IRON WATER MAIN of the size and type specified and per EACH of FLUOROCARBON RUBBER (VITON) GASKET of the size specified in plans.

**Basis of Payment.** Payment shall be made at the Contract unit price per LINEAR FOOT for each of the various sizes of DUCTILE IRON WATERMAIN and per EACH of FLUOROCARBON RUBBER (VITON) GASKET of the size specified in plans, actually installed as specified, measured in place. These Contract unit prices shall be payment in full for all materials, labor, and equipment required for: site preparation, including removal, replacement and/or repair of fences and other site objects; trench excavation, including removal and disposal of existing pipes, structures, and excess excavated materials; protection, support and repair of damage to existing utilities; support of trench walls; shoring and bracing; dewatering of trenches; pipe; bends; fittings; restraining glands; installation and removal of temporary fire hydrants, which will be provided by the City; thrust blocks; plugging existing water mains; support of pipe at water main connections; joint materials; hydrostatic testing; disinfection; corporation stops used for

disinfection; bedding; backfill placement, compaction and compaction testing; testing; correction of defects; and, other work required to complete the installation which is not included under other Payment Items.

The City of Evanston will furnish temporary fire hydrants which are to be installed by the Contractor at the locations designated on the plans for the purpose of flushing the newly installed water main clean at a velocity of 2.5 ft./sec. Prior to the final water main interconnections, the Contractor shall remove the temporary fire hydrant, store it in a safe location, and contact the City for pick up. This work shall be included in the cost of the water main construction, and no separate payment shall be made.

**WATER VALVES 6”**

**WATER VALVES 8”**

**WATER VALVES 12”**

**Description.** Valves. Gate valves and tapping valves with sleeve and cut in-valves 24-inches and smaller in size shall be resilient wedge mechanical joint type, manufactured to meet or exceed the requirements of AWWA C515, latest revision. Gate valves larger than 24- inches in size shall be of double disc type to meet AWWA C500 requirements and shall be in accordance with the following specifications:

Valves shall be Waterous Series 2500 and shall have the manufacturer and year cast on the body with raised letters.

Valves shall have an unobstructed waterway equal to or greater than the full nominal diameter of the valve. The sealing mechanism shall consist of a cast iron gate having a vulcanized synthetic rubber coating. The resilient sealing mechanism shall provide zero leakage at the design water pressure of 150 psi when installed with the line flow in either direction. All valves are to be tested in strict accordance with AWWA C515 or AWWA C500.

Valves shall have non-rising stems made of cast, forged, or rolled bronze shown in AWWA C515. Two stem seals shall be provided and shall be of the O-ring type.

Valves shall be equipped with cast iron operating nuts and shall be secured to the stem with stainless steel bolts. Valves shall turn counterclockwise, or left (looking downward at the operating nut) to open.

The valve body, bonnet and cover shall be cast iron ASTM A126, Class B. All internal and external surfaces shall be coated with epoxy to a minimum thickness of 4 mils. Bonnet bolts shall be stainless steel.

**Method of Measurement.** This work shall be measured per each WATER VALVE with specified diameter.

**Basis of Payment.** Payment will be made at the contract unit price per EACH for WATER VALVES, of the diameter specified.

**VALVE VAULT, TYPE A, 6' DIAMETER, TYPE 1 FRAME, CLOSED LID**

**Description.** This work shall consist of constructing valve vaults for water mains and water services in accordance with Section 44 of the latest edition of the "Standard Specifications for Water Construction in Illinois" and Section 602 of the latest edition of the "Standard Specifications for Road and Bridge Construction" except as modified herein.

In addition to the requirements of Sections 44-2.02, 44-301 and 602, valve vaults shall be constructed in accordance with IDOT Highway Standard 602501, Value Vault Type A. All lids for valve vaults shall have the word "WATER" cast into them.

When valve vaults are constructed over existing valve boxes and water main, the work shall include removing existing valve boxes and making any adjustments necessary to the existing water main and appurtenances to allow for the construction of the valve vault. This work shall be incidental to the price of constructing VALVE VAULTS, TYPE A, TYPE 1 FRAME, CLOSED LID, SPECIAL.

**Method of Measurement and Basis of Payment.** This work will be paid for at the contract unit price each for VALVE VAULTS, TYPE A, 6' DIAMETER, TYPE 1 FRAME, CLOSED LID of the type and diameter specified, together with the specified frames, grates and lids, which price shall include all frames, grates, lids, concrete and reinforcement for median inlets, bedding stone, steps, flat slab tops, valve extensions, operating wrenches, and all excavation and backfill.



**FIRE HYDRANTS TO BE ADJUSTED**

**Description.** This work shall consist of adjusting fire hydrants as directed by the ENGINEER, in accordance with Section 564 of the STANDARD SPECIFICATIONS.

**Method of Measurement.** This work shall be measured per each for FIRE HYDRANTS TO BE ADJUSTED.

**Basis of Payment.** This work shall be paid for at the contract unit price each for FIRE HYDRANTS TO BE ADJUSTED.

## **FIRE HYDRANTS TO BE REMOVED**

**Description.** This work consists of removal of fire hydrants in accordance with Section 564, except as revised herein.

"This work shall also consist of removing all designated hydrants on water mains which are to be abandoned as a part of this project."

All backfill under and within two (2) feet of the proposed paved areas excavated as a result of this work will conform to the specifications for TRENCH BACKFILL as herein provided."

"All pavement will be sawed to a full depth prior to the removal of the pipe up to auxiliary valve and valve box. At the direction of the Owner, the Contractor shall cover the abandoned fire hydrants with burlap bags until the Contractor removes the abandoned fire hydrants. The hydrant will be removed completely with the bottom section. Removal shall include the pipe and valve from the fire hydrant to the upstream of the auxiliary valve. The existing pipe shall be plugged. All excavated areas shall be backfilled and compacted under and within two (2) feet of all paved areas with trench backfill. All other excavated areas will be backfilled with suitable material to existing grade within parkway areas immediately following hydrant and auxiliary valve removal."

Fire hydrants shall remain the property of the City and shall be stored in a secured area for pickup by City.

**Method of Measurement.** This work shall be measured per each fire hydrant to be removed.

**Basis of Payment.** Existing fire hydrant/auxiliary valve assemblies and valve vaults removed (as part of watermain relocation) will be paid for at the Contract unit price per EACH for FIRE HYDRANTS TO BE REMOVED. This Contract unit price shall be payment in full for all materials, labor, and equipment required for: site preparation; excavation; disposal of excess excavated materials; capping water mains which will remain in operation; thrust-blocking; backfill placement, compaction and compaction testing; testing/ inspection; correction of defects; stockpiling reclaimed hydrants, valves, and auxiliary valves; and, all related work required to complete the installation which is not included in other Payment Items.

## **FIRE HYDRANT WITH AUXILIARY VALVE AND VALVE BOX**

**Description.** This work consists of fire hydrant installation with auxiliary valve and valve box as shown on plans. Fire hydrant with auxiliary valve and valve box. Hydrants shall conform in all respects to the American Water Works Association Standard C502 latest revision and shall meet the following specifications:

Hydrants are to be Clow Medalion. The hydrant shall have a breakaway flange at the ground line and shall be for five and one-half (5-½) or six (6) feet of cover as appropriate. Hydrant size shall be 5-¼ inch valve opening with a 6-inch mechanical joint inlet connection. Stem seals shall be "O-Ring" type. Hydrants shall be equipped with drain outlets. Finish color above the ground line shall be red. Note red color shall extend at least 6-inches below the intended ground line. Hydrant shall be installed such that the breakaway flange is installed within two (2) inches of the finished grade. The breakaway flange must not be buried. All buried bolts shall be stainless steel. Hydrant extension is allowed to adjust to minimum grade requirements.

Hydrants furnished shall be for buried installation with two 2 ½ inch hose connections and one 4-inch pumper nozzle, National Standard Threads. Operating and outlet nozzle cap nuts shall be of pentagon shape in conformance with Section 3.2.9.8 of AWWA Standard. Suitable nozzle caps, gaskets, and chains shall be provided.

All auxiliary valves used for hydrant installation shall be in conformance with the specifications of AWWA C515. Valve boxes used for auxiliary hydrant valves shall be 5-¼-inch shaft diameter with cover marked "WATER". All boxes shall be Waterous. The auxiliary valve shall be installed 2 feet from the fire hydrant or as specified by the Engineer.

Where existing fire hydrants are being replaced, the replacement shall include removal of all existing hydrant components, including: the existing connection to the water main, the water main to the hydrant, hydrant valve, valve box and hydrant. Care shall be exercised in the removal of the existing hydrant and valve such that they are not damaged. The existing valve and hydrant shall be stored by the Contractor to the end of the Project or other time during the Project designated by the Owner, at which time it shall be delivered to the Owner.

Installation of New or Replacement Fire Hydrant shall include all new components, including: tee fitting equipped with Mega-Lug joint restraining glands at the water main, 6-inch hydrant water supply main, auxiliary hydrant valve, valve box and hydrant.

Replacement components shall conform to all applicable specifications presented in Section 561. In order to achieve the required hydrant height from the ground surface shown on the drawings for replacement hydrants, a Gradelok adjustable pipe offset shall be used, if necessary.

All new fire hydrants installed mid-block shall be installed on the property line between two adjacent properties. New fire hydrants shall be covered with a burlap bag until they are placed in service. Existing fire hydrants which are taken out of service with the existing water main shall be covered with a burlap bag until they are removed."

Use of same class pipe material with main line is required on each proposed hydrant location. (If water main line is class 54, use class 54 for hydrant run).

New and relocated fire hydrants shall be placed a minimum of three feet from the back of the curb unless otherwise directed by the Engineer. All fire hydrants on new mains shall be covered with burlap bags until such time that the Engineer notifies the Contractor that the burlap bags shall be removed."

All fire hydrants are to be Clow Medalion and are to be supplied with factory installed 6" flanged and mechanical joint resilient wedge auxiliary valve conforming to AWWA C500-80. Valve shall be waterous M.J. All botls to be Series 300 stainless steel on hydrant and valve. Hydrants shall be installed with a bury mark at grade level and no lower than 18" from the center of steamer. port to final grade hydrants shall be installed plumb and level. When extending a hydrant, the "break flange" shall be relocated to grade level. Auxiliary valves shall open in a counter clockwise fashion, be keyable and to grade, and shll include valve boxes, external above-grade surfaces. Fire hydrants shall be coated by the manufacturer with one coat of alkyd based, lead and chrome-free primer and two coats of alkyd based, chain-stopped gloss enamel conforming to waterous M4182, federal safety.

**Method of Measurement.** This work shall be measured per each FIRE HYDRANT WITH AUXILIARY VALVE AND VALVE BOX.

**Basis of Payment.** Payment shall also be made at the Contract unit price per EACH for FIRE HYDRANT WITH AUXILIARY VALVE AND VALVE BOX, of the size specified.

**DOMESTIC WATER SERVICE BOXES TO BE ADJUSTED**

**Description.** This work shall consist of adjusting domestic water service boxes to match finished grade as directed by the ENGINEER, in accordance with Section 565.

Top sections, extensions and/or caps compatible with the existing box, may be required to adjust the box to the final grade. Replacement of damaged caps shall be considered as included in this item.

For boxes which are located in sidewalks or driveways constructed as part of this improvement, the CONTRACTOR is responsible for confirming all caps and bolts can be opened after the concrete or asphalt has been placed. The CONTRACTOR shall confirm each roundway is keyable. If the CONTRACTOR cannot key the roundway, he shall notify the ENGINEER. After the work has been completed, the CONTRACTOR shall open each box in the presence of the ENGINEER.

**Method of Measurement.** This work shall be measured per each for DOMESTIC WATER SERVICE BOXES TO BE ADJUSTED.

**Basis of Payment.** This work shall be paid for at the contract unit price each for DOMESTIC WATER SERVICE BOXES TO BE ADJUSTED.

**DOMESTIC WATER SERVICE BOXES TO BE REMOVED**

**Description.** This work shall consist of the removal of existing curb boxes and curb stops at the locations indicated on the plans or directed by the ENGINEER. The material and equipment shall be removed in a manner which will not cause damage to the existing service line to remain.

Domestic water service boxes shall be removed as directed by the ENGINEER.

**Basis of Payment.** This work will be paid for at the contract unit price each for DOMESTIC WATER SERVICE BOXES TO BE REMOVED, which price shall be payment in full for all labor, equipment, and material to complete the work as specified herein.

**CATCH BASINS TO BE CLEANED**

Existing catch basins and inlets shall be considered as drainage structures insofar as the interpretation of this Special Provision is concerned. When specified for payment, the location of drainage structures to be cleaned will be shown on the plans.

All existing drainage structures which are to be adjusted or reconstructed shall be cleaned according to Article 602.15 of the Standard Specifications. This work will be paid for according to accordance with Article 602.16 of the Standard Specifications.

All other existing catch basins and inlets which are specified to be cleaned on the plans will be cleaned according to Article 602.15 of the Standard Specifications.

**Basis of Payment.** This work will be paid for at the contract unit price each for CATCH BASINS TO BE CLEANED.

**CATCH BASIN, TYPE C, 4"-DIAMETER, WITH SPECIAL FRAME, OPEN LID**

**Description.** This work shall consist of the equipment, material and labor to install catch basins according to Article 602. Adjustment of frame between stages is included.

**Basis of Payment.** This work will be paid for at the contract unit price each for CATCH BASIN, TYPE C, 4"-DIAMETER, WITH SPECIAL FRAME, OPEN LID.



## **EPOXY COATING FOR EVANSTON STRUCTURES**

Epoxy Coating products shall be applied to new catch basin, inlets and manhole structures within the City of Evanston limits and as specified to receive a corrosion protective coating sufficiently thick to totally protect the existing host structure from further corrosion and deterioration. Epoxy coating materials must be compatible with the structure cementitious rehabilitation system. Substrate and surface preparation, application conditions, application equipment, material preparation, and curing shall be in strict accordance with the manufacturer's written recommendations.

Epoxy Coating Products shall be:

Raven 405 High Build Epoxy Lining System, 100 mil. Minimum thickness, to be applied in two coats as manufactured by Raven Chemicals, Broken Arrow, OK

Testing

All structures shall be visually inspected by the Contractor. The coating shall be free of pinholes and hollow spots/voids and other defects that will reduce the life expectancy of the coating.

The Contractor is responsible for providing equipment and labor to perform wet film thickness measurements in accordance with ASTM D4414 – Standard Practice for Measurement of Wet Film Thickness of Organic Coatings by Notched Gages. Measurements shall be taken at every structure during application of the coating, documented and attested to by the Contractor for submission to the Owner.

### **APPLICATION OF EPOXY COATING PRODUCT**

General

1. The Contractor shall comply with local, state and federal regulatory and other applicable agencies with regard to environment, health, and safety during work.
2. Cementitious lining materials shall be properly cured according to manufacturer's requirements prior to epoxy coating application. Coating material must be compatible with the cementitious lining material.
3. Temperature of the surface to be epoxy coated should be maintained between 40 degrees and 120 degrees Fahrenheit, or as recommended by the manufacturer.

4. Surfaces to be epoxy coated should be shielded to avoid exposure of direct sunlight or other intense heat sources. Where varying surface temperatures do exist, coating application shall be scheduled when the temperature is falling and not rising, or as recommended by the manufacturer.

#### Application of Coating Product

1. Application procedures shall conform to the recommendations of the epoxy coating product manufacturer, including environmental controls, product handling, mixing, application equipment, and methods.
2. Spray equipment shall be specifically designed to accurately ratio and apply the coating product. Equipment shall be in proper working order and shall be as recommended by the product manufacturer.
3. Contractors qualified in accordance with these specifications shall perform all aspects of the coating application.
4. Prepared surfaces shall be coated by spray application of the coating product described herein to the thickness specified, or as recommended by the manufacturer.
5. Subsequent top coating or additional coats shall occur within the product's recoat time. Additional surface preparation procedures will be required if this recoat time is exceeded. The product manufacturer's re-coat time for the specific application, based on temperature and project conditions, shall be strictly followed by the Contractor.
6. The coating product shall mechanically bond with adjoining construction materials throughout the structure to effectively seal and protect concrete or masonry substrates from infiltration and attack by corrosive elements. Procedures and materials necessary to effect this bond shall be as recommended by the polymer coating product manufacturer. No hollow spots will be accepted.

**Basis of Payment.** This work will be paid for at the contract unit price each for CATCH BASINS, INLETS or MANHOLES within the City of Evanston limits.

**VALVE BOX FRAMES TO BE ADJUSTED**

**VALVE BOX FRAMES TO BE ADJUSTED WITH NEW FRAME**

**Description.** This work shall consist of adjusting valve box existing or new frame to match finished grade as directed by the ENGINEER, in accordance with Section 603 of the STANDARD SPECIFICATIONS.

**Method of Measurement.** This work shall be measured per each for VALVE BOX FRAMES TO BE ADJUSTED or VALVE BOX FRAMES TO BE ADJUSTED WITH NEW FRAME.

**Basis of Payment.** This work shall be paid for at the contract unit price each for VALVE BOX FRAMES TO BE ADJUSTED or VALVE BOX FRAMES TO BE ADJUSTED WITH NEW FRAME.

**STRUCTURES TO BE ADJUSTED**

**Description.** This work shall be completed in conformance with applicable portions of Sections 602 and 603 of the Standard Specifications. Drainage and utility structures shall be understood to include catch basins, manholes, inlets, and valve vaults.

**Method of Measurement and Basis of Payment.** This work will be measured and paid for at the contract unit price per each for STRUCTURES TO BE ADJUSTED.

**SANITARY SEWER TELEVISION INSPECTION, VIDEOTAPING AND RECORDING**

**Description.** This work consists of sanitary sewer television inspection, videotaping and recording. Sub-surface videotaping will be required before the start of construction and will also be required following completion of the construction (but prior to installation of the bituminous surface course).

**Method of Measurement.** This work shall be measured per lineal FOOT of sewer for SANITARY SEWER TELEVISION INSPECTION, VIDEOTAPING, AND RECORDING

**Basis of Payment.** This work shall be paid for at the Contract unit price per FOOT of sewer for SANITARY SEWER TELEVISION INSPECTION, VIDEOTAPING, AND RECORDING of existing combined and storm sewers on streets in which tunnels, relief sewers, and water mains are proposed, at locations as specified, where not covered by other payment items, and at other locations as directed by Engineer. The Contract unit price shall be payment in full for all materials, labor, and equipment required for: traffic control; cleaning of existing sewers (jetting); internal videotaping existing mainline combined sewers and storm sewers, including reverse set-ups, retrieving stuck televising equipment or repairing of sewers damaged by the televising effort; providing one copy of the videotapes (DVD format) and reports to the Owner and other related work required.

The quantity shall not include pre-construction or post-construction videotaping for: sewer liner installation, new relief sewer installation, new storm sewer installation, and new combined sewer installation, all of which shall be considered included in the Contract.

## **STREET SWEEPING**

**Description.** The Contractor shall utilize a mechanical street sweeper to clean streets affected by the Contractor's operations, including haul routes, at least twice per week and additionally as directed by the Engineer. The street-sweeper shall be a full-sized, municipal-type sweeper having dust collection and street washing capabilities.

If, in the opinion of the Engineer, dust becomes a problem despite the normal cleanup measures of street sweeping, the Contractor shall wash down the pavement, spread calcium chloride as a palliative, or re-sweep streets as necessary, all at no additional cost. The Contractor shall keep sufficient quantities of calcium chloride on site, for use as directed by the Engineer for dust control.

**Method of Measurement.** This work shall be measured per HOUR for STREET SWEEPING.

**Basis of Payment.** This work will be paid for at the Contract unit price per HOURS for STREET SWEEPING, which price shall be payment in full for labor, equipment and materials required to complete the work.

## **MAINTENANCE OF LIGHTING SYSTEM**

Replace Article 801.11 and 801.12 of the Standard Specifications with the following:

**Description.** Effective the date the Contractor's activities (electrical or otherwise) at the job site begin, the Contractor shall be responsible for the proper operation and maintenance of all existing and proposed lighting systems which are part of, or which may be affected by the work until final acceptance or as otherwise determined by the Engineer.

At least one week prior to the beginning of construction the Contractor shall conduct and inspection of the existing lighting units with a representative of the agency responsible for maintenance. The inspection shall reveal defective lighting items such as cable, mast arms, luminaires, poles, and all other appurtenances that combine for a complete operating unit. The Contractor shall not be responsible for any defective items identified during the inspection. In case the Contractor fails to contact the maintaining agency for this inspection, the Contractor shall be held responsible for all items that are found defective at the completion of the contract.

The Contractor shall become responsible for the maintenance of the existing lighting units on a date mutually agreed upon between the Contractor and the maintaining agency representative, but no later than the beginning of any construction within the limits of the project. If any mobilization or any type of work begins on the project, the Contractor shall assume complete maintenance at that point, and assume all deficiencies at their own expense. This maintenance shall remain in effect until written notice of final acceptance of the proposed lighting system is issued by the Engineer. Only after this requirement has been satisfied may the Contractor begin removal operations of the existing lighting units.

### **Maintenance of Existing Lighting Systems**

**Existing lighting systems.** Existing lighting systems is defined as any lighting system or part of a lighting system in service prior to this contract. The contract drawings indicate the general extent of any existing lighting, but whether indicated or not, it remains the Contractor's responsibility to ascertain the extent of effort required for compliance with these specifications and failure to do so will not be justification for extra payment or reduced responsibilities.

### **Extent of Maintenance.**

**Partial Maintenance.** Unless otherwise indicated, if the number of circuits affected by the contract is equal to or less than 40% of the total number of circuits in a given controller and the controller is not part of the contract work, the Contractor needs only to

maintain the affected circuits. The affected circuits shall be isolated by means of in-line waterproof fuse holders as specified elsewhere and as approved by the Engineer.

Full Maintenance. If the number of circuits affected by the contract is greater than 40% of the total number of circuits in a given controller, or if the controller is modified in any way under the contract work, the Contractor shall maintain the entire controller and all associated circuits.

**Maintenance of Proposed Lighting Systems**

Proposed Lighting Systems. Proposed lighting systems shall be defined as any lighting system or part of a lighting system which is to be constructed under this contract.

The Contractor will be fully responsible for maintenance of all items installed under this contract. Maintenance shall include, but not be limited to, any equipment failures or malfunctions as well as equipment damage either by the motoring public, Contractor operations, or other means. The potential cost of replacing or repairing any malfunctioning or damaged equipment shall be included in the bid price of this item and will not be paid for separately.

**Lighting System Maintenance Operations**

The Contractor's responsibility shall include all applicable responsibilities of the Electrical Maintenance Contract, City of Chicago Division of Electrical Operations, and State of Illinois Department of Transportation, Division of Highways, District One. These responsibilities shall include the maintenance of lighting units, cable runs and lighting controls. In the case of a pole knockdown or damage caused by normal vehicular traffic, the Contractor shall promptly clear the lighting unit and circuit discontinuity and restore the system to service.

Responsibilities shall also include weekly night-time patrol of the lighting system, with patrol reports filed immediately with the Engineer and with deficiencies corrected within 24 hours of the patrol. Patrol reports shall be presented on standard forms as designated by the Engineer. Uncorrected deficiencies may be designated by the Engineer as necessitating emergency repairs as described elsewhere herein.

The following chart lists the maximum response, service restoration, and permanent repair time the Contractor shall be allowed to perform corrective action on specific lighting system equipment.

INCIDENT OR PROBLEM	SERVICE RESPONSE TIME	SERVICE RESTORATION TIME	PERMANENT REPAIR TIME
Control cabinet out	1 hour	4 hours	7 Calendar



			days
Hanging mast arm	1 hour to clear	na	7 Calendar days
Radio problem	1 hour	4 hours	7 Calendar days
Motorist caused damage or leaning light pole 10 degrees or more	1 hour to clear	4 hours	7 Calendar days
Circuit out – Needs to reset breaker	1 hour	4 hours	na
Circuit out – Cable trouble	1 hour	24 hours	21 Calendar days
Outage of 3 or more successive lights	1 hour	4 hours	na
Outage of 75% of lights on one tower	1 hour	4 hours	na
Outage of light nearest RR crossing approach, Islands and gores	1 hour	4 hours	na
Outage (single or multiple) found on night outage survey or reported to EMC	na	na	7 Calendar days
Navigation light outage	na	na	24 hours

- **Service Response Time** -- amount of time from the initial notification to the Contractor until a patrolman physically arrives at the location.
- **Service Restoration Time** – amount of time from the initial notification to the Contractor until the time the system is fully operational again (In cases of motorist caused damage the undamaged portions of the system are operational.)
- **Permanent Repair Time** – amount of time from initial notification to the Contractor until the time permanent repairs are made if the Contractor was required to make temporary repairs to meet the service restoration requirement.

Failure to provide this service shall result in liquidated damages of \$500 per day per occurrence. In addition, the Department reserves the right to assign any work not completed within this timeframe to an Electrical Maintenance Contractor of their choice. All costs associated to repair this uncompleted work shall be the responsibility of the Contractor. Failure to pay these costs to this Electrical Maintenance Contractor within one month after the incident shall result in additional liquidated damages of \$500 per month per occurrence. Unpaid bills shall be deducted from the cost of the Contract. Repeated failures and/or a gross failure of maintenance shall result in the State's

Electrical Maintenance Contractor being directed to correct all deficiencies and the resulting costs deducted from any monies owed the Contractor.

Damage caused by the Contractor's operations shall be repaired at no additional cost to the Contract.

**Operation of Lighting**

The lighting shall be operational every night, dusk to dawn. Duplicate lighting systems (such as temporary lighting and proposed new lighting) shall not be operated simultaneously. Lighting systems shall not be kept in operation during long daytime periods. The Contractor shall demonstrate to the satisfaction of the Engineer that the lighting system is fully operational prior to submitting a pay request. Failure to do so shall be grounds for denying the pay request.

**Method of Measurement.** This item will be measured per each lighting system maintained by the City within the project limits, and shall include all labor and materials to maintain each installation in full operation throughout the duration of the construction of this project, or as indicated by the Engineer.

**Basis of Payment.** Maintenance of lighting systems shall be paid for at the contract unit price each for MAINTENANCE OF LIGHTING SYSTEM, which shall include all work as described herein.

**SANITARY SEWER REMOVAL 8”**

**Description.** This work consists of the removal of Sanitary and Combination Sewer of the size and type shown on the plans. This work shall be performed in accordance with all applicable articles of Section 551 of the Standard Specifications Standard Specifications, Division IV of the Standard Specifications for Water and Sewer Main Construction in Illinois (Latest Edition), except as revised herein.

Excavation and backfill for sanitary sewer removal shall conform to the typical sections shown in the plans and shall conform to the provisions of Sections 20, 21, and 22 of the Standard Specifications for Water & Sewer Main Construction in Illinois.

This work will be performed in conjunction with manhole adjustments as indicated in the plans.

This work will not be paid for separately and shall be considered included in the cost of STORM SEWER REMOVAL for specified diameter.

**Method of Measurement.** This work shall be measured per linear foot for the specified size of SANITARY SEWER REMOVAL.

**Basis of Payment.** This work will be paid for at the contract unit price per linear foot for SANITARY STORM SEWER REMOVAL for specified diameter.

### **TRENCH BACKFILL (SPECIAL)**

**Description.** This work shall consist of excavating a trench for the installation of conduit and backfilling with limestone screenings as a portion of the total backfill of the trench, all as shown in City of Chicago Division of Electrical Operations Standard Drawings No. 579 and No. 813. This work shall meet all applicable requirements of Article 819 of the Standard Specifications.

**Material.** Underground Cable Marking Tape shall meet the requirements of Section 1066.05 of the Standard Specifications. Backfill shall meet the requirements of Section 1003.04 of the Standard Specifications.

**Construction Requirements.** The trench shall be deep enough to provide thirty inches (30") of cover over the conduit to be installed. The trench shall not exceed twelve inches (12") in width unless approved by the Resident Engineer. The bottom of the trench shall be tamped, and the trench inspected by the Resident Engineer before conduit is installed. All trenches shall be backfilled as soon as possible after the installation of the conduit or cable. Any material excavated from the trenches that in the opinion of the Resident Engineer is satisfactory backfill, may be used for backfill above the layer of screenings. The limestone screenings shall be used to fill the bottom of the trench to a depth of one foot above the top of the conduit or duct encasement. Cinders, rocks, or other inappropriate materials shall not be permitted to be used as backfilling material. Backfilling material, beginning with limestone screenings shall be deposited in the trench in layers not to exceed six inches (6") in depth, and shall be thoroughly compacted with a mechanical tamper before the next layer is deposited in the trench. All trenches for conduit shall be backfilled as per this specification. Unsuitable material shall be disposed of according to the requirements of Section 202.03 of the Standard Specifications. Underground cable marking tape shall be installed twelve inches (12") below the finished grade for all conduit runs.

**Method of Measurement.** This work will be measured in feet along the centerline of the trench. Trench and backfill will not be measured for payment for conduit which is installed by pushing or by directional boring. Where more than one (1) conduit is installed in a single trench, only one run will be measured for payment.

**Basis of Payment.** This work will be paid for at the contract unit price per lineal foot, measured with conduit in place, for TRENCH AND BACKFILL WITH SCREENINGS. Such price will include the cost of all excavation, furnishing and placing all backfill material, and disposal of all surplus excavated material. If sidewalk, driveway pavement or pavement shall be removed and replaced, such work will be paid for separately.

STANDARD DRAWINGS  
579 813

**TEMPORARY PAVEMENT REMOVAL**

**Description.** This work shall include the removal of temporary concrete and hot-mix asphalt patches, regardless of thickness, per Section 440 and as described herein.

**Method of Measurement and Basis of Payment.** This work will be measured and paid for at the contract unit price per square yard for TEMPORARY PAVEMENT REMOVAL.

**HOT-MIX ASPHALT SURFACE REMOVAL, VARIABLE DEPTH**

**Description.** Work under this item shall be performed according to Section 440 of the IDOT Standard Specifications for Road and Bridge Construction, except as herein modified.

This work shall consist of the removal of hot-mix asphalt (HMA) surfaces, including adjacent Portland cement concrete pavement/trenches/patch surfaces, in preparation for subsequent resurfacing as shown in the plans and as directed by the Commissioner.

**Construction Requirements.** Prior to the start of grinding operations, all open lid structures shall be protected to prevent any grinding debris from entering the structure. Any debris entering structures shall be immediately removed and the entire structure shall be cleaned at no cost to the City.

**Method of Measurement.** This work will be measured for payment in square yards. No adjustment will be made for variations in the depth of material removed.

**Basis of Payment.** This work will be paid for at the contract unit price per square yard for HOT-MIX ASPHALT SURFACE REMOVAL, VARIABLE DEPTH.

**ABANDON EXISTING WATER MAIN, FILL WITH CLSM**

**Description.** This work shall consist of the capping, filling, and abandonment of the existing watermain. When directed by the Engineer and the new watermain has been placed into service, this work is to be accomplished.

**Construction Methods.** When the new watermain has been installed, tested and placed into service, the contractor shall excavate down to the existing watermain, work with the City to temporarily shut down the water system, cut into the existing watermain and cap both ends of the existing watermain. The caps shall be a fitting that is connected to sections of water main pipe by means of a positive restrained joint consisting of mechanical joints with retainer gland or MEGALUG joints. Fittings shall be ductile iron meeting requirements of ANSI/AWWA C153/A21.10 and ANSI/AWWA C111/A21.11. Concrete thrust blocks shall be placed against the cap on the existing watermain to remain in service.

The abandoned pipe shall be completely filled with controlled low strength materials per Section 1019.

The Contractor shall backfill the excavation with CA-6 or appropriate backfill, as approved by the Engineer, to the existing grade elevation. The backfill shall be compacted in accordance with Section 550 except that only Method 1 shall be used.

**Method of Measurement and Basis of Payment.** This work will be paid for at the contract unit price per foot for ABANDON EXISTING WATER MAIN, FILL WITH CLSM for the specified size.

**WATER MAIN REMOVAL, 6"**

**WATER MAIN REMOVAL, 8"**

**WATER MAIN REMOVAL, 12"**

**Description.** This work shall consist of the removal and legal disposal of the existing water main up to 12" in diameter at the locations located on the plans. The work shall be performed in accordance with Article 551 and 605 of the Standard Specifications, Division IV of the Standard Specifications for Water and Sewer Main Construction in Illinois (Latest Edition), except as revised herein.

Excavation and backfill for water main removal shall conform to the typical sections shown in the plans and shall conform to the provisions of Sections 20, 21, and 22 of the Standard Specifications for Water & Sewer Main Construction in Illinois.

This work will not be paid for separately and shall be considered included in the cost of WATER MAIN REMOVAL for specified diameter.

**Method of Measurement.** This work shall be measured per linear foot for the specified size of WATER MAIN REMOVAL.

**Basis of Payment.** This work will be paid for at the contract unit price per linear foot for WATER MAIN REMOVAL for specified diameter.



**WATER SERVICE CONNECTION (SHORT)**

**WATER SERVICE CONNECTION (LONG)**

**Description.** This work consists of water service connection in accordance with Section 562, except as revised herein.

Water service 2" diameter and less.

Work shall consist of the disconnection of the existing water services from the existing water main, to and including the existing service box and curb stop, tapping the new water main, and extending new copper services perpendicularly from the new water main to the new service box to be installed in the parkway, as close to the old service box as possible, as shown on the Drawings and/or as directed by the Engineer.

All existing water services which are 3-inch in diameter will be changed to 4-inch services and reduced to 3-inch at the point of connection to the existing service.

Water service 4" or greater in diameter.

Work shall consist of the disconnection of the existing water service from the existing water main, installing appropriately sized tee fittings with an attached valve(s), and extending the new ductile iron service from the new water main to the new service box to be installed in the parkway, as close to the old service box as possible, as shown on the drawings and/or as directed by the Engineer.

Ductile Iron Pipe Water Service

All ductile iron pipe shall be thickness class 52 in accordance with AWWA Standard Specifications for Ductile Iron Pipe, centrifugally cast in Metal Molds for water or other Liquids - AWWA -C151 latest revision. The whole of the above Specifications shall apply. The pipe shall be furnished with push-on joints. All pipe shall be cement-mortar lined inside and bituminous-coated outside, in accordance with Sec. 51-8 - ANSI A21.51 (AWWA C104 and C151). All ductile iron pipe must be clearly marked by the manufacturer to indicate pipe classification or pipe thickness. Unmarked pipe will not be accepted.

Copper Pipe.

Copper pipe shall be copper water tube, Type K, soft temper, for underground service, conforming to ASTM-B88 and ASTM-B251 of the inside diameter indicated on the Drawings. The pipe shall be marked with the manufacturer's name or trademark and a mark indicative of the type of pipe. The outside diameter of the pipe and minimum weight per foot of the pipe shall not be less than that listed in ASTM B251, Table 11.

For existing lead water service only, provide a minimum of 2 feet of straight PVC pipe, SDR 9, potable water service tubing (CTS) to be included in the cost of the CONNECTION.

#### Stops and Fittings.

All corporation stops, curb stops, and connection couplings shall be fabricated of bronze alloy and shall be provided with outlets suitable for connections. All connections shall be made with flare-type couplings. Stops and fittings shall be as manufactured by Ford Co. and shall be in accordance with AWWA Specifications. The curb stops shall be Minneapolis pattern (City of Evanston Standard). Corporation stops and curb stops shall be the non-restricting ball valve type.

#### Curb Boxes.

The curb boxes shall be cast iron Minneapolis pattern base, for rigid assembly, extension-type for 5'-6" bury or as required to make flush with the existing ground elevation. The boxes shall be complete with a lid marked 'WATER' and pentagon brass plug. Curb boxes shall be as manufactured by Mueller Co.

Shop Drawings for water system components shall be submitted for approval as soon as possible, but not less than thirty (30) calendar days prior to the time when the components are intended to be installed.

Care should be taken in installing new water services so as to have the least interruption of service to the water customer. This work will require disruptions of water service. The Contractor shall notify the Engineer not less than 48-hours in advance of planned disruptions. It should be noted that the water main will not be turned off for the installation of water services. It should also be noted that the City of Evanston Utilities Division personnel are the only persons authorized to turn on and off water main valves.

All water service lines shall be augered in place and shall be a minimum of five (5) feet in depth. Provide pipe insulation if cover is less than 5-feet (included in the cost of various pay items). The Contractor may select a boring tool, mechanical drill or jack, at his option, to form the passage through the soil for insertion of water services under existing pavements. The size of the passage shall be just large enough to accommodate the service, but not so large to cause post-construction subsidence of the pavement. The service line shall be capped or plugged during the insertion process to prevent the entrance of soil. The insertion and receiving pits shall be backfilled in accordance with Section 208.

The replacement service line shall be one continuous length (no couplings in the new copper tubing will be allowed) and be of sufficient length to allow for some movement for trench settling after placement of the backfill material. Contractor shall keep the existing and new water service line clean during installation. Following installation, the service pipe shall be flushed clean prior to disconnecting the existing service. The connection of the new copper service to the existing service shall be completed at a point at least eighteen inches (18") from the new curb stop. The old curb stop shall be closed and disconnected from the new service line. After each service is reconnected, the

Contractor shall verify that the water service is supplying adequate water. The Contractor will be charged for any labor and materials used by the City Utilities Division to correct any problems that arise due to Contractor's efforts.

**Method of Measurement.** This work shall be measured per EACH water service connection of the type specified.

**Basis of Payment.** Water Service work will be paid for at the Contract unit price per EACH service connection for WATER SERVICE CONNECTION (SHORT) up to 2 inches in diameter, less than 40 LF in length, counted in place.

Water Service work will be paid for at the Contract unit price per EACH service connection for WATER SERVICE CONNECTION (LONG) up to 2 inches in diameter, 40 LF to 80 lf in length, counted in place.

The Contract unit price WATER SERVICE shall be payment in full for all materials, labor, and equipment required for: site preparation, including removal, replacement and/or repair of fences and other site objects; excavation, including removal and disposal of existing pipes, structures, and excess excavated materials; protection, support and repair of damage to existing utilities; support of installation pit walls; shoring and bracing; dewatering of installation pits; augering/boring/jacking of new service line, disconnection of existing water services from existing water main and extending new services from the new water main to the new service box to be installed in the parkway; new curb boxes, couplings, fittings, joint materials, corporation stops, tapping saddles, curb stops, service piping, and buffalo boxes; machine tapping of holes into new watermain; supply backfill material, backfill placement, compaction and compaction testing; disinfection; testing; correction of defects; and other related work required to complete the installation which is not included under other Payment Items. Additionally, for WATER SERVICE 4 inches or greater, the price shall also include all tees (no tapping saddles allowed) and two (2) 4-inch or greater resilient wedge type valves and valve boxes per each long service, and one (1) 4-inch or greater resilient wedge type valve and valve box per each short service to match the diameter of the new service. Services less than or equal to 1 inch shall be replaced with a 1-inch diameter minimum service. Services less than or equal to 2 inches and greater than or equal to 4 inches shall be replaced with the same diameter as the existing service. Existing services greater than 2 inches and less than 4 inches shall be replaced with 4-inch services.

**CONNECTION TO EXISTING WATERMAIN 6”**

**CONNECTION TO EXISTING WATERMAIN 8”**

**Description.** The Contractor shall perform connections to the existing water main at locations shown on the drawings.

**Materials.** Couplings shall be installed to connect to existing water mains where indicated on the Drawings. Couplings shall be ductile iron with stainless steel bolts and nuts. Couplings shall meet requirements to accommodate a working pressure of 150 psi. Couplings shall be Type 441 by Smith-Blair, Inc.

The Contractor shall not operate valves on existing mains. Valves will be closed and opened only by the employees of the City’s Public Works Department. The Contractor shall expose the water main to be connected to and shall confirm the size and type of piping present.

The Contractor shall obtain the necessary materials required to make a proper connection. The Contractor shall not proceed until he has all the required materials on site. The Contractor shall limit the time for connections on the specified diameter lines to four (4) hours. In no case, shall a customer(s) be out of service overnight.

Once the new water mains have been tested and approved for service, then the Contractor shall, under the direction of the Engineer, place the new water main in service.

The entire length of water main of specified diameter placed out of service for the purpose of making the connections of the proposed water main to the existing water main shall be disinfected before the existing water main is returned to service.

Dewatering, if required, shall be considered included in the cost of this item.

**Method of Measurement.** This work shall be measured per EACH connection to an existing water main.

**Basis of Payment.** Payment shall also be made at the Contract unit price per EACH for CONNECTION TO EXISTING WATER MAIN, of the size specified.

## **VALVE VAULTS TO BE REMOVED**

**Description.** This item shall consist of the removal of the existing water valve vaults, as shown on the plans. Removal shall include the excavation and physical removal and disposal of the valve vaults.

For valve vaults located outside the limits of the roadway, the removal shall include the excavation and physical removal of the structures and backfilling the void left by the valve vaults with earthen backfill.

For valve vaults located within the limits of the roadway, the removal and replacement of the pavement shall be paid for separately at the contract unit price of the required items. The removal shall include the excavation and physical removal of the valve vaults and backfilling the void left by the valve vaults with Trench Backfill. Trench Backfill needed to complete the removal shall be considered included in the cost of VALVE VAULT TO BE REMOVED.

**Method of Measurement.** This work shall be measured per EACH valve vault to be removed.

**Basis of Payment.** Valve vault removal shall be paid for at the contract unit price per EACH for VALVE VAULT TO BE REMOVED. This Contract unit price shall be payment in full for all materials, labor, and equipment required for: site preparation; excavation; disposal of excess excavated materials; capping water mains which will remain in operation; thrust-blocking; backfill placement, compaction and compaction testing; testing/ inspection; correction of defects; stockpiling reclaimed hydrants, valves, and auxiliary valves; and, all related work required to complete the installation which is not included in other Payment Items.

**VALVE BOX**

**Description.** This work shall consist of the installation of a valve box. A screw type shall be used except in pavement where a slide type shall be used.

All required valve box extensions shall be made so that the top section is a minimum 2 feet in length.

Manufacturer shall be Waterous with a cover marked with the word "WATER".

**Method of Measurement.** This work shall be measured per EACH valve box.

**Basis of Payment.** Payment shall also be made at the Contract unit price per EACH VALVE BOX, of the size specified.

## **VALVE BOXES TO BE REMOVED**

**Description.** This item shall consist of the removal of the existing valve boxes, as shown on the plans. Removal shall include the excavation and physical removal and disposal of the valve boxes.

For valve boxes located outside the limits of the roadway, the removal shall include the excavation and physical removal of the structures and backfilling the void left by the valve boxes with earthen backfill.

For valve boxes located within the limits of the roadway, the removal and replacement of the asphalt pavement shall be paid for separately at the contract unit price of the required items. The removal shall include the excavation and physical removal of the valve boxes and backfilling the void left by the valve boxes with Trench Backfill. Trench Backfill needed to complete the removal shall be considered included in the cost of VALVE BOX TO BE REMOVED.

**Method of Measurement.** This work shall be measured per EACH valve box to be removed.

**Basis of Payment.** Existing VALVE BOXES TO BE REMOVED will be paid for at the Contract unit price per EACH. This Contract unit price shall be payment in full for all materials, labor, and equipment required for: site preparation; excavation; disposal of excess excavated materials; capping water mains which will remain in operation; thrust-blocking; backfill placement, compaction and compaction testing; testing/ inspection; correction of defects; stockpiling reclaimed hydrants, valves, and auxiliary valves; and, all related work required to complete the installation.

## **MULCH, SPECIAL**

**Description.** The work under this item shall consist of furnishing, transporting, and placing lava rock mulch into planting beds or around trees as described herein.

**Materials.** Lava rock shall be ½ inch diameter to 1 inch diameter, shall be clean, free of foreign matter, sticks, stones, and clods.

**General Requirements.** The Contractor shall supply and install lava rock mulch around trees, shrubs, herbaceous plants in landscaped planting beds, and throughout the furthest dimensions in at-grade planters. Annual areas shall be mulched with lava rock fines.

The Contractor shall remove all litter and plant debris, repair grade by raking and adding planter soil mix or pulverized topsoil as needed prior to lava rock mulching. Care shall be taken not to bury leaves, stems, or vines under lava rock mulch material.

All finished areas shall be left smooth and level to maintain a uniform surface and appearance. All work areas shall be clean of debris and lava rock prior to leaving the site.

**Submittals.** A sample shall be provided prior to performing the work.

**Construction Requirements.** Place lava rock mulch manually around plants as follows:

Annuals: Spread one (1) inch lightly through annual plantings.

Perennials, bulbs, groundcovers, vines, grasses: Spread two (2) inches around plants. Ensure lava rock is away from crowns of plants.

Shrubs, including roses: Spread three (3) inches around shrubs. Ensure lava rock is away from stems and crown of shrub.

Trees, shade and ornamental: Spread three (3) inches of around trees. Do not pile lava rock mulch around trunk; ensure root flare is visible.

Mechanical or power mulch systems are not acceptable methods of placing lava rock mulch.

**Method of Measurement.** MULCH, SPECIAL will be measured in place and the area computed in square yards.



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**Basis of Payment.** This work will be paid at the contract unit price per square yard for MULCH, SPECIAL which price shall be payment for completing the work as specified.

## **PEDESTRIAN TRAFFIC CONTROL AND PROTECTION**

**Description.** This work shall consist of all labor, materials, transportation, handling and incidental work necessary to furnish, install, maintain and remove all pedestrian traffic control devices required and as approved by the Engineer and shown on plans including the detour portion.

Work under this item must be performed in accordance with Section 701 of the Standard Specifications, except as herein modified. This work shall consist of furnishing, installing, maintaining, relocating and subsequently removing all signs, markings, traffic cones, barricades, temporary fence, warning lights, flaggers and other devices which are to be used for the purpose of regulating, warning or guiding pedestrian traffic during the construction of this improvement.

Pedestrian Traffic Control must be in accordance with the applicable section of the Standard Specifications, the applicable guidelines contained in the Illinois Manual on Uniform Traffic Control Devices for Streets and Highways, and any Special Details and Highway Standards contained herein and in the plans.

Special attention is called to Articles 107.09 (Public Convenience and Safety) and 107.14 (Maintenance of Traffic) of the Standard Specifications and the following Highway Standards, Details, Supplemental Specifications and Special Provisions, and Recurring Special Provisions contained herein relating to traffic control.

Contractor vehicles must enter or leave work areas in a manner that will not be hazardous to or interfere with normal pedestrian traffic and must not park or stop except within designated work areas. Personal vehicles will not be permitted to park within the right of way except in specific areas designated by the Engineer.

All signs, markings, traffic cones, barricades, temporary fence, warning lights, flaggers, and other traffic control devices must conform to the plans, specifications, special provisions and the latest edition of the "State of Illinois Manual on Uniform Traffic Control Devices." The Contractor must obtain, erect, maintain, and remove all Pedestrian Traffic Control devices in accordance with Article 107.14 of the Standard Specifications. Placement and maintenance of all pedestrian traffic control devices will be as directed by the Engineer. The Engineer will be the sole judge as to the acceptability of placement and maintenance of the pedestrian traffic control devices prescribed in the appropriate standards.

The Contractor must insure that all barricades, temporary fence, signs, lights and other devices installed by him/her are operational every day, including Sundays and holidays. In the event of severe weather conditions, the Contractor must furnish any additional personal required to properly maintain all pedestrian traffic control devices as directed by the Engineer.

The Contractor must be responsible for the timely installation, maintenance, relocation and subsequent removal of all temporary signing, barricading and temporary striping necessary to accomplish these detours. The cost of this work will be considered included in the contract lump sum for TRAFFIC CONTROL AND PROTECTION (SPECIAL).

Pedestrian Sidewalk Control: This work must consist of installing, maintaining, and removing necessary signs, barricades, wood frame-constructed walkways, and wood framed hurricane fencing needed to direct pedestrians to usable sidewalks and walkways during the construction. (Sign legend "Pedestrian Walkway (Arrow)": Size 24" x 30"; black legend on a white reflectorized background) must be placed at pedestrian crossing locations informing pedestrians of the correct pedestrian zone. Barricades must be placed on all closed sidewalk sections.

REQUIREMENTS:

- 1) The Contractor must maintain a continuous 5' sidewalk pedestrian zone along the building face on the both sides of Howard Street during construction. The sidewalk must be longitudinally sawcut the cost of which will be considered included in the cost of SIDEWALK REMOVAL. The Contractor will be allowed to remove and replace this remaining sidewalk but must reopen it for use within 48 hours. Failure to do so will result in a deduction for Pedestrian Traffic Control and Protection Deficiency as defined in this special provision.
- 2) Temporary 4' fencing on metal T-posts must be placed the distance specified in the plans from the building face separating the pedestrian zone from the work zone. This fencing must be secure from falling over.
- 3) Use one "Pedestrian Walkway (Arrow)" (black legend on white reflectorized background sign at each end of each sidewalk section being reconstructed.
- 4) At each point of closure, sufficient numbers of barricades must be used to completely close the pathway.
- 5) Pedestrian walkways must be maintained free of any obstructions and hazards such as holes, debris, mud, construction equipment, stored materials and must be broom swept daily or as directed by the Engineer.
- 6) All hazards near or adjacent to walkways must be clearly delineated.
- 7) Construction activities may only involve sidewalks on one side of the street at a time; the work must be staged so that both sidewalks are not out of service at the same time.
- 8) The Contractor must maintain pedestrian access to adjacent properties by installing ADA compliant wood frame-constructed walkways and ramps from the curb line to adjacent property entrances, and at either end of the

pedestrian path as directed by the Engineer. Pedestrian access to adjacent properties must be uninterrupted until the walk is fully restored.

- 9) The Contractor must maintain disabled person pedestrian access to crosswalks across Howard Street and all intersecting cross streets at all times via ADA compliant wood frame-constructed walkways and ramps through the work zones.
- 10) If instructed by ENGINEER, TEMPORARY SIDEWALK shall be Hot-Mix Asphalt or Portland Cement Concrete.
- 11) The City of Evanston prefers re-routing pedestrians to the sidewalk across the street rather than diverting them into the roadway.
- 12) Only a single block-long sidewalk closure shall be permitted at a time.
- 13) The CONTRACTOR will not create mid-block temporary crosswalks.
- 14) At least on east-west and one north-south accessible path must be available at all locations at all times. At any street where two adjacent radius returns will be reconstructed for streetscape improvements, such work must be sub-staged to meet this access requirement.
- 15) Sidewalks must be open to pedestrian traffic during the weekends.
- 16) **Sidewalk removal, forming, pouring new sidewalk and reopening sidewalk must occur within a 72-hour span.**

Construction Requirements. The CONTRACTOR shall provide the ENGINEER, at the preconstruction meeting, a proposed plan for traffic control and protection throughout the duration of the project. At the preconstruction meeting, the CONTRACTOR shall furnish the name of the individual in his direct employ who is to be responsible for the installation and maintenance of the traffic control for this project. If the actual installation and maintenance are to be accomplished by a subcontractor, consent shall be requested of the ENGINEER at the time of the preconstruction meeting in accordance with Article 108.01 of the Standard Specifications. This shall not relieve the CONTRACTOR of the requirement to have a responsible individual in his direct employ supervise the work.

Construction operations shall be conducted in a manner such that streets will be open to emergency traffic.

Method of Measurement. This work measured as a lump sum.

Basis of Payment. This work will be paid for at the contract lump sum price for TRAFFIC CONTROL AND PROTECTION (SPECIAL).

## **TRASH RECEPTACLE**

**Description.** This work must consist of furnishing and installing a new trash receptacle with a plastic liner at the locations specified in the Contract plans or as directed by the Engineer.

**General Requirements.** Each trash receptacle will be placed at the location indicated in the plans. The locations will be field marked and verified for approval by the Engineer.

Assembly. The anchor bolt must be drilled and grouted into the sidewalk surface only after the Trash Receptacle location has been finalized.

### **Materials.**

City of Chicago Section.

Materials must be as specified in the plans and must be "Gloss Black" in color, steel trash receptacle, 36-gallon capacity with plastic liner by the following suggested manufacturers:

Victor Stanley, Inc.,  
Wausau Tile, Inc.  
Trystan, Inc.

City of Evanston Section.

Materials must be as specified in the plans. Finish must be as shown in the plans.

**Submittals.** Submit manufacturer's technical data for each manufactured product, including certification that each product complies with specified requirements. Submit shop drawings showing complete information for fabrication. Include anchoring detail. Submit color sample.

**Method of Measurement.** TRASH RECEPTACLE will be measured in place per each installed.

**Basis of Payment.** The work under this item will be paid for at the contract unit price per each as shown in the Schedule of Unit Prices for TRASH RECEPTACLE, which price will include all labor, anchor bolt and bolt installation, equipment, materials and incidental work necessary to complete the work as specified.

## **UNIT PAVERS**

**Description.** Contractor must provide all equipment and materials, and do all work necessary to construct the unit paving as indicated on the Drawings and as specified. Pavers must be tested in accordance with Article 1041. Any required testing not covered by Article 1041 must be provided by the supplier.

**General Requirements.** Drawings and general provisions of Contract, including General and Supplementary Conditions and all other Divisions of the Project Manual, apply to this Section.

**Quality Assurance.** Except as modified herein, the work shall be in accordance with the applicable portions of the Standard Specifications.

### **Qualifications:**

- A. Contractor or subcontractor shall submit evidence of the following for approval of the Engineer:
  - 1. Experience installing unit pavers using sand and bituminous setting beds.
  - 2. Installed (within past three years) a minimum of 100,000 square feet per year for the past three years of unit paving using both sand and bituminous setting beds.
  - 3. The same experienced supervisory personnel will be made available for this project.
  - 4. Bituminous setting bed work shall not be sublet.
- B. If requested the paving firm shall submit list of comparable projects setting forth description, square footage, location and knowledgeable references with addresses and phone numbers.

**Submittals:** The contractor shall submit the following for approval of the Engineer:

- A. Manufacturer's Literature: Materials descriptive literature, installation instructions, and paver color selection chart.
- B. Test Reports: Three (3) copies, showing compliance with specified ASTM requirements.
- C. Shop Drawings: Layout drawings of each paved area showing the pattern of pavers, indicate pavers requiring cutting, indicate setting bed methods in each area, drainage patterns and drains. Include details of setting beds, tie bars, and noting all materials and their thickness.
- D. Contractor must submit to the Engineer a minimum of 25 square feet of unit pavers for approval. Submit paver samples indicating full color range of all unit paver on slab in the specified colors and patterns.

**Delivery, Storage, and Handling:** Deliver and handle pavers in such a manner as to prevent damage. Units shall be stored above ground on blocking. Blocking shall be

clean and nonstaining. All damaged or otherwise unsuitable material shall be immediately removed from the job site.

Access to Businesses and Homes. During the installation of the unit pavers and base Contractor must keep driveways and entrances serving the businesses and homes clear and available to the Owner and the business' employees at all times. Customer access shall be maintained during normal business hours. Contractor is responsible for providing temporary structures such as wooden bridges, ramps, or walkways as required to provide the public safe, secure, and recognizable access ways to businesses during construction.

Pavers:

City of Chicago Section.

A. Pavers shall be as manufactured by

1. Pine Hall Bricks, Inc., supplied by Lake Street Supply, 1810 W Lake St. Chicago IL 60612 (773)-410-0103
2. Whitacre Greer, Lake Street Supply, 1810 W. Lake St., Chicago, IL 60612 (773) 410-0103
3. The Belden Brick Company, Lake Street Supply, 1810 W. Lake St., Chicago, IL 60612 (773) 410-0103

B. PAVERS shall be:

- Model: as indicated on the drawings
- Color: as indicated on the drawings
- Pavers shall be installed as indicated on drawings
- Unit Clay Paver shall meet the minimum material and physical properties set forth in ASTM C1272-14b, Standard Specification for Clay Paving Units.
- Pavers shall conform to severe freeze-thaw test requirements set forth in ASTM 1645-06 on sampling and testing interlocking paving units.
- Pavers shall be installed as indicated on drawings.
- All cut surfaces of pavers must have sealant applied per manufacturer's recommendations. Cut Pavers shall not be set until approved by the Engineer.

City of Evanston Section.

C. Pavers shall be as manufactured by

1. Pine Hall Bricks, Inc., supplied by Lake Street Supply, 1810 W Lake St. Chicago IL 60612 (773)-410-0103
2. Whitacre Greer, Lake Street Supply, 1810 W. Lake St., Chicago, IL 60612 (773) 410-0103
3. The Belden Brick Company, Lake Street Supply, 1810 W. Lake St., Chicago, IL 60612 (773) 410-0103

D. PAVERS shall be:

- Model: as indicated on the drawings

- Color: as indicated on the drawings
- Pavers shall be installed as indicated on drawings
- Unit Clay Paver shall meet the minimum material and physical properties set forth in ASTM C1272-14b, Standard Specification for Clay Paving Units.
- Pavers shall conform to severe freeze-thaw test requirements set forth in ASTM 1645-06 on sampling and testing interlocking paving units.
- Pavers shall be installed as indicated on drawings.
- All cut surfaces of pavers must have sealant applied per manufacturer's recommendations. Cut Pavers shall not be set until approved by the Engineer.

Bituminous Setting Bed Components:

- A. Asphalt Cement: Shall conform to ASTM D3381 with a viscosity grade of A.C. 10 or A.C. 20.
- B. Aggregates: Clean, hard sand with durable particles and free from adherent coating, lumps of clay, alkali salts, and organic matter. Sand shall be uniformly graded from coarse to fine with all passing the No. 4 sieve and shall meet screen analysis test, ASTM C136.
- C. Mix Ratios: 7 percent asphalt (by weight), 93 percent aggregates (by weight). Each ton shall be apportioned by weight in the approximate ratio of 145 pounds asphalt cement to 1,855 pounds aggregate.
- D. Mix Requirements: Bituminous setting bed shall be plant mixed and heated to approximately 300°F.
- E. Contractor must determine exact proportions to produce the appropriate mixture for construction of the bituminous setting bed to meet construction requirements.
- F. Setting Bed Primer: Shall conform to ASTM D 2028 - Standard Specification for Cutback Asphalt (Rapid-Curing Type).

Neoprene Tack Coat Components:

- A. Mastic (asphalt adhesive):
  - Solids (base): 75 percent  $\pm$  1 percent.
  - Pounds/gallon: 8-8.5 pounds/gallon
  - Solvent: Varsol (over 100° F. flash)
- B. Solids (base): 2 percent Neoprene.
  - 2 percent Neoprene.
  - 10 percent Fiber.
  - 88 percent Asphalt.
  - Melting Point: ASTM D 36, 200°F. minimum.
  - Penetration: 77 ° F 100 gram load,  
5-second (.1 mm) 23-27.
  - Ductility: ASTM D 113 at 25°C.,  $\pm$  0.5°C (77°F  $\pm$  0.9°F)



5 cm per minute ( $\pm 5\%$ )

Paver Joint Material. Sand: Dry sand or poly sand conforming to ASTM C-144 with all particles passing the No. 16 sieve.

Portland Cement Concrete Underlayment. The Portland Cement Concrete Underlayment with drainage weep holes filled with pea gravels and filter fabric and tie bars shall be in accordance with Standard Specification Article 424.

General.

- A. All pavers shall be installed per the respective manufacturer's recommendations.
- B. No paver setting work shall be performed when the underlayment has free moisture, ice, or snow, or when the underlayment is frozen.
- C. Concrete underlayment shall be sound, clean, and free from debris and materials or substances which will hinder the bond of the setting bed. The top surface of concrete underlayment slab shall not vary more than one half (1/2) inch of its proposed elevation.
- D. No bituminous setting bed work shall be performed when the ambient temperature is below 40°F. or at 40°F. and falling, or at any time when the setting bed stiffens before paver units are installed.

Paver Cutting.

- A. To reduce dust during paver installation, unit pavers shall only be cut using wet saws. No dry cutting permitted.
- B. Cut pavers shall be placed in areas shown on the details in the plans. "L" shaped pavers shall be avoided where possible.
- C. Pavers shall be cut radially when joints between pavers on curves exceed 1/8 inch.
- D. Radial cut pavers shall be created by trimming both sides of paver.
- E. Cut paver shall not be slimmer than half the size of a full unit. If smaller pieces are required for pattern, provide over-sided units and cut down.
- E. Cut paver shall not be slimmer than half the size of a full unit. If smaller pieces are required for pattern, provide oversized units and cut down

Bituminous Setting Bed Preparation.

- A. Where required, install steel paver edging as shown on drawings.
- B. Place 3/4-inch deep control bars in parallel directly over base to be used as guides for striking board. Use wood shims under control bars to set proper grade.
- C. Place hot (250°F+) bituminous setting bed material between control bars and strike with striking board to create a smooth, firm, and even setting bed. Additional bituminous material may be necessary to achieve consistent quality setting bed.

- D. After completion of first setting bed panel, advance first control bar and wood shims to next position to prepare next panel. Contractor must carefully fill depressions that remain between panels.
- E. Repeat procedure for successive setting bed panels. No wood shims or control bars shall be allowed to remain in the bituminous setting bed.
- F. Roll hot setting bed with a power roller (not over one (1) ton in weight) to a nominal depth of 3/4 inches. This thickness shall be adjusted so that when the pavers are placed and rolled, the top surface of the pavers will be at the required final grade.
- G. Apply neoprene tack coat to surface of bituminous setting bed by mopping, squeegeeing, or troweling.

**Paver Installation - Bituminous Setting Bed.**

- A. Place pavers by hand in straight courses with hand tight joints and uniform top surface. Good alignment shall be kept and patterns shall be as shown on plans and details.
- B. Protect the alignment and elevations of the newly laid pavers with plywood sheeting at all times. Advance the plywood as work progresses and maintain plywood protection over all areas subject to movement of materials, workers, and equipment.
- C. Pavers shall be cut only when necessary and used in courses as indicated on plans and details.
- D. Joints in the underlayment, if any, shall not reflect up through the setting bed and paver system.
- E. When all pavers are installed, apply joint sand to paving and sweep into all joints until joints are completely filled. Sweep clean the entire surface and remove all excess sand. Do not allow traffic on pavers prior to joints being filled.
- F. Protect newly laid pavers, slabs and curbs with plywood panels on which workers stand. Advance protective panels as work progresses but maintain protection in areas subject to continued movement of materials and equipment to avoid creating depressions or disrupting alignment of installed pavers, slabs or curbs.
- G. Replace cracked or chipped unit pavers at no additional cost to the Commissioner.

**Cleaning of Paved Surface.** After completion of the unit pavers, paver installation areas shall be thoroughly swept clean and surface shall be left unsoiled. Where required by the City, surface shall be cleaned with water or an approved cleaner.

**Method of Measurement.** UNIT PAVERS will be measured for payment in place and the area computed in square feet.

**Basis of Payment.** UNIT PAVERS will be paid for at Contract Unit Price per square foot for which such price shall include all labors, materials and equipment necessary to perform the work as herein specified. Portland Cement Concrete Underlayment with

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weep holes filled with pea gravels and filter fabric and tie bars, and Bituminous Setting Bed and Neoprene Tack Coat shall be included in the Contract Unit Price.

GRANULAR SUBBASE TYPE B and SAND CUSHION will be paid for separately.

## **CAST IRON TREE GRATES**

**Description.** Work under this item shall consist of furnishing and installing the 4' x 10' cast iron tree grates, grate frame, P.C.C thickened slab, granular material, and lava rock mulch, as shown on the plans or as ordered by the Engineer, and specified herein, and must conform to the requirements of applicable portions of the Standard Specifications.

### **General Requirements.**

#### **Material**

The material must be gray iron castings conforming to A.S.T.M. A48 or A-48-75, class 35 or 5B, and Article 1006.14 of the Standard Specifications. Concrete must be Class SI and conform to the requirements of Section 1020 of the Standard Specifications.

#### **Design**

Grate pattern must comply with ADA Guidelines for equal access. Tree grates will be 1.5" thick with accompanying frame. Grate will consist of two halves with 24" minimum diameter opening for trees. Grate openings must meet or exceed ADA Standard. Grate dimensions will be specified in plans or by the Commissioner. Grate halves must be bolted together with tamperproof bolts. The frames and grates shall be imprinted with cast letters indicating "City of Chicago" or "City of Evanston" at the locations indicated per the standard detail drawings included in the contract plans.

#### **Frame**

Frame must be 1 3/4" x 1 3/4" x 1/4" steel frame, or must coordinate with grate dimensions, surrounding the entire perimeter of the tree pit. Frame must be manufactured with anchor tabs for concrete installation.

#### **Finish**

- Surface Preparation:

The top surface must be cleaned in accordance with Section 506 for Method 2 (power or hand tool cleaning) and must be free of all loose rust and loose mill scale.

- Coating:

Before installation, in an effort to reduce the appearance of oxidation, all surfaces (top, bottom and edges) of the grates are to be coated and rubbed with two applications of a Type 1 Membrane Curing Compound meeting the requirements of Article 1022.01 of the Standard Specifications, or alternative compound as approved by the Commissioner.

Surface preparation and coating will not be measured and paid for separately but will be included in the cost of all items listed herein.

#### **Shop Drawings**

Shop drawings of all items related to the manufacture and installation of the tree grate and frame must be submitted and approved by Engineer before fabrication.

**Manufacturer**

Tree grates can be supplied by the following suggested manufacturers:

- a. Neenah Foundry, Neenah, Wisconsin
- b. Urban Accessories, Woodinville, WA;
- c. Ironsmith, Palm Desert, CA;
- d. Fairweather/Olympic Foundry, Seattle, WA.

And must match in similarity the following Neenah tree grate styles; square R-8713, rectangle R-8811. See details for specific dimensions.

**Fasteners**

Tree grate halves must be joined together with tamper resistant bolts with tamper resistant bolt assembly packages as provided by the manufacturer. Eliminate drill tap, c'sink and assemble for (24) 3/8-16 x 2" flat hd. stnls. stl. screw with pin (kit no. 90357). Tree grates must be secured from beneath only.

**Inspection**

Installation assumes responsibility for performance.

**Surface conditions**

Examine frame, concrete ledge, or ground surface to receive grate. The seat for the grates must be cleaned prior to setting the grates. Correct conditions to comply with manufacturer's recommended installation procedures.

**Opening to receive grates & frame installation**

Sub-base granular material Type B must be placed and compacted to 95% proctor prior to installation of frame. Frame will then be placed on top of compacted sub-base surface. Wood forms must be placed inside frame to prevent concrete seepage into pit area, and expansion joints placed on the outside of the frame.

Tree grate frame shall be installed in thickened concrete slab at tree pit perimeter as indicated in plans and as recommended by manufacturer.

If installing grate at back of curb, a C-channel must be installed at curb to accept tree grate frame. If installing grate at pavers on concrete slab, an L-channel must be installed at the slab to accept tree grate frame. Hilti-type Anchoring system for C-channel or L-channel must have a minimum shear capacity of 12 kips live wheel load. Detailed product information must be submitted for approval prior to installation.

**Join Grate Halves**

Bring tree grate halves together around tree at a level to allow easy access to underside. Join sections at preformed holes using temper-resistant bolt packages provided by manufacturer as suggested. The cost for this work and equipment will be incidental to these items.

**Warranty**

Manufacturer's written warranty must be handed over to Engineer prior to installation of grates.

**Material under Grate**

Lava rock shall be black, ½ inch diameter to 1-inch diameter, 3 inches minimum in depth, clean and free of foreign matter, sticks, stones, and clods. The cost of furnishing and installing lava rock mulch will be included in the cost of this item.

Lava rock must meet the bottom of the tree grates and filled around the opening level with grade.

The Contractor must remove all litter and plant debris before mulching. The Contractor must repair grade by raking and adding topsoil as needed, before mulching. Care must be taken not to bury leaves, stems, or vines under mulch material.

All finished mulch areas must be left smooth and level to maintain a uniform surface and appearance. All tree grate areas or work areas must be clean of debris and mulch, prior to leaving the site.

**Method of Measurement.** CAST IRON TREE GRATES will be measured for payment per each tree pit constructed, complete in place.

**Basis of Payment.** The work under this item will be paid for at the contract unit price per each as shown in the Schedule of Unit Prices for CAST IRON TREE GRATES, which price will include; all necessary excavation, furnishing and placing the granular base, forms, reinforcement, concrete, lava rock, and any other work needed to complete the construction of the tree grate supports. No separate measurement nor payment must be made for Class SI Concrete, castings, frames or other appurtenant work, the cost of which will included in the unit price each for CAST IRON TREE GRATES.

## **DECORATIVE GATEWAY ELEMENT**

**Description.** Work under this item shall consist of providing all the labor, tools, equipment, and materials necessary to furnish, deliver, and install ornamental metal fabrications, all mounting hardware, as shown in the Contract Plans and as herein specified, all complete and subject to the terms and conditions of the Contract, and as directed by the Engineer. Decorative Gateway Element, as shown on the Drawings and specified herein, include but are not necessarily limited to the following:

- A. Identifier- Dimensions as specified in plans
  - a. Panel Assemblies
    - i. Thermal or Water Jet Cut Aluminum Panels with digital graphics printed on vinyl sheeting adhered to panel
    - ii. Thermal or Water Jet Cut Painted Aluminum Panels
    - iii. All anchoring hardware and accessories required
  - b. Cast Aluminum Mounting Collars
  - c. Anchoring accessories such as straps, gussets, tubes, and couplings, including all hardware and materials required to complete, assemble and install each fabrication
  - d. Warranties

### **General Requirements.**

**Fabricator Qualifications:** Provide ornamental metal fabrications by a firm specializing in the type of ornamental metal work shown on the Drawings and described herein as evidenced by past experience. Upon request, the fabricator must submit such required evidence to the Engineer establishing compliance with the specified experience.

Preferred fabricators:

Duroweld, 1565 Rockland Road, Lake Bluff, IL 60044, 847-680-3064, Ron Harris or David Thomas.

Western Remac Inc, 170 Internationale Parkway, Woodridge IL, 60517, 630-972-7770

MK Signs, 4900 N Elston Ave, Chicago II, 60630, 773-545-444, Anthony Cilia

**Fabricator Responsibilities:** Provide ornamental metal fabrications and accessories of the assembly by a firm having undivided responsibility for the design, fabrication and installation as shown on the Drawings and specified herein.

**Graphics:** Digital output ready graphics will be supplied to the Contractor by the Commissioner. The Contractor will develop finished artwork and all necessary attachments for the Identifier.

### **Submittals.**

Product Data: For each product specified herein or on drawings.

Samples:

- A. Color samples: For each color to be used for vinyl graphics, polycarbonate light ring and for painted color finishes.
- B. Panel Assembly and Graphic Approval Samples: Submit 24"x24" sample of typical section of Light pole Identifier including thermal or water jet cut aluminum panel assemblies for approval of quality, connections, finish and color fidelity of all colors shown.

**Shop Drawings.**

- A. The drawings are for design intent only. The Identifier fabricator is responsible for the proper engineering of all items. The structure, dimensions, and specifications for all items shall be indicated in the shop drawings.
- B. Provide shop drawings for all items including:
  - 1. Complete fabrication and installation drawings for each sign type. Indicate dimensions, materials, finishes, fastenings, anchorage, jointing, sealing, backing, utility requirements, rough-in, and adjacent site conditions.
  - 2. Details: Thermal or Water Jet Cut areas, graphics, metal materials, dimensions, gages, finishes, methods of fabrication, fasteners, fittings, accessories, supports, framing and anchors. Show adjacent construction and method of anchorage of fabricated items, including electrical components.
  - 3. Additional elements required to clearly convey the fabrication and installation requirements.
- C. Minimum 1" = 1'-0" scaled color print of each ornamental metal fabricated item as shown and specified on the Drawings.
- D. Shop drawings shall be signed and sealed by a licensed structural engineer responsible for their preparation.
  - 1. Details on drawings indicate a design approach for sign fabrication but do not necessarily include all fabricating details required for the complete structural integrity of the signs, erecting, and service at the installed locations, nor do they necessarily consider the preferred shop practices of the individual Fabricators. Therefore, it shall be the responsibility of the fabricator to perform the complete structural design of the signs and to incorporate all the reasonable safety factors necessary to protect the Owner, its representatives, and Designer against public



liability. Designs which survive rational engineering analysis will be acceptable, provided that shop drawings, including structural design are approved by the Owner. Signs must meet all applicable local, state, and federal codes, as well as testing laboratory listings where required.

- E. Subsequent iterations for submittal will be incidental to this item.
- F. Maintenance data: For installed products, including precautions against harmful cleaning materials and methods.
- G. Pre-Product Sample: One sample of pre-production casting of typical aluminum mounting collars and other accessories- bracelets, brackets, gussets, plates, straps, tubes and couplings required for assembly.

**Materials.**

Metal Material: Alloy and temper must be of adequate strength and durability, and capable of performing function of holding identifier securely in place without bending or deforming.

- 1. Aluminum Plate and Sheet: ASTM 8209, SOOS-H16, or alloy and temper as recommended by manufacturer.
- 2. Aluminum Extrusions: ASTM 8221, 6O63-T5, or alloy and temper as recommended by manufacturer.
- 3. Aluminum Bars, Rods and Wire: ASTM 8211.
- 4. Stainless Steel: Provide the most suitable austenitic alloy, form and finish required to produce the Work. Type 304 or 316, and low carbon Type 304L or 316L for components to be welded, unless otherwise noted.
  - a. Stainless Steel Casting; Type 316
  - b. Stainless Bars and Shapes; ASTM A276

Fasteners: Use fasteners fabricated from same basic metal or alloy as the metal fastened, and finished to match in color and texture, unless otherwise specified. Comply with Federal Specification (GSA) FF-S- 92 for machine screws. Do not use metals that are corrosive or incompatible with joined materials.

Mounting collars: Cast aluminum two-piece clamps to receive panel assemblies.

Vinyl sheeting with digitally printed graphics: Retroreflective vinyl sheeting shall conform with Illinois Department of Transportation Standard Specifications for Road and Bridge Construction Article 1091.03. Manufacturer shall submit product data for digital printing method for approval by Commissioner.

Provide bracelets, brackets, gussets, plates, straps, tubes and couplings with each fabricated assembly, as may be required for proper support and anchorage to the construction and for other work. Cut, reinforce, drill and tap fabricated metal work as may be required to receive other items of work.

**Fabrication.**

Fabricate and assemble all items in the shop and mark each item to ensure proper installation at the project site. Disassemble for shipment only to the extent required by shipping limitations.

Carefully match parts of the fabrication to maintain continuity of line and design. Joint all parts with hairline contact, flush and smooth with adjacent surfaces. Form joints exposed to weather to be watertight. Remove all mold marks so as to produce smooth, even surfaces, free of blemishes and surface shadows.

Fabricate and thermal or water jet cut to the thicknesses, sizes and shapes shown on the Drawings, or as required to produce work of adequate strength and durability, without objectionable deflections. Perform all cutting by machine. Plane cut edges which are to be welded. Use proven details of fabrication, as required to achieve proper assembly and alignment of the various components of the work. Provide finished fabrications with surfaces, exposed to view, which do not exhibit pitting, stains, marks, discolorations or other imperfections on the finished units.

**Delivery and Handling.**

Deliver fabrications to the project site clearly marked for proper identification. Wrap fabrications to protect finish from damage during delivery, storage and handling. Deliver to site when supporting construction is completed and prepared for fabrication installation.

Handle materials at the job site in such a manner as to prevent damage. Immediately remove from the job site, damaged or otherwise unsuitable material when so ascertained.

**Examination and Preparation.**

Contractor must examine all parts of supporting structures and conditions under which ornamental work is to be erected, and notify Engineer in writing of conditions detrimental to proper and timely completion of the work. Correct conditions that affect the proper installation of the ornamental metal fabrications. Fabrication and/or installation of ornamental metal and associated items constitutes acceptance of the existing conditions by the Contractor.

Field Measurements: Where ornamental fabrications are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

Provide a full size Mock-Up Installation: Prior to the start of production prepare the following for the Engineer's review.

- A. Panel Assemblies of cut Aluminum painted and with vinyl graphics
- B. Anchoring accessories such as straps, gussets, tubes, and couplings, including all hardware and materials required to complete, assemble and install each fabrication

The Engineer's review of the mock-ups will be for final acceptance of material finish, conformance with general quality prior to production and does not relieve the Ornamental Metal Fabricator from the responsibility and conformance of requirements as herein specified.

**Finish.**

Metal Finish: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

- A. Finish designations prefixed by AA comply with the system established by the Aluminum Association for designating aluminum finishes.

Paint Finish:

- A. Color: as indicated on drawings.
- B. Written approval of color by Engineer must be obtained prior to ordering and application of paint.
- C. Field cleaning and touch-up painting must only be done between May 1 and October 31.

Protection: Protect fabrication surfaces and corners by covering with padding and kraft paper or plastic covering prior to shipment from the fabrication shop.

Attachments: Bracelets, collars, couplings, and hardware necessary to assemble Gateway Monument/Light pole Identifier must be provided with dimensions as shown on the Drawings. All exposed fasteners shall be stainless steel and finished to match in color and texture metal being fastened, unless otherwise specified. Do not use metals that are corrosive or incompatible with joined materials.

**Installation.**

Examine all surfaces and conditions of the installation to receive ornamental metal fabrications. Installation of the ornamental metal fabrications and associated construction constitutes acceptance of the existing materials and conditions.

Verify dimensions and conditions of the supporting structures at the project site.

Provide protection of in-place construction, surfaces and materials which can be damaged during the installation of this work. Patch, repair or replace any such construction damaged during the work of this section as reviewed and approved by the Commissioner at no additional cost to the Commissioner.

Set ornamental metal fabrications accurately as measured from established building lines and levels, plumb and in true alignment with existing and previously completed new work. Allow for expansion and contraction of materials and building construction.

Anchor securely in place in the manner shown on the final reviewed shop drawings and the final reviewed mock-up samples, using specified anchors. Separate aluminum and steel fabrications using plastic washers.

Do not cut or abrade finishes which cannot be completely restored in the field. Return units with such finishes to the shop for required alterations, followed by complete refinishing.

Remove protective coverings when there is no longer any danger of damage to the ornamental metal fabrications from other work yet to be performed in the same location. Restore protective coverings which have been removed or damaged during shipment or installation of the work, or if such other work is yet to be performed.

Repair and refinish all damaged surfaces of fabrications that will affect the appearance and performance of finish coatings. Submit materials and methods of surface repair and repainting to the Commissioner for review prior to application. Damaged surfaces will be repaired and refinished at no additional cost to the Commissioner. Remove and replace or remove and factory refinish any fabrication which, if after review and decision by the Commissioner, cannot be successfully field repaired at no additional cost to the Commissioner.

**Method of Measurement.** This work shall be measured per each DECORATIVE GATEWAY ELEMENT assembly furnished and installed.

**Basis of Payment.** This item of work will be paid for at the Contract Unit Price per each for DECORATIVE GATEWAY ELEMENT which will include all labor, furnishing, placing and installation, equipment, materials including painted metal and vinyl artwork panels, bracelets, mounting banner arms, mounting hardware and any incidental work necessary to complete work as specified.

## **MULCH**

**Description.** This item shall include all labor, materials and equipment necessary to furnish, transport and hardwood bark mulch at all existing trees to be protected and remain parkways. The item shall also include all mulching (for trees without tree grates).

### **Submittals.**

Shredded hardwood bark mulch – sample  
Request for Material Inspection Sheet

### **Products.**

- A Shredded Hardwood Mulch (Parkways and Tree pits without grates)  
Hardwood bark mulch shall be clean, finely shredded mixed-hardwood bark, not to exceed two (2) inches in its largest dimension, free of foreign matter, sticks, stones, and clods. All hardwood mulch shall be processed through a hammer mill. Hardwood bark not processed through a hammer mill shall not be accepted. A sample and request for material inspection form must be supplied to the Commissioner for approval prior to performing any work.

### **Preparation and Execution.**

Place mulch layer around Parkway trees (existing protected trees to remain) or Tree pits without grates (existing protected trees to remain) as follows:

Three (3) inches deep - keep mulch away from the trunk of the tree. Trees installed in grass parkways shall have a 3' minimum diameter mulch ring.

Contractor shall make inspections of all tree pits without tree grates periodically (every six months during the guarantee period as specified) to ensure that level of mulch has been maintained.

**Method of Measurement.** MULCH will be measured per square yard. All materials required to provide and install shredded hardwood bark mulch shall be considered incidental to this item.

**Basis of Payment.** MULCH will be paid for at the contract price per square yard, which price shall include furnishing and installing the hardwood bark mulch as specified, and all materials, equipment and labor necessary to complete the work. Also included with these items is all initial maintenance as described.

**PAVEMENT MARKING (SPECIAL)**

**Description.** This work shall consist of furnishing and applying green methyl methacrylate pavement markings in accordance with Section 780, per Manufacturer’s recommendations, and as modified herein.

**Materials.** Replace Article 780.02 with the following.

“Materials shall be Methyl Methacrylate Area Marking with Anti-Skid as manufactured by one of the following:

1. CycleGrip<sup>®</sup>MMax by Ennis-Flint Inc
2. Color-Safe<sup>®</sup> by Transpo Industries Inc.
3. Sher-Endure<sup>™</sup> by Sherwin-Williams Company

Color shall meet the following.

1. The daytime chromaticity coordinates for the color used for green colored pavement shall be as follows:

1		2		3		4	
x	y	x	y	x	y	x	y
0.230	0.754	0.266	0.460	0.367	0.480	0.444	0.583

The daytime luminance factor (Y) shall be at least 7, but no more than 35.

Skid/Slip Resistance: The surface of the material shall contain anti-skid elements with a minimum hardness of 7 (Mohs scale). Upon application the material shall provide a minimum skid resistance value of 60 BPN when tested according to ASTM E 303. Glass beads shall not be used.

**Method of Measurement.** Replace Article 780.12 (b) with the following.

“(b) Measured Quantities. Markings will be measured in square feet.”

**Basis of Payment.** Replace Article 780.13 with the following.

“This work will be paid for at the contract unit price per square foot of applied area, as specified, for PAVEMENT MARKING (SPECIAL).”

**PAVEMENT MARKING REMOVAL (SPECIAL)**

**Description.** This work shall consist of equipment, labor and disposal of removing the Temporary Pavement Marking tape type IV in accordance with Section 780.

Refer to Maintenance of Traffic plans for locations of Temporary Pavement Marking Tape Type IV and staging use.

**Basis of Payment.** This work will be paid for at the contract unit price per square foot of applied area, as specified, for PAVEMENT MARKING REMOVAL (SPECIAL).

**CURB AND GUTTER (SPECIAL)**

**Description.** This work consists of the installation of new curb and gutter of a type similar to that which is existing as well as curb and gutter which is called out as mountable curb and gutter on the plans, in accordance with the applicable portions of Sections 420, 442, 440, 606, and 1000 of the Standard Specifications and as directed by the Engineer.

The Contractor shall machine-saw a perpendicular clean joint between that portion of the curb and gutter to be removed and that which is to remain in place. If the Contractor removes or damages the existing curb and gutter outside the limits designated by the Engineer for removal and replacement, he/she will be required to remove and replace that portion at his/her own expense to the satisfaction of the Engineer. The PCC mix shall be high-early.

**Method of Measurement.** The work shall consist of furnishing and installing 24" long, #5 epoxy coated tie bars in existing Portland Cement Concrete (PCC) bases where new PCC Curbs and Gutters and new PCC Bases are poured against existing PCC Bases at locations shown on the Plans and as designated by the Engineer.

**Basis of Payment.** This work will be paid for at the contract unit price per linear foot for CURB AND GUTTER (SPECIAL) which shall include all labor, material and equipment necessary to install the curb and gutter including the saw cutting, as specified herein.



**SAND CUSHION, 3”**

**Description.** Work under this item shall be performed according to Section 311 of the IDOT Standard Specifications for Road and Bridge Construction, except as herein modified.

This work shall consist of placing sand cushion of 3” nominal depth beneath proposed sidewalks, driveways, or other appurtenances as directed by the ENGINEER on the City of Chicago side of the project.

**Materials.** Materials shall be a fine aggregate meeting the requirements of Article 1003.04.

**General Requirements.** If unstable or unsuitable subbase conditions are encountered after excavation to proposed subbase elevations, the Commissioner may require removal and replacement of this unsuitable material with sand cushion.

**Construction Requirements.** The method for placement and compaction of the sand cushion shall be to the satisfaction of the Commissioner.

**Method of Measurement.** This work will be measured for payment in place in cubic yards.

**Basis of Payment.** This work will be paid for at the contract unit price per cubic yard for SAND CUSHION, 3”.

## **BENCHES**

**Description.** This work shall consist of furnishing and installing benches at the locations specified in the Contract plans or as directed by the Engineer.

**General Requirements.** Each bench will be placed at the location indicated in the plans. The locations will be field marked and verified for approval by the Engineer.

### ASSEMBLY

Anchor bolts must be located with assembled bench in place. Benches must be mounted as detailed in the plans. Anchor bolts must be drilled and grouted into the concrete base for pavers, concrete wearing surface or concrete sidewalk. Once installed, anchor bolts must be field painted to match bench color/gloss.

### MATERIALS

Materials must be as specified in the plans and must be "Gloss Black" in color, Standard 6 Foot Length with Center Armrest by the following suggested manufacturers:

Victor Stanley, Inc.  
Wausau Tile, Inc.  
Trystan, Inc.

See plans for details.

FINISH- Finish must be powder coating or similar coating process.

### SUBMITTALS

Submit manufacturer's technical data for each manufactured product, including certification that each product complies with the specified requirements. In accordance with the Standard Specifications, the Contractor must submit shop drawings for the Engineer's approval showing the bench completely assembled including shop drawings of its component parts. Submit color sample.

**Method of Measurement.** BENCHES will be measured in place per each unit installed.

**Basis of Payment.** The work under this item will be paid for at the contract unit price per each BENCHES, which price will include labor, anchor bolts and bolt installation, equipment, materials and incidental work necessary to complete the installation as specified.

## **BICYCLE RACKS**

**Description.** This item shall consist of furnishing and installing new bicycle racks.

**General Requirements.** Contractor is responsible for furnishing and installing of new bike racks according to the standard details in the construction plans, and for any damage incurred to racks during installation.

RACK: To be as specified in the detail drawings.

**Materials.** Bicycle Rack - The bicycle rack must be fabricated from square Domestic (U.S. manufactured) Steel tubing, in accordance with ASTM A500 Grade B, 2" X 2" in size with 0.25" wall mechanical and structural mild steel tubing. The tubing must be bent in a one piece width as shown on the contract documents. The bicycle racks must not be welded in sections. Only the base plate must be welded to the steel tubing by using stainless steel A.C.D.C. 309L 16 or 17 electrode rod for welding. Color of the coating must be "Gloss Black".

The coating must be applied only after the bicycle rack has been fabricated.

The final product will be rejected if the coating cracks, ripples in the curved areas or is otherwise damaged due to the fabrication and/or shipping.

Fastener-Expansion anchor to be stainless steel mushroom head spike, 1/2" x 4", as per manufacturer's recommendations.

Base plates - Base plates must be fabricated from Domestic (U.S. manufactured) Stainless Steel, 3/8" thick, in accordance with ASTM-T-304.

### **Coating of Bicycle Rack**

#### **Steel:**

Shot blast to near white steel.  
Iron phosphate pre-treatment.

#### **Primer:**

Thermosetting epoxy powder coating (Corvel Zinc Gray 13-7004).  
Electrostatic application, cure schedule approximately 6 minutes at 250 degrees.  
Thickness 1.8 - 10 mils.

#### **Topcoat:**

Triglycidyl Isocyanurate (TGIC) Polyester powder coating.  
Electrostatic application cured in oven for approximately 20 minutes at 250 degrees.  
Total coatings: 8-10 mils.  
Finish color to be black.

Submittals. Bicycle Rack- Shop drawings or catalog cut. Fastener - Catalog cut.

Certifications. Submit manufacturer's certification that the tubing and coatings meet the project specifications.

Prior to production, the manufacturer of the bicycle racks is to submit certification that the steel to be used is in compliance with the "Steel Products Procurement Act" as described in Article 112.11 of the Special Conditions.

Samples: Submit 3-12" long samples of the tubing with finish coat/color and 4 fasteners.

Installation: Bicycle Racks must be located according to the plans and as designated by the Engineer. Fastening of the bicycle rack must be surface mounted on concrete only. Locations of racks to be verified in the field. Drilling through rebar, furnishing electricity and shims are incidental to bicycle rack installation. Siting of racks will be coordinated at the end of the job with the Engineer.

**Method of Measurement.** BICYCLE RACK will be measured per each bike rack.

**Basis of Payment.** BICYCLE RACKS will be paid for at the contract unit price for each bicycle rack, which will include furnishing and installing new racks with mounting hardware.

**DRILL AND GROUT #6 TIE BARS**

**Description.** This item shall consist of the drilling, grouting, providing tie bar and installation of tie bars as directed by the ENGINEER for the PCC patches. All requirement equipment and material shall be included and shall be in accordance with Section 442 of the Standard Specifications.

**Method of Measurement.** This work shall be measured per EACH DRILL AND GROUT #6 TIE BARS.

**Basis of Payment.** The work shall be paid for at the contract unit price each for DRILL AND GROUT #6 TIE BARS.

**PARKING METERS TO BE REMOVED**

**Description.** This item of work shall consist of the equipment, material and labor to remove and dispose of parking meters as described in the plans per City of Evanston standard.

The Contractor shall notify the City Parking Department 7 calendar days in advance of his scheduled removal. The Contractor shall not remove any meters until the City has removed the meter heads. The Contractor shall not remove or handle meter heads. All removed items not salvaged by the City shall be legally disposed of by the Contractor.

**Method of Measurement and Basis of Payment.** This work will be paid for at the contract unit per each PARKING METERS TO BE REMOVED.

**STRUCTURAL REPAIR OF CONCRETE (SPECIAL)**

**Description:** Repair damaged sections of planter to match existing on planters on the south leg of the intersection of Howard and Damen. Precast Concrete panels sit on cast in place concrete base. Concrete panels comprise of 4 types of panels. All material, labor and equipment to perform the repair shall be included in pay item.

Main scope will comprise of the following:

1. Provide shop drawings showing caulk, seal, dimensions, and medallion dimensions for project approval. Shop drawings must show how panels will be secured to cast in place base
2. Submit material samples ensuring match of existing color and finish
3. Protect existing to remain trees
4. Remove existing mortar from cast in place concrete base
5. Repair waterproof membrane and weep holes
6. Install system to secure precast panels to cast in place base
7. Install new precast panels and corresponding medallions
8. Restore landscaping and remove tree protection

The producer of the precast panels shall be on the Illinois Department of Transportation's current "Qualified Producer List of Certified Precast Concrete Producers."

**Method of Measurement.** This work shall be measured per square foot of STRUCTURAL REPAIR OF CONCRETE (SPCIAL).

**Basis of Payment.** Payment shall also be made at the Contract unit price per SQUARE FOOT of STRUCTURAL REPAIR OF CONCRETE (SPECIAL).

## **PRESSURE CONNECTION TO EXISTING WATERMAIN**

**Description.** The Contractor shall perform pressure connections to the existing water main at locations shown on the drawings. These connections shall be made without taking the existing water main out of service. This work shall be performed in accordance with the details in the plans and in accordance with Section 46 of the Standard Specifications for Water and Sewer Main Construction (Latest Edition), except as revised herein.

Dewatering, if required, shall be considered included in the cost of PRESSURE CONNECTION of specified size. For water main extensions and water services greater than 2-inch, tapping sleeves are required which shall be CST-EX "Total Seal" Extra Heavy Duty all stainless steel tapping sleeve with drop-in stainless-steel bolts and nuts as manufactured by Cascade Waterworks Manufacturing. Tapping valves shall be as specified under Article 561.02 Subparagraph (c.) and shall be secured using stainless steel T-bolts and nuts. Tapping sleeves shall be located a minimum of two feet clear distance from any existing joint or fitting.

The Contractor shall obtain the necessary materials required to make a proper connection. The Contractor shall not proceed until he has all the required materials on site.

Once the new water mains have been tested, chlorinated and approved for service then the Contractor shall, under the direction of the Engineer, place the new water main in service.

**Method of Measurement.** This work shall be measured per each PRESSURE CONNECTION TO EXISTING WATERMAIN.

**Basis of Payment.** Payment shall also be made at the Contract unit price per EACH for PRESSURE CONNECTION TO EXISTING WATER MAIN, of the size specified.



**STORM SEWER (WATER MAIN REQUIREMENTS), 12”**

**Description.** This work shall consist of constructing combined, relief, and storm sewers of the required inside diameter with necessary fittings and appurtenances in accordance with Section 550 of Standard Specifications except as revised herein.

Relief sewers 24-inch and larger. Reinforced concrete sewer pipe having a laying length of not less than 7 feet. Special short lengths shall be provided for use in making closures and meeting manholes. Pipe shall meet the requirements of ASTM C-76, latest revision, “Reinforced Concrete Culvert, Storm Drain and Sewer Pipe”, be of the strength classification designated on the Contract Drawings, and otherwise meet this specification. Contractor shall design and submit details pertaining to the pipe sizes and pipe classifications which are not adequately detailed in ASTM C-76 to the Engineer for approval. Pipe shall be circular with circular reinforcement wall-type B or C and Type I Cement plus fly ash. The pipe will be subjected to field inspection by the Engineer. All tests shall be made in accordance with ASTM C-76. All pipes shall have bell and spigot ends. Spigot ends shall be grooved to accommodate a watertight rubber “O-Ring” type joint gasket meeting the provisions of ASTM C-443. The gasket sealing the joint shall be made of natural rubber having a texture to assure a watertight and permanent seal and shall be the product of a manufacturer having at least five year’s experience in the manufacture of rubber gaskets for pipe joints. The gasket shall be a continuous ring, of suitable circular cross-section and of such size as to make the joint watertight when the pipes are held. The rubber gasket shall have a reasonably smooth surface free from pitting, blisters, porosity and other imperfections, meeting the requirements of ASTM C-443, latest revision. Lifting holes shall not be permitted on pipes less than 84-inch diameter.

Combined sewers 4 to 15 inches in diameter and more than 5 feet deep; relief sewers 4 to 15 inches in diameter and more than 5 feet deep; and sanitary service connection piping other than specified in Paragraph d following - Poly-vinyl chloride (PVC) pipe conforming to ASTM D-3034 having joints conforming to ASTM D-3212. Pipe shall be a solid wall product not thinner than SDR 26 with minimum stiffness of 115 psi. Where minimum separation requirements between sewer pipe and water main are not met, the use of Poly-vinyl chloride (PVC) pipe conforming to AWWA C-900 and rated for 150 psi (DR18) having joints conforming to ASTM-3139 and ASTM F-477 is required.

Combined sewers 16 to 24 inches in diameter and more than 5 feet deep; and, relief sewers 16 to 24 inches in diameter and more than 5 feet deep (alternate bid item) - Poly-vinyl chloride (PVC) pipe conforming to ASTM F-679 having joints conforming to ASTM D-3212 and a solid wall not thinner than SDR26 with minimum stiffness of 115 psi may be used in lieu of DR25 pipe at Contractor's option. Where minimum separation requirements between sewer pipe and water main are not met, the use of Poly-vinyl chloride (PVC) pipe conforming to AWWA C-905 and rated for 165 psi (DR25) having joints conforming to ASTM-3139 and ASTM F-477 is required.

Catch basin and inlet leads; relief sewers 4 to 24 inches in diameter and 5 feet or less in depth or where indicated on drawings; sanitary sewer service connection piping crossing under other utilities; and, combined sewers 4 to 24 inches in diameter where indicated on drawings - Ductile iron pipe conforming to ANSI 21.51 (AWWA - C151); of a minimum thickness Class 50 as designed per ANSI A21.50 (AWWA - C150) except as designated on the Contract Drawings; tar (seal) coated per ANSI A21.4(AWWA - C104); and, with push-on joints per ANSI A21.11(AWWA - C111).”

The width and depth of trench excavation for all pipes shall be as shown on the Drawings. Along the proposed pipe alignments indicated on the Drawings, Contractor shall remove the surface materials only to such widths as will permit a trench to be excavated, which will afford sufficient room for efficient and proper construction. Where sidewalks, driveways, pavements, and curb/gutter are encountered, care shall be taken to protect such against fracture or disturbance beyond these working limits.

Prior to the placement of all pipe, bedding shall be placed on the trench bottom, compacted and shaped to receive the pipe. Bedding shall consist of gravel or crushed limestone conforming to CA-11 of Section 1004 for RCP and DIP sewers, and ASTM D2321 Class IB for PVC Sewers. Geotextile filter fabric, DuPont SF 40, shall be provided to encase the pipe bedding and initial pipe cover in trenches through wet, soft, and/or granular native soils and elsewhere as directed by Engineer.

The trench shall be excavated to the alignment and depth required and may be advanced up to 50 feet ahead of the pipe laying operation during working periods and up to 20 feet ahead of pipe laying operations during non-work periods. Trenching operations shall be terminated at the end of each day's work in locations which do not obstruct roadways, alleys or driveways. In general, the length of open trench shall not exceed 70 feet from the forward cut to the completely backfilled trench nor shall more than one street crossing be obstructed by the same trench at any one time. Open cut excavations shall be reduced to a maximum length of 30 feet for overnight protection.

Roadway restoration activities, except installation of final HMA surface course, shall be carried out such that no more than 1,000 lineal feet of permanent roadway is removed at any one time for each open-cut pipe installation operation; no more than 1,000 feet of permanent roadway is removed per active mainline sewer or water main installation crew; and, such that the period that the permanent roadway removed at any location does not exceed thirty (30) calendar days, without the approval of the Engineer. In no case, however, shall the total length of permanent roadway removed exceed 2,500 lineal feet regardless of the number of open-cut sewer or water main construction operations (active mainline crews) underway. Roadways shall be reinstated as soon as possible after sewer and water main installation.

Contractor shall conduct dewatering as necessary to maintain the water table level below the trench bottom prior to and during pipe laying, jointing and backfilling. The dewatering operation, however accomplished, shall be carried out so that it does not destroy or weaken the strength of the soil under or alongside the trench.

Contractor shall divert all sanitary flow around the construction area by means of flumes or temporary by-pass pumping systems. Pumping shall be sufficient such that no backing up of sanitary flow will occur. Contractor shall be responsible for all damage resulting from negligence in creating restrictions to flow within the sewer system. Contractor shall not interrupt the flow from individual sanitary services for more than four hours. Sanitary flows shall not be diverted into catch basins or relief sewers.

Open-cut trenches shall be supported as required to fully protect life, existing utilities, adjacent structures, pavements, and the Work. Trench support is an integral part of the Contractor's means and methods. The Contractor shall employ the services of a registered (Illinois) Structural Engineer, registered (Illinois) Professional Engineer, Geotechnical Engineer, and other professionals as necessary to prepare designs of support systems. The support systems shall conform to Federal laws, State laws and municipal ordinances. The minimum protection shall conform to the recommendations in O.S.H.A. Safety and Health Standards for Construction. A sand box or trench shield may be used as permitted by O.S.H.A.

For sewers located in unpaved areas, augering construction shall be made where the sewer passes within a distance of tree diameter times 8 or 8 feet, whichever is greater, from trees. For sewers located in paved areas, augering construction shall be made where the sewer passes within a distance of tree diameter times 5 or 8 feet, whichever is greater, from trees. The auger shall be approximately 6 inches larger than the outside diameter of the pipe bell and extend not less than 10 feet or as shown on drawings, whichever is greater, from the base of the tree in both directions. The annular space between pipe and auger wall shall be filled with granular material. Augering work shall be considered included in the cost of the construction of sewers and no separate payment shall be made."

Sewers designated on the Drawings to be abandoned shall be filled with Controlled Low- Strength Material (CLSM), unless otherwise specified by the Engineer. CLSM shall meet the following requirements:

CLSM shall consist of a mixture of portland cement, fly ash, fine aggregate, and water proportioned to provide a backfill material that is self-compacting and capable of being excavated with hand tools if necessary at a later date. All materials shall meet the following requirements:

Portland Cement, Type I    Section 1001  
Water    Section 1002

Fine Aggregate (Natural Sand) Section 1003.02  
Fly Ash Section 1010.02

Proportioning. Materials for CLSM shall be proportioned as follows:

Portland Cement 50 lbs.  
Fly Ash 300 lbs. (if Type F) or 200 lbs. (if Type C) Fine Aggregate  
(Saturated Surface Dry) 2900 lbs.  
Water 45-65 gallons

These quantities will yield approximately one cubic yard of CLSM of the proper consistency. The flowability shall be observed by the Engineer and the water content adjusted within the specified limits to produce desired results. The CLSM shall be ready-mixed as specified in Section 1020.11 of the Standard Specifications. Sufficient mixing capacity shall be provided to permit the CLSM to be placed without interruption. The mixer drum shall be completely emptied prior to the initial batch of CLSM to ensure that no additional cement fines are incorporated into the mix.

Placement. The CLSM shall be discharged directly from the truck into the space to be filled, or by other methods approved by the Engineer.”

Laying of sewer pipe shall be accomplished to line and grade in the trench only after it has been dewatered and the foundation and/or bedding has been prepared. Mud, silt, gravel, and other foreign material shall be kept out of the pipe and off joint surfaces. All pipe laid shall be retained in position so as to maintain alignment and joint closure until sufficient backfill has been completed to adequately hold the pipe in place.

Pipe alignment shall not deviate by more than 0.5 inch or 0.25 inch per foot of diameter, whichever is greater, from true vertical alignment; or 2.0 inches or 0.5 inch per foot of diameter, whichever is greater, from true horizontal alignment, prior to and following placement and compaction of backfill. Sewers found to vary from these alignment criteria shall be excavated and relayed or otherwise corrected as approved by the Engineer.

Contractor shall check line and grade of each pipe section installed with laser beam; and, in the event they do not meet specified limits described hereinafter, the work shall be immediately stopped, the Engineer notified, and the cause remedied before proceeding with the Work.

Installation of PVC sewers shall conform to ASTM D2321. After installing any sewer on the bedding and the joint made, backfilling to one foot above the crown of the pipe shall be placed to form a granular encasement. The pipe shall be laid so that it will be uniformly supported for the entire length of its pipe barrel fully bearing on the aggregate cradle. No blocking of any kind will be permitted to adjust the pipe to grade.

All branch sewer connections shall meet the structural, jointing, and water-tightness requirements for the mainline pipe to which they are made. Break-in-connections will not be allowed. Connections of pipe 18-inches in diameter or smaller to RCP may be made using cast- in or cored-in flexible couplings meeting ASTM C-923, or precast wye or tee fittings as approved by Engineer. Connections of pipe larger than 18-inch diameter to RCP shall be with pre-cast wye or tee fittings as approved by Engineer. Connections to PVC or DIP shall be made using factory-made wye or tee fittings. Tapping saddles may NOT be used for connections to PVC pipe. Connections may be tees or wyes at Contractor's option, unless shown otherwise on the Drawings. All fittings shown on plans and necessary offsets due to any conflicts are included in unit price of these pay items.

Plugs for pipe branches, stubs, or other open ends, which are not to be immediately connected, shall be made of an approved material and shall be secured in place with a joint comparable to the main line joint. Stoppers may be of an integrally cast breakout design.

“Non-Shear” couplings as manufactured by Fernco Inc. shall be used for connections of new pipe to existing pipe, and where dissimilar pipe and joint materials are encountered. No stainless steel shear rings will be allowed.

Covering of the pipe to a depth of one-foot over the top of the pipe shall be performed by a method which assures that materials fill and support the haunch areas of the pipe, encasing the pipe to the limits as indicated. The aggregate shall be placed in layers not exceeding six inches (6”) in thickness and carried up at the same levels on both sides of the pipe. Each layer shall be thoroughly compacted and tamped under and around the pipe.

Cover and backfill shall be compacted in accordance with Method 1 or Method 3, and shall achieve a Standard Proctor Density of not less than 95 percent as tested in accordance with Section 106. To facilitate compaction by Method 3, the Contractor shall provide a well point/pump system, sump pits and pumps, or other proactive procedures approved by the Engineer for extracting the water used for backfill compaction from the pipe bedding material. The spacing between extraction points shall be sufficient to assure adequate water velocities for the jetting process and to assure that the backfill and/or bedding will not become over-saturated such that compaction is lost. In any case, jetting water extraction points shall be located not more than 400 feet apart.

Following completion of the backfilling process, the final layer of backfill shall also be inundated with water in accordance with Method 2. The Contractor shall repair any subsidence which occurs prior to paving by adding additional backfill material and compacting in accordance with Method 1.

Contractor shall repair any subsidence greater than 1½ inches which occurs following paving by removing paving, installing additional backfill, compacting in accordance with

Method 1, and re- installing paving. Contractor shall repair any subsidence 3-inches or less which occurs following base course paving by installing additional leveling binder immediately prior to installation of the bituminous surface course. Contractor shall repair any subsidence, which occurs following installation of bituminous surface course by installation of additional surface course. The unsettled pavement surrounding the subsidence area shall be milled to a depth of 1½ inches for at least the full lane width each way of the subsidence transverse to the direction of traffic and 20- feet each way of the subsidence longitudinal to the direction of traffic. Concrete pavement displaced more than ½ inch by subsidence shall be removed and replaced to the nearest contraction joints, expansion joints, curbs, or transitions to other pavement types, as applicable. The cost of correcting subsidence, including additional paving, shall be borne by the Contractor at no additional cost to the Owner, whether that subsidence is caused by the Contractor's failure to adequately compact backfill or otherwise perform the Work, or is inherent in the construction methods utilized, including tunneling.”

Contractor shall be responsible for all on-site and off-site testing for the Work performed under this Section. Contractor shall retain the services of an independent certified testing laboratory to perform all testing. All testing shall be in accordance with Section 106 of this Specification and the Standard Specifications. Copies of all on-site and off-site test reports shall be submitted to the Engineer. Certified test reports will be acceptable for material proposed to be incorporated into the Work; however, final acceptance will be based on the material as it is actually incorporated into the Work. Testing shall including the following:

**Pre-construction and Post-construction Sub-surface Videotaping.**

Prior to commencing construction and following completion of construction, Contractor shall conduct a closed-circuit internal television inspection of existing mainline combined, storm and sanitary sewers along the routes of the proposed relief sewer, combined sewer, and water mains. The purpose of the televising is to document the condition of the existing sewers prior to the start of construction and any change in condition which occurs as a result of construction. Following completion of sewer and water main installation, infiltration/exfiltration testing, backfill compaction testing, and deflection testing, but before final restoration and placing sewers in service, the Contractor shall conduct an internal television inspection of all new mainline sewers 48 inch in diameter or smaller. Inspection of new mainline sewers shall be performed in the presence of the Engineer.

The closed circuit camera and other televising equipment used shall be specifically designed for sewer line inspection. The camera shall be cable drawn. The camera shall be high-resolution color and shall be equipped with a lighted, pivoting head to view branch connections. For sewers 24-inches and larger, the camera shall be mounted on an appropriately sized skid so that the camera is centered in the sewer. Camera pull speed through the mainline pipe shall not exceed 30 feet per minute, the camera should be paused at every connection, and the camera panned to view the full interior of the

connection. Crawler-type cameras shall not be used unless the sewer cannot be televised using cable drawn equipment, such as dead-end sewers or sewers so obstructed that pulling cables cannot be installed. If, during the internal inspection, the camera cannot pass through the entire sewer from a single set-up, the sewer internal inspection shall be completed using a reverse set-up from an adjacent manhole. If the sewer cannot be inspected over the remainder of its full length using the reverse set-up, Contractor shall notify the Engineer immediately while the camera remains in the sewer.

Contractor shall record the internal inspection on DVD format. Each DVD made shall be labeled "City of Evanston, 2020 Water Main Improvements, PW-WMRS-1503" and shall be consecutively numbered. An index of each DVD shall be provided which includes tape number, street/alley location (including names of end-blocks), beginning manhole number, ending manhole number, length of sewer, diameter of sewer, beginning and ending tape counter numbers. Contractor shall utilize the Owner's manhole numbering system (available through Engineer) to identify the existing sewer sections televised. For post-construction inspection of new sewers, the manhole numbering system shown on the Drawings, prefaced by " City of Evanston, 2020 Water Main Improvements, PW-WMRS-1503" or other project designation, shall be utilized. The upstream manhole number, downstream manhole number and footage from beginning manhole shall be superimposed on the video image.

Contractor shall also prepare a written report for each section of sewer televised. Each report shall be labeled "City of Evanston, 2020 Water Main Improvements, PW-WMRS-1503" and shall be coordinated with the DVD. For each sewer section televised, the report shall include: date of inspection, DVD reference number including counter readings, street location (including names of end-blocks), beginning manhole number, ending manhole number, length of sewer, diameter of sewer, and pipe material. The report shall note the locations (as a distance from the beginning manhole) the locations, orientations (o'clock position) and appropriate size parameters of: service and other connections; pipe defects, such as cracks, offsets, sags, deformations and break-in connections; water infiltration; mineral, grit, and grease build-ups; root intrusions; and, other irregularities.

**Backfill Compaction.** During the installation of Case I backfill material, the Contractor shall conduct density testing specified in Article 550.07 in accordance with Section 106. The cost of testing shall be included in the cost of storm sewer, water main, relief sewer and combined sewer installation and no separate payment shall be made.

**Infiltration/Exfiltration Testing.** Contractor shall conduct infiltration testing of each manhole-to-manhole section of relief sewer after the pipe is installed and backfilled, but before street paving operations commence. If Contractor elects to compact backfill by jetting (Article 550.07 - Method 3), then the infiltration test shall be performed during the jetting operation. Where the depth of the ground water is less than 24 inches over the

crown of the pipe at the upstream section to be tested, an exfiltration test shall be used in place of an infiltration test.

Infiltration tests shall be made by measuring the flow of infiltrating water over a calibrated weir set up in the invert of the sewer. Personnel for reading flow measuring devices will be furnished by the Engineer, but all other labor, equipment, material and water, including gauges and meters, will be furnished by the Contractor.

Exfiltration tests shall be made by bulk-heading the section to be tested and completely filling the subject sewer. The bulkheads shall be watertight and shall be adequately braced to withstand the head of water pressure that will be applied in the testing process. As such, the Contractor shall employ the services of a Registered (Illinois) Structural Engineer for bulkhead and bulkhead bracing design. The exfiltration test shall be conducted by filling the sewer to a level four feet above the crown of the sewer in the manhole at the upper end of the section being tested. The rate of flow required to keep this required level will be the exfiltration. Tests shall be conducted for at least two hours.

No additional pipe shall be laid until the infiltration/exfiltration test on each manhole-to-manhole section of pipe meets specified limits following:

Exfiltration: 100 gallons per day per inch of pipe diameter per mile of sewer.

Infiltration: 100 gallons per day per inch of pipe diameter per mile of sewer. No visible leaks which endanger the pipe or surrounding bedding/ backfill.

If the specified infiltration/exfiltration limits are exceeded, the Contractor shall televise or internally inspect the sewer in the presence of the Engineer to identify the source(s) of the leakage. Contractor shall immediately make all repairs and/or replacements necessary to achieve the specified infiltration/exfiltration limits. After all repairs are made, the Contractor shall again make an infiltration or exfiltration test. All costs of internal inspection to locate leakage sources, other testing and pipe correction shall be borne by the Contractor at no additional cost to the Owner.

Deflection Testing. For PVC pipes, a deflection test shall also be performed as described in the Standard Specifications for Water and Sewer Construction in Illinois. The maximum permitted deflection shall be 5 percent. Those pipe sections failing deflection testing shall be corrected by re-excavating the pipe, allowing the pipe to return to its circular cross- section (or replacing the pipe if necessary), and replacing the pipe cover and backfill. Devices that generate internal pressures or vibrations shall not be used to correct pipes failing the deflection test. The cost for deflection testing and pipe correction shall be included in the prices bid for Sewer Items. No additional payment will be made for deflection testing or correction of defects located.

Internal Television Inspection: Following completion of open-cut sewer installation, infiltration/exfiltration testing, backfill compaction testing, and deflection testing, but



before final surface is installed, the Contractor shall conduct an internal television inspection of all mainline sewers installed. The television camera used shall be high resolution color, shall be equipped with a revolving head capable of viewing up service connections, and shall be equipped with a footage counter which records on the videotape. For televising pipes 54-inches and smaller, the camera shall be stopped at each lateral connection and the camera head rotated to give a full view of the interior of the lateral. DVD format shall be made of the internal inspections and given to the Owner. The cost of televising the Relief Sewer, Combined Sewer, Storm Sewer, Sanitary Sewer, shall be considered included in the cost of each SEWER item. No additional payments will be made for this work.

**Method of Measurement.** This work will be measured per LINEAR FOOT of STORM SEWER (WATER MAIN REQUIREMENTS), of the type and diameter specified.

**Basis of Payment.** This work will be paid according to Article 550.10 of the Standard Specifications, per LINEAR FOOT of STORM SEWER (WATER MAIN REQUIREMENTS), of the type and diameter specified.

## **REMOVAL AND DISPOSAL OF REGULATED SUBSTANCES**

**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.

### Site #1 HOWARD STREET

- Station 54+70 to Station 57+10 from 20 feet LT to 0 feet LT. This material meets the criteria of Article 669.05(a)(5) and shall be managed in accordance to Article 669.05. Potential contaminants of concern sampling parameters: VOCs, SVOCs and Metals.

### Site #2 HOWARD STREET

- Station 97+10 to Station 99+85 from 23 feet LT to 2 feet LT. This material meets the criteria of Article 669.05(a)(5) and shall be managed in accordance to Article 669.05. Potential contaminants of concern sampling parameters: VOCs, SVOCs and Metals.

### Site #3 HOWARD STREET

- Station 103+25 to Station 108+35 from 10 feet RT to 24 feet LT. This material meets the criteria of Article 669.05(a)(5) and shall be managed in accordance to Article 669.05. 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**

Additional information on the above sites is available from the City of Evanston.

**TREES, (SPECIAL)**

**Description.** This work shall consist of furnishing, transporting, and planting trees as called out and shown on the landscape plans. The work shall also include the preparation of subsoil, placing of topsoil, planting, mulching, fertilizing and maintenance. This work shall be completed as detailed in the plans.

This work shall be in accordance to Section 253 and as modified herein/

Species shall be as shown in the plans.

**Method of Measurement.** This work will be measured per EACH of the type specified.

**Basis of Payment.** This work will be paid according to Article 253 of the Standard Specifications, per EACH for TREES, (SPECIAL) of the type specified.

## **TREE TRANSPLANT**

This work consists of digging, transporting, and planting recently installed trees.

The trees designated by the Engineer to be salvaged shall be removed and immediately replanted as directed by the Engineer. Mechanically dug plants must be replanted immediately in their permanent locations and not stored. These trees will be placed within quarter mile of the extraction site at locations staked by the Engineer within the project area.

All work methods, transplanting of salvaged plant material and all other related landscape work shall be done in accordance with Section 253 of the Standard Specifications except as follows:

Article 253.03 - add the following:

Digging and planting times for transplanted trees shall be as required by the Engineer and shall not cause delay of the project.

Planting times for replacement plants shall be as required in Article 253.03.

Article 253.04 - add the following:

Trees to be transplanted shall not be dug more than 24 hours prior to the time the Contractor is ready to transport these materials from their original locations. All trees shall be balled and burlapped or mechanically dug to the sizes specified in the latest American Standard for Nursery Stock. Earth balls of balled and burlapped plant material shall be watered and shall be protected against drying out. Balled plants shall not be left in open holes overnight.

Article 253.09(a) - add the following:

All tree pruning shall be done prior to installation.

Delete Article 253.11 and substitute the following:

Within 48 hours after planting, mulch shall be placed around all plants in the entire mulched bed or saucer area specified to a depth of 4 inches (100 mm). Individual saucer shall be a minimum 3 foot diameter around each tree. No weed barrier fabric will be required for tree and shrub planting. Mulch shall be kept 6" away from the base of the trunk.

Article 253.14 - add to paragraph three the following:

Any transplanted tree which is not acceptable at the time of the Period of Establishment Inspection shall be replaced with a balled and burlapped tree of the same type and size as that which is unacceptable.

Delete the first paragraph of Article 253.15 Plant Care (a) and substitute the following:

During plant care additional watering shall be performed at least every two weeks during the months of May through October. The contractor shall apply a minimum of 35 gallons of water per tree. The Engineer may direct the Contractor to adjust the watering rate and frequency depending upon weather conditions. See specification for Supplemental Watering.

**Method of Measurement:**

Trees to be transplanted shall be measured for payment as each in place at the planting location. A root ball with multiple stems shall be measured as one tree.

**Basis of Payment:**

This work will be paid for at the contract unit price each for TREE TRANSPLANT, which price shall include all labor, equipment, materials, plant care, disposal and incidental required to complete the work as specified herein and to the satisfaction of the Engineer. Watering shall be paid for at the contract unit price for SUPPLEMENTAL WATERING. Payment will be made according to the following schedule.

- a) Initial Payment. Upon completion of transplanting, mulch covering, wrapping, and bracing, 75 percent of the pay item(s) will be paid for trees found to be in a live and healthy condition by May 31st, as specified in Article 253.14.
- b) Final Payment. Upon inspection and acceptance of the plant material, or upon execution of a third party bond, the remaining 25 percent of the pay item(s) will be paid.

**LIDS, TYPE 1 CLOSED LID**

**Description.** This work shall consist of providing and installing lids as directed by the ENGINEER, in accordance with Section 604 of the STANDARD SPECIFICATIONS.

**Method of Measurement.** This work shall be measured per each for LIDS, TYPE 1 CLOSED LID

**Basis of Payment.** This work shall be paid for at the contract unit price each for LIDS, TYPE 1 CLOSED LID.

**WATERMAIN LINE STOP 8”**

**Description.** This work consists of watermain line stop in accordance with Section 561 of Standard Specifications for Road and Bridge Construction (latest edition), except as revised herein.

"Where shown on the Drawings, Line Stopping shall be performed. This work shall involve the placement of a self-contained hydraulic unit within an operating water main for the purpose of installation of a valve and/or other connection with the existing system without interruption of service."

Line Stops. The line-stop unit shall be a self-contained hydraulic (hand pump operated) ram. The line-stopping device shall be of such a design that, when hydraulic pressure is applied, the bladder will expand and conform to the I.D. of the pipe and tuberculation inside the main (if any) will be moved outside of the sealing area.

The line-stop shall be of the 'Short Stop' variety, which will require removing only the top of the pipe during the operation. All fittings shall employ an I.D. thread, screw-type engagement together with O-Ring seal for bubble-tight completion. After insertion of plug, a screw-on cap will be used and bolted down. The system shall be capable of containing a water pressure of 150 psi. The line-stopping system shall be Hydro-Stop. Line-stop sleeves shall be Style "Evanston Sleeve Total Seal" Extra Heavy Duty as manufactured by Hydro Stop.

**Method of Measurement.** This work shall be measured per EACH WATERMAIN LINE STOP.

**Basis of Payment.** This work shall be paid for at the contract unit price each for WATER MAIN LINE STOP, 8” which price shall include all materials, labor and equipment to complete the work.

Water mains shall be abandoned by saw cutting the main at the point to be abandoned and installing a mechanical joint plug or cap. Bricking and mortaring the main to be abandoned will not be allowed. The Contractor shall be responsible for dewatering the trench, which cost is considered included to the price of WATER MAIN LINE STOP, 8”.

**WATER MAIN CASING PIPE**

**Description.** The casing pipe for the water main shall be PVC C900 water main quality pipe for the size indicated on the plans.

Damaged casing which will result in an unsatisfactory joint when the succeeding section of casing is placed is cause for rejection and shall be replaced.

Provide casing spacers for carrier pipes.

**Method of Measurement.** This work shall be measured per LINEAR FOOT of WATER MAIN CASING PIPE of the diameter specified.

**Basis of Payment.** Water main casing and other necessary accessories to complete water main casing installation will be paid for at the contract unit price per foot for WATER MAIN CASING PIPE, of the size specified.



**CHANGEABLE MESSAGE SIGN, SPECIAL**

**Description.** This work shall consist of providing and installing the changeable message sign throughout the multiple stage and phase duration of this project. This work shall be in accordance with Article 701.

**Method of Measurement.** This work shall be measured per CALENDAR MONTH.

**Basis of Payment.** This work shall be paid for at the contract unit price per CALENDAR MONTH.

## **TRAFFIC SIGNAL GENERAL REQUIREMENTS**

These Traffic Signal Special Provisions and the CDOT 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 CDOT 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 IMSA 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 this 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 Vendor. Company that sells a particular type of product directly to the contractor or the Equipment Supplier.

101.57 Equipment supplier. Company that supplies, represents and provides technical support for approved traffic signal controllers and other related equipment. The Equipment Supplier shall:

- Be full service with on-site facilities to assemble, test and trouble-shoot traffic signal controllers and cabinet assemblies.
- Be staffed with permanent sales and technical personnel able to provide traffic signal controller and cabinet expertise and support.
- Technical staff shall hold current IMSA Traffic Signal Technician Level III certification and shall attend traffic signal turn-ons and inspections with a minimum 14 calendar day notice.

### **Submittals.**

Revise Article 801.05 of the Standard Specifications to read:

All material approval requests shall be submitted to the Resident Engineer, who will then forward the submittal on to the IDOT Local Agency Area Engineer and the Local Agency. Electronic material submittals shall follow the District's Traffic Operations Construction Submittals guidelines. General requirements include:

1. All material approval requests shall be made prior to or no later than one week after 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 requested by the Bureau of Local Roads and Streets, the number of requested sets of the manufacturer's descriptive literatures and technical data for the traffic signal materials shall be submitted.
  5. 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.
  6. When hard copy submittals are necessary for structural elements, four 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.
  7. Partial or incomplete submittals will be returned without review.
  8. 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. The Contractor shall account for the additional review time in his schedule.
  9. The contract number, the name of the lead local agency (as indicated on the cover sheet of the plans), section number, project location/limits and corresponding pay code number must be on each sheet of correspondence, catalog cuts and mast arm poles and assemblies drawings.
  10. 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.
  11. 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 'Information Only'. 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.
12. The Contractor shall secure approved materials in a timely manner to assure construction schedules are not delayed.
  13. All submitted items reviewed and marked 'APPROVED AS NOTED' or 'DISAPPROVED' are to be resubmitted in their entirety, unless otherwise indicated within the submittal comments or transmittal accompanying the documents, with a disposition of previous comments to verify contract compliance at no additional cost to the contract.
  14. 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.
  15. 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.

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 equipment supplier. The Department reserves the right to request any controller and cabinet to be tested at the equipment supplier's facility prior to field installation, at no extra cost to this contract.

Maintenance and Responsibility.

Revise Article 801.11 of the Standard Specifications to read:

- a. Existing traffic signal installations and/or any electrical facilities at all or various locations may be altered or reconstructed totally or partially as part of the work on this Contract. The Contractor is hereby advised that all traffic control equipment, presently installed at these locations, may be the property of the State of Illinois, Department of Transportation, Division of Highways, County, Private Developer, Municipality or Transit Agency in which they are located. Once the Contractor has begun any work on any portion of the project, all traffic signals within the limits of this contract or those which have the item "Maintenance of Existing Traffic Signal Installation," "Temporary Traffic Signal Installation(s)" and/or "Maintenance of Existing Flashing Beacon Installation," shall become the full responsibility of the Contractor. The Contractor shall supply the Resident Engineer, IDOT Local Agency Area Engineer, Local Agency, the Owner of the traffic signal, and/or their Electrical Maintenance Contractor with two 24-hour emergency contact names and telephone numbers.
- b. Automatic Traffic Enforcement equipment such as red lighting running and railroad crossing camera systems are owned and operated by others and the Contractor shall not be responsible for maintaining this equipment.
- c. Regional transit, County and other agencies may also have equipment connected to existing traffic signal or peripheral equipment such as PTZ cameras, switches, transit signal priority (TSP and BRT) servers and other devices that shall be included with traffic signal maintenance at no additional cost to the contract.
- d. When the project has a pay item for "Maintenance of Existing Traffic Signal Installation," "Temporary Traffic Signal Installation(s)" and/or "Maintenance of Existing Flashing Beacon Installation," the Contractor must notify the Resident Engineer, the Local Agency, the Owner of the traffic signal, and/or their Electrical Maintenance Contractor 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. If work is started prior to an 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 no cost to the owner of the traffic signal. 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.

- e. 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 of the Engineer. Approval to shut down the traffic signal installation will only be granted during the period extending from 10:00 a.m. to 3:00 p.m. on weekdays. Shutdowns shall not be allowed during inclement weather or holiday periods.
- f. The Contractor shall be fully responsible for the safe and efficient operation of the traffic signals and other equipment noted herein. Any inquiry, complaint or request by the Department, the Local Agency, the Owner of the traffic signal, and/or their Electrical Maintenance Contractor, or the public, shall be investigated and repairs begun within one hour. Failure to provide this service will result in liquidated damages of \$1000 per day per occurrence. In addition, the Department reserves the right to assign any work not completed within this timeframe to the Electrical Maintenance Contractor. All costs associated to repair this uncompleted work shall be the responsibility of the Contractor. Failure to pay these costs to the Electrical Maintenance Contractor within one month after the incident will result in additional liquidated damages of \$1000 per month per occurrence. Unpaid bills will be deducted from the cost of the Contract. The Department, the Local Agency, the Owner of the traffic signal, and/or their Electrical Maintenance Contractor may inspect any signaling device under their jurisdiction at any time without notification.
- g. 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.
- h. The Contractor shall be responsible to clear snow, ice, dirt, debris or other condition that obstructs visibility of any traffic signal display or access to traffic signal equipment.
- i. The Contractor shall maintain the traffic signal in normal operation during short or long term loss of utility or battery back-up power at critical locations

designated by the Engineer. Critical locations may include traffic signals interconnected to railroad warning devices, expressway ramps, intersection with an SRA route, critical corridors or other locations identified by the Engineer. Temporary power to the traffic signal must meet applicable NEC and OSHA guidelines and may include portable generators and/or replacement batteries. Temporary power to critical locations shall not be for separately but shall be included in the contract.

Damage to Traffic Signal System.

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

Any traffic signal control equipment damaged or not operating properly from any cause shall be replaced with new equipment meeting current CDOT 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 otherwise the traffic signal installation will not be accepted. Cable splices are only allowed at the bases of post and mast arms.

Temporary replacement of damaged or knockdown of a 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.

Automatic Traffic Enforcement equipment, such as Red Light Enforcement cameras, detectors, and peripheral equipment, 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:

It is the intent to have all electric work completed and equipment field tested by the Equipment Supplier 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 road is open to traffic, except as otherwise provided in Section 850 of the Standard Specifications, the Contractor may request a turn-on and inspection of the completed traffic signal installation at each separate location. This request must be made to the Bureau of Local Roads and Streets at (847) 705-4487 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.

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 control equipment vendor's office 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 Agency that is responsible for the maintenance of each traffic signal installation will assume the maintenance upon successful completion of this inspection.

The District requires the following Final Project Documentation from the Contractor at traffic signal turn-ons in electronic format in addition to hard copies where noted. A CD/DVD shall be submitted with separate folders corresponding to each numbered title below. The CD/DVD shall be labelled with date, project location, company and contract or permit number. Record Drawings, Inventory and Material Approvals shall be submitted prior to traffic signal turn-on for review by the Department as described herein.

**Final Project Documentation:**

1. Record Drawings. Signal plans of record with field revisions marked in red ink. One hard copy set of 11"x17" record drawings shall also be provided.
2. Inventory. Inventory of new and existing traffic signal equipment including cabinet types and devices within cabinets in an Excel spread sheet format. One hard copy shall also be provided.
3. Pictures. Digital pictures of a minimum 12M pixels of each intersection approach showing all traffic signal displays and equipment. Pictures shall include controller cabinet equipment in enough detail to clearly identify manufacture and model of major equipment.



4. Field Testing. Written notification from the Contractor and the equipment vendor of satisfactory field testing with corresponding material performance measurements, such as for detector loops and fiber optic systems (see Article 801.13). One hard copy of all contract required performance measurement testing shall also be provided.
5. Materials Approval. The material approval letter. A hard copy shall also be provided.
6. Manuals. Operation and service manuals of the signal controller and associated control equipment. One hard copy shall also be provided.
7. Cabinet Wiring Diagram and Cable Logs. Five (5) hard copies 11" x 17" of the cabinet wiring diagrams shall be provided along with electronic pdf and dgn files of the cabinet wiring diagram. Five 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.
8. Controller Programming Settings. The traffic signal controller's timings; backup timings; coordination splits, offsets, and cycles; TBC Time of Day, Week and Year Programs; Traffic Responsive Program, Detector Phase Assignment, Type and Detector Switching; and any other functions programmable from the keyboard. The controller manufacturer shall also supply a printed form, not to exceed 11" x 17" for recording that data noted above. The form shall include a location, date, manufacturer's name, controller model and software version. The form shall be approved by the Engineer and a minimum of three (3) copies must be furnished at each turn-on. The manufacturer must provide all programming information used within the controller at the time of turn-on.
9. Warrantees and Guarantees. All manufacturer and contractor warrantees and guarantees required by Article 801.14.
10. GPS coordinate of traffic signal equipment as describe 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 the traffic signal. If approved, traffic signal acceptance shall be verbal at the "turn on" 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 final inspection. The Contractor shall notify the Electrical Maintenance Contractor to inspect 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 above requirements 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 above requirements 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 2<sup>nd</sup> paragraph of Article 801.16 of the Standard Specifications to read:

“When the work is complete, and seven days before the request for a final inspection, the reduced-size set of 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 on CDROM as well as hardcopy for review and approval. 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 catalog cuts which have been Approved or Approved as Noted shall be submitted in PDF format along with the record drawings. 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.”

As part of the record drawings, the Contractor shall inventory all traffic signal equipment, new or existing, on the project and record information in an Excel spreadsheet. The inventory shall include equipment type, model numbers, software manufacturer and version and quantities.

Add the following to Article 801.16 of the Standard Specifications:

“In addition to the specified record drawings, the Contractor shall record GPS coordinates of the following traffic signal components being installed, modified or being affected in other ways by this contract:

- All Mast Arm Poles and Posts
- Traffic Signal Wood Poles

- Rail Road Bungalow
- UPS
- Handholes
- Conduit roadway crossings
- Controller Cabinets
- Communication Cabinets
- Electric Service Disconnect locations
- CCTV Camera installations
- Fiber Optic Splice Locations
- Conduit Crossings

Datum to be used shall be North American 1983.

Data shall be provided electronically and in print form. The electronic format shall be compatible with MS Excel. 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 (i.e. TS22157\_15-01-01)
- 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, per the IDOT special provisions

Examples:

Date	Item	Description	Latitude	Longitude
01/01/2015	MP (Mast Arm Pole)	NEQ, NB, Dual, Combination Pole	41.580493	- 87.793378
01/01/2015	HH (Handhole)	Heavy Duty, Fiber, Intersection, Double	41.558532	- 87.792571

01/01/2015	ES (Electrical Service)	Ground mount, Pole mount	41.765532	- 87.543571
01/01/2015	CC (Controller Cabinet)		41.602248	- 87.794053
01/01/2015	RSC (Rigid Steel Crossing)	IL 31 east side crossing south leg to center HH at Klausen	41.611111	- 87.790222
01/01/2015	PTZ (PTZ)	NEQ extension pole	41.593434	- 87.769876
01/01/2015	POST (Post)		41.651848	- 87.762053
01/01/2015	MCC (Master Controller Cabinet)		41.584593	- 87.793378
01/01/2015	COMC (Communication Cabinet)		41.584600	- 87.793432
01/01/2015	BBS (Battery Backup System)		41.558532	- 87.792571
01/01/2015	CNCR (Conduit Crossing)	4-inch IL 31 n/o of Klausen	41.588888	- 87.794440

Prior to the collection of data, the contractor shall provide a sample data collection of at least six data points of known locations to be reviewed and verified by the Engineer to be accurate within 1 foot. Upon verification, data collection can begin. 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 submit the data for review and approval as specified.

Accuracy. Data collected is to be mapping grade. A handheld mapping grade GPS device shall be used for the data collection. The receiver shall support differential correction and data shall have a minimum 1 foot accuracy after post processing.

GPS receivers integrated into cellular communication devices, recreational and automotive GPS devices are not acceptable.

The GPS shall be the product of an established major GPS manufacturer having been in the business for a minimum of 6 years.”

Delete the last sentence of the 3<sup>rd</sup> paragraph of Article 801.16.

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 this Contract requires the services of an Electrical Contractor, the Contractor shall be responsible at his/her own expense for locating existing IDOT electrical facilities prior to performing any work. If this Contract does not require the 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 may be at the expense of the Contractor. For non-IDOT signals, the Contractor shall coordinate with the agency owning the traffic signals for locating the existing electrical facilities. 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.

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

Bagging Signal Heads.

Light tan colored traffic and pedestrian signal reusable covers shall be used to cover dark/un-energized signal sections and visors. 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 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.

**MAINTENANCE OF EXISTING TRAFFIC SIGNAL AND FLASHING BEACON  
INSTALLATION**

General.

1. Full maintenance responsibility shall start as soon as the Contractor begins any physical work on the Contract or any portion thereof. If Contract work is started prior to a traffic signal inspection, maintenance of the traffic signal installation(s) will be transferred to the Contractor without an inspection.
2. The Contractor shall have electricians with IMSA Level II certification on staff to provide signal maintenance. A copy of the certification shall be immediately available upon request of the Engineer.
3. This item shall include maintenance of all traffic signal equipment and other connected and related equipment such as flashing beacons, emergency vehicle pre-emption equipment, master controllers, uninterruptable power supply (UPS and batteries), PTZ cameras, vehicle detection, handholes, lighted signs, telephone service installations, communication cables, conduits to adjacent intersections, and other traffic signal equipment.
4. Regional transit, County and other agencies may also have equipment connected to existing traffic signal or peripheral equipment such as PTZ cameras, switches, transit signal priority (TSP and BRT) servers, radios and other devices that shall be included with traffic signal maintenance at no additional cost to the contract.
5. 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 the local municipality and should be de-activated while on contractor maintenance.
6. The energy charges for the operation of the traffic signal installation shall be paid for by the Contractor.

Maintenance.

1. The Contractor shall check all controllers every two (2) weeks, which will include visually inspecting all timing intervals, relays, detectors, and pre-emption equipment to ensure that they are functioning properly. The Contractor shall check signal system communications and phone lines to assure proper operation. This item includes, as routine maintenance, all portions of emergency vehicle pre-emption equipment. The Contractor shall maintain in stock at all times a sufficient amount of materials and equipment to provide effective temporary and permanent repairs. Prior to the traffic signal maintenance transfer, the contractor shall supply a detailed maintenance schedule that includes dates,

- locations, names of electricians providing the required checks and inspections along with any other information requested by the Engineer.
2. The Contractor is advised that the existing and/or span wire 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 of the Engineer. Approval to shut down the traffic signal installation will only be granted during the period extending from 10:00 a.m. to 3:00 p.m. on weekdays. Shutdowns shall not be allowed during inclement weather or holiday periods.
  3. The Contractor shall provide immediate corrective action when any part or parts of the system 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 on flashing operation. The signals shall flash RED for all directions unless a different indication has been specified by the Engineer. The Contractor shall be required to place stop signs (R1-1-36) at each approach of the intersection as a temporary means of regulating traffic. When the signals operate in flash, the Contractor shall furnish and equip all their vehicles assigned to the maintenance of traffic signal installations with a sufficient number of stop signs as specified herein. The Contractor shall maintain a sufficient number of spare stop signs in stock at all times to replace stop signs which may be damaged or stolen.
  4. The Contractor shall provide the Engineer with 2 (two) 24 hour telephone numbers for the maintenance of the traffic signal installation and for emergency calls by the Engineer.
  5. Traffic signal equipment which is lost or not returned to the CDOT for any reason shall be replaced with new equipment meeting the requirements of the Standard Specifications and these special provisions.
  6. 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 and identical equipment. The cost of furnishing and installing the replaced equipment shall be borne by the Contractor at no additional charge 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 State's Electrical Maintenance

- Contractor perform the maintenance work. The Contractor shall be responsible for all of the State's Electrical Maintenance Contractor's costs and liquidated damages of \$1000 per day per occurrence. The State'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 make reviews of the Existing Traffic Signal Installation that has been transferred to the Contractor for Maintenance.
7. 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.
  8. Equipment included in this item that is damaged or not operating properly from any cause shall be replaced with new equipment meeting current CDOT 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 otherwise the traffic signal installation will not be accepted. Cable splices outside the controller cabinet shall not be allowed.
  9. Automatic Traffic Enforcement equipment, such as Red Light Enforcement cameras, detectors, and peripheral equipment, damaged or not operating properly from any cause, shall be the responsibility of the municipality or the Automatic Traffic Enforcement Company per Permit agreement.
  10. The Contractor shall be responsible to clear snow, ice, dirt, debris or other condition that obstructs visibility of any traffic signal display or access to traffic signal equipment.
  11. The Contractor shall maintain the traffic signal in normal operation during short or long term loss of utility or battery back-up power at critical locations designated by the Engineer. Critical locations may include traffic signals interconnected to railroad warning devices, expressway ramps, intersection with an SRA route, critical corridors or other locations identified by the Engineer. Temporary power to the traffic signal must meet applicable NEC and OSHA guidelines and may



- include portable generators and/or replacement batteries. Temporary power to critical locations shall not be paid for separately but shall be included in the contract.
12. Temporary replacement of damaged or knockdown of a 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.

**Basis of Payment.** This work will be paid for at the contract unit price per each for MAINTENANCE OF EXISTING TRAFFIC SIGNAL INSTALLATION. Each intersection will be paid for separately. Maintenance of a standalone and or not connected 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.

**ELECTRIC CABLE IN CONDUIT, EQUIPMENT GROUNDING CONDUCTOR, NO. 6 1C**

Description. This work will consist of furnishing and installing electric cable as specified. The cable will be installed in conduit underground.

Material. The cable must meet all requirements of Material Specification 1534 of the Bureau of Electricity, City of Chicago.

Construction Method. All cables must be installed with care to prevent damage to the cable. Any defects found in the cable must be reported to the resident engineer. Damaged cable must be replaced.

The cable must be pulled into the conduit with a minimum of dragging on the ground or pavement. This will be accomplished by means of reels mounted on jacks or other suitable devices located for unreeling cable directly into duct. Lubricants must be used to facilitate installation if deemed necessary by the contractor.

Bends in the cable will conform to the recommended minimum radii as outlined in the National Electric Code.

Cable passing through manholes must be trained and racked around the sides of the manhole into a permanent position. If racks are non-existent or in poor condition, the contractor must install racks. The material must be approved by the resident engineer. Any material and labor involved in training and racking the cable will be considered incidental to the cost of this pay item.

Where cable runs continue from manhole to manhole without tapping within a light pole, they will be continuous without splices unless authorized by the resident engineer.

All wire or cable in the distribution panels and control cabinets must be properly trained and have sufficient slack provided for any rearrangement of equipment or future additions. There must be at least two feet of slack in a street light pole base or street light controller base. A handhole must have at least five feet of slack and a manhole at least ten feet of slack.

Method of Measurement. The length of cable furnished and installed will be measured as the length of conduit plus three feet for cable entering and leaving a light pole or street light control cabinet, plus any slack in manholes or handholes.

Basis of Payment. This work will be paid for at the contract unit price per lineal foot for ELECTRIC CABLE IN CONDUIT, EQUIPMENT GROUNDING CONDUCTOR, NO. 6 1C. Such price will be payment in full for furnishing, installing, and testing the cable, and

will include all material, labor, terminations, and incidentals necessary to complete the work as per the contract plans.

MATERIAL  
1534

## **TEMPORARY TRAFFIC SIGNAL INSTALLATION**

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, temporary signage as shown on the temporary traffic signal installation plan, emergency vehicle priority systems, interconnect, vehicle detectors, uninterruptable power supply, and signing. Temporary traffic signal controllers and cabinets interconnected to railroad traffic control devices shall be new. When temporary traffic signals will be operating within a county or local agency Traffic Management System, the equipment must be NTCIP compliant and compatible with the current operating requirements of the Traffic Management System.

### General.

Only an approved controller equipment supplier will be allowed to assemble temporary traffic signal and railroad traffic signal cabinet. Traffic signal inspection and TURN-ON shall be according to TRAFFIC SIGNAL GENERAL REQUIREMENTS special provision.

### Construction Requirements.

#### (a) Controllers.

1. Only controllers supplied by one of the CDOT approved equipment supplier 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, 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 30 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.
2. Only control equipment, including controller cabinet and peripheral equipment, supplied by one of the CDOT approved equipment suppliers 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 plans. 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.

- (b) Cabinets. All temporary traffic signal cabinets shall have a closed bottom made of aluminum alloy. The bottom shall be sealed along the entire perimeter of the cabinet base to ensure a water, dust and insect-proof seal. The bottom shall provide a minimum of two (2) 4 inch (100 mm) diameter holes to run the electric cables through. The 4 inch (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.
- (d) Traffic Signal Heads. All traffic signal sections shall be 12 inches (300 mm). Pedestrian signal sections shall be 16 inch (406mm) x 18 inch (457mm). Traffic signal sections shall be LED with expandable view, unless otherwise approved by the Engineer. Pedestrian signal heads shall be Light Emitting Diode (LED) Pedestrian Countdown Signal Heads except when a temporary traffic signal is installed at an intersection interconnected with a railroad grade crossing. When a temporary traffic signal is installed at an intersection interconnected with a railroad grade crossing, Light Emitting Diode (LED) Pedestrian Signal Heads shall be furnished. 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) Vehicle Detection. All temporary traffic signal installations shall have vehicular detection installed at all approaches of the intersection and as directed by the Engineer. Pedestrian push buttons shall be provided for all pedestrian signal heads/phases as directed by the Engineer. Microwave vehicle sensors or video vehicle detection system shall be approved by CDOT prior to Contractor furnishing and installing. The Contractor shall install, wire, and adjust the alignment of the microwave vehicle sensor or video vehicle

detection system in accordance to the manufacturer's recommendations and requirements. The Contractor shall be responsible for adjusting the alignment of the microwave vehicle sensor or video vehicle detection system for all construction staging changes and for maintaining proper alignment throughout the project. An equipment supplier shall be present and assist the contractor in setting up and maintaining the microwave vehicle sensor or 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.

- (f) Uninterruptable Power Supply. All temporary traffic signal installations shall have 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 CDOT material specifications.
- (g) Signs. All existing street name and intersection regulatory signs shall be removed from existing poles and relocated to the temporary signal span wire. 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 intersection regulatory 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 the regulatory 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 reflecting street name signs shall be installed on the temporary traffic signal installation.

In special circumstances, temporary signage will be shown in the temporary traffic signal installation plan sheets. These signs pertain to an operational change at the intersection and must be installed for the associated construction stage, or as directed by the Engineer. The cost to furnish, maintain, and remove the temporary signage shall be included in the unit cost of this pay item.

- (h) 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.
- (i) Maintenance. Maintenance shall meet the requirements of the Standard Specifications and 850.01TS MAINTENANCE OF EXISTING TRAFFIC SIGNAL INSTALLATION Special Provisions. 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 he begins any physical work on the Contract or any portion thereof. In addition, a minimum of seven (7) days prior to assuming maintenance of the existing traffic signal installation(s) under this Contract, the Contractor shall request that the Resident Engineer contact the Bureau of Traffic Operations (847) 705-4424 for an inspection of the installation(s).

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, microwave vehicle sensors, temporary signage as shown on the temporary traffic signal plans, video vehicle detection system, any maintenance or adjustment to the microwave vehicle sensors/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 intersection will be paid for separately.

**MANHOLE, ELECTRIC, 3'X4'X4' WITH 24" FRAME AND LID**

**Description.** This item will consist of furnishing and installing an electrical manhole of the dimensions indicated with either a 24" or 30" frame and lid.

**Material.** The concrete manhole must meet the applicable requirements of Material Specification 1528. The frame and lid must meet the requirements of Material Specification 1458. A 24" frame and lid must meet the requirements of Standard Drawing 872. A 30" frame and lid must meet the requirements of Standard Drawings 874 and 10927. Bricks must meet the requirements of Article 1041 of the Standard Specifications. All other materials used must meet the appropriate material requirements of the Standard Specifications.

**Method of Construction.** The manhole will be a precast concrete structure, or, if conditions merit, a cast in place concrete structure, complete with cast iron frame and lid. A 3'X4'X4' manhole with a 24" frame and lid must conform to the requirements of Drawing 730. A 3'X4'X4' manhole with a 30" frame and lid must conform to Drawing 729. A 4'X6'X6' manhole with a 24" frame and lid must conform to Drawing 732. A 4'X6'X6' manhole with a 30" frame and lid must conform to Drawing 733. The number and size of conduit openings will be as shown on the construction plans.

Each manhole will be installed in paved sidewalk, earth parkway, or in pavement at the location specified on the construction plans or at a location as directed by the Resident Engineer.

The area where the manhole is to be placed must be properly excavated. All disposable material will be properly disposed of per Section 202.03 of the Standard Specifications. Each manhole must be set or constructed to conform with the appropriate City of Chicago drawings, except that the number and size of conduit openings will be in accordance with the construction plans. The frame casting must be accurately set on a full bed of mortar to the finished elevation so that no subsequent adjustment will be necessary. Mortar and brick, or mortar and concrete rings, may be used to adjust to the proper grade. Adjustment rings, bricks, and frames must be set in a full mortar bed. Use of partial bricks will not be allowed. Bricks must be laid in full header courses only. In no instance will the neck of the manhole exceed two (2) feet in height. Mortar will be mixed in a proportion of one (1) part cement to three (3) parts sand by volume of dry materials. After entering laterals have been installed in place in the manhole, the openings in the wall must be plugged in an approved manner flush with the inner surface. If backfill is required, screenings must be used and properly compacted. Parkway must be restored to the proper grade. Pavement must be restored to the correct grade. Patching of the pavement must be done with high early strength concrete meeting the requirements of Articles 1001 and 1020 of the Standard Specifications. Sidewalks must be restored to the proper grade using a 5-inch thickness of concrete. The inside of the manhole must be clean of all debris.



Replacing Handhole with Manhole. When a present handhole is to be replaced with a new manhole, the handhole must be broken down and all debris removed. This will be paid for as a separate pay item. The present laterals and cables must be maintained during breakdown of a present handhole and construction of a new manhole. Present laterals must be cut back to terminate at a distance from the inner face of the new manhole wall, as directed by the Resident Engineer. The cost of cutting back the present laterals will be included in the cost of the new manhole. New laterals terminating in the manhole must be included in the cost of installing new lateral. The new manhole must be installed in accordance with the appropriate City of Chicago drawings. All other work associated with this replacement will be considered incidental to this pay item.

**Method of Measurement.** This item will be measured per each unit installed.

**Basis of Payment.** The unit price for installing manholes will include necessary excavation, backfilling and restoration of parkway and pavement in accordance with the foregoing specifications. No additional payment will be allowed for restoring parkway or the restoration of sidewalk or pavement. Removal of sidewalk or pavement will be covered by separate pay items. New conduit, if necessary, will also be paid for separately. The unit cost will be for complete installation for each unit for MANHOLE, ELECTRIC, 3'X 4'X 4' WITH 24" FRAME AND LID, or ELECTRICAL MANHOLE 3'X 4'X 4' WITH 30" FRAME AND LID, or ELECTRICAL MANHOLE 4'X6'X6' WITH 24" FRAME AND LID, or ELECTRICAL MANHOLE 4'X6'X6' WITH 30" FRAME AND LID.

MATERIAL SPECIFICATION:  
1458 1528

DRAWING:  
730 872  
874 10927  
729 733  
732

**HANDHOLE (SPECIAL)**

**HEAVY-DUTY HANDHOLE (SPECIAL)**

1. **DESCRIPTION.** This item is for supplying and installing an electrical handhole 30" in diameter with a 24" frame and lid or a handhole 36" in diameter with a 30" frame and lid in pavement or in a driveway or as shown in the plans.
2. **MATERIAL.** The frame and lid must meet the requirements of Material Specification 1458. The handhole must meet the requirements of Material Specification 1528. A 24" frame and lid must also meet the requirements of Standard Drawing 872. A 30" frame and lid must also meet the requirements of Standard Drawings 874 and 10927. Bricks must meet the requirements of Article 1041 of the Standard Specifications. All other materials used must meet the appropriate material requirements of the Standard Specifications.
3. **METHOD OF CONSTRUCTION.** The handhole will be a precast concrete structure, or, if conditions merit, a cast in place concrete structure, complete with cast iron frame and cover, and conforming in detail with either Drawing Number 867, Drawing Number 866, or Drawing 871, except that the number of conduit openings must be as shown on the construction plans.

Each handhole must be installed at the location specified on the plans or at the location identified by the Resident Engineer. The area where the handhole is to be placed must be properly excavated. All disposable material must be properly disposed of per Section 202.03 of the Standard Specifications. Each handhole must be set or constructed on a foundation of loose stone not less than eight inches (8") deep. The 36" handhole for pavement installation must have a floor as shown in Drawing Number 871. The frame casting must be accurately set on a full bed of mortar to the finished elevation so that no subsequent adjustment will be necessary. It is desirable not to use a neck for the frame. However, if approved by the Resident Engineer, mortar and brick, or mortar and concrete rings, may be used to adjust to the proper grade. Adjustment rings, bricks, and frames must be set in a full mortar bed. Use of partial bricks will not be allowed. Bricks must be laid in full header courses only. Mortar must be mixed in a proportion of one (1) part of cement to three (3) parts sand by volume of dry materials. After entering laterals have been installed in place in the handhole, the openings in the wall must be plugged in an approved manner flush with the inner surface. If backfill is required, screenings must be used and properly compacted. Parkway must be restored to the proper grade. Pavement must be properly restored to the correct grade. Patching of the pavement must be done with high early strength concrete meeting the requirements of Articles 1001 and 1020 of the Standard Specifications. Sidewalks must be restored to the proper grade using a 5 inch thickness of concrete. The inside of the handhole must be

clean of all debris.

**METHOD OF MEASUREMENT.** This item will be paid for at the contract unit price per each unit installed.

**BASIS OF PAYMENT.** The necessary excavation, backfilling and restoration of parkway and pavement must be made in accordance with the foregoing specifications, and the cost thereof must be included in the unit price each for installing the handholes. This work shall be paid for EACH for HANDHOLE (SPECIAL) for a 30" diameter handhole with a 24" frame and lid, and HEAVY-DUTY HANDHOLE (SPECIAL) for a 36" diameter heavy-duty handhole with a 30" frame and lid. No additional payment will be allowed for restoring parkway, sidewalk, or pavement. Removal of sidewalk or pavement will be paid for separately under a different pay item.

MATERIAL SPECIFICATION  
1458  
1528

DRAWING  
866 874 871  
867 872 10927

**CONCRETE FOUNDATIONS (SPECIAL)**

**Description.** This item will be for all work necessary for installing a foundation for a “Super P” cabinet.

**Material.** Concrete will be Portland cement concrete, SI Class, meeting the requirements of Article 1020 of the Standard Specifications. Ground rods will meet the requirements of Material Specification 1465. Conduit will be PVC meeting the requirements of Material Specification 1533. Anchor rods will meet the applicable requirements of Material Specification 1467.

**Construction.** The Contractor will install a concrete foundation for a base mounted traffic signal controller cabinet, as shown on City of Chicago Drawing Number 888 for a “P” cabinet, or as shown on Drawing 888A for a “Super P” cabinet. Work under this item will be performed in accordance with Article 800 of the Standard Specifications.

The foundation will have a minimum depth of at least forty inches (40") below grade and must have large radius conduit elbows in quantity, size and type shown. The elbow ends above ground will be capped with standard conduit bushings. The ground rod will be installed adjacent to the foundation and will be driven straight down with the top to be no higher than 30 inches below finished grade. The Contractor will furnish anchor bolts, hardware, conduit elbows, and all other material shown on the foundation construction drawing.

All excavation and restoration of parkway will be considered as part of this item. If the foundation is in sidewalk, an expansion joint will be required between the sidewalk and the foundation.

**Method of Measurement.** This work will be measured as each for each unit installed complete.

**Basis of Payment.** Unit price will include cost of all material and labor required to install this foundation, as per applicable construction plans and these specifications. The conduit elbows will be considered as part of the foundation and will not be paid for as a separate item or as part of the conduit laterals leading to the foundation. All necessary excavation and restoration of parkway to the original condition will be included in the unit price. Any sidewalk removal will be paid for as a separate pay item. However, any restoration of sidewalk will be considered as part of this item, including any expansion joint between the sidewalk and the foundation. This work will be paid for at the Contract Unit Price of EACH for CONCRETE FOUNDATIONS (SPECIAL).

MATERIAL SPECIFICATION:  
1465        1533  
1467

DRAWING:  
888  
888a

## **CONCRETE FOUNDATION, 30" DIAMETER**

**Description.** The foundation will be a poured in place concrete structure used for structurally supporting street light poles or traffic signal poles. Foundations used to support a traffic pole with a 30 foot monotube arm (Standard Drawing 816) will use 1 ¼" anchor rods and a 17 1/4" bolt circle. Foundations used to support a traffic pole with a 35, 40, or 44 foot monotube arm (Standard Drawing 817) will use 1 1/2" anchor rods and a 16 1/2" bolt circle.

**Material.** Concrete must be Portland cement concrete meeting the requirements of Article 1020 of the Standard Specifications for SI Class concrete. Reinforcement bars must meet the requirements of Section 1006.10 of the Standard Specifications. Anchor rods must meet the requirements of Material Specification 1467 and the ground rod must meet the requirements of Material Specification 1465. Conduit elbows must be PVC conduit meeting the requirements of Material Specification 1533.

**Construction.** Every foundation will be installed at the location designated and in the manner herein specified or in special cases as specifically directed. The contractor will locate foundations as per plan or as directed by the Resident Engineer. A hole must be augered for placement of the concrete form.

Top surface of these foundations in parkway will be at an elevation of two inches (2") above grade or as required by the Engineer. Care must be taken to install a level foundation and to ensure adequate anchor rod projections for double-nut installation. The foundations must be centered back from the face of the curb in accordance with dimensions shown on the construction plans. Foundation raceways must consist of large radius conduit elbow(s) in quantity, size and type as specified on the corresponding standard drawing or in the construction plans. Any number of elbows in excess of the number shown on the standard drawing must be paid for under a separate pay item. The elbow ends above ground will be capped with standard conduit bushings. The Contractor must furnish anchor rods, a ground rod, hardware, conduit elbow(s) and all other material shown on applicable foundation construction drawings. Depth of foundation will be as shown on the appropriate drawing. The foundation top must be chamfered 3/4 of an inch. When the foundation is installed in a sidewalk, the foundation must be installed level, with the height of the foundation as close to the height of the sidewalk as possible, or as directed by the Engineer. A proper expansion joint will be installed between the sidewalk and the foundation.

Anchor rods must be set in accordance with applicable construction plans so that when poles are mounted on the foundations, the street lighting mast arm will be properly oriented as indicated on the construction plans. The anchor rods will be set by means of a metal template which shall be submitted for approval before any foundation work is begun. The template must hold the rods vertical, and in proper position. Anchor rods must conform in all respects to the appropriate City drawing.

**Method of Measurement.** This item will be measured per FOOT for each foundation installed complete.

**Basis of Payment.** Payment will be made for foundations installed in place, including elbows, in accordance with construction drawings, constructions plans and these specifications. All necessary excavation and restoration of pavement, sidewalk and fill to their original conditions will be included in the unit price. This work will be paid for at the contract unit price per lineal foot, as specified in the contract, for CONCRETE FOUNDATION of the diameter and size specified.

MATERIAL SPECIFICATION

1465

1467

1533

DRAWING

953 818 956

806 837 830

811 937 11825

816 817 844

**CONCRETE FOUNDATION, 20" DIAMETER**

**DESCRIPTION.** This foundation will be for structural support of a traffic signal post, or other pedestal mounted equipment. The foundation must be poured in place and must be 20" in diameter, with a 13" bolt circle, 3/4" diameter anchor rods, and must be 5 feet in depth.

**MATERIAL.** Concrete must be Portland cement concrete meeting the requirements of Article 1020 of the Standard Specifications for SI Class concrete. Anchor rods must meet the requirements of Material Specification 1467 and the ground rod must meet the requirements of Material Specification 1465. Conduit must be PVC meeting the requirements of Material Specification 1533.

**CONSTRUCTION.** Foundations must conform to Drawing Number 709. Top surface of these foundations will be at an elevation of two inches (2") above grade or as required by the Resident Engineer. Care must be taken to install a level foundation and to ensure adequate anchor rod projections for double nut installation. The foundation top must be chamfered 3/4 of an inch. The foundation must be centered back from the face of the curb in accordance with dimensions shown on the construction plans. When the foundation is in a solid sidewalk area, the foundation must be installed level, with the height of the foundation as close to the height of the sidewalk as possible, or as directed by the Engineer. A proper expansion joint must be installed between the sidewalk and the foundation.

Foundation raceways must consist of large radius conduit elbow(s) in quantity, size and type specified on Drawing 709 or as indicated on the construction plans. Elbows, in excess of those shown on Drawing 709, will be paid for separately under an additional pay item. The elbow ends above ground must be capped with standard conduit bushings. The Contractor must furnish anchor rods, hardware, conduit elbow(s) and all other material shown on applicable foundation construction drawings. Depth of foundation will be as noted on Drawing 709.

The anchor rods will be set by means of a metal template which must be submitted for approval before any foundation work is begun. The template must hold the rods vertical, and in proper position.

All excavation and restoration of parkway will be considered as part of this item. If the foundation is in sidewalk, an expansion joint will be required between the sidewalk and the foundation.

**METHOD OF MEASUREMENT.** The foundation will be measured for payment in FEET in place. The length measured will be limited to that shown on the plans or authorized by the Engineer.

BASIS OF PAYMENT. Payment will be made for foundations installed in place including two (2) elbows in accordance with construction plans and these specifications. Removal of sidewalk or pavement will be paid for separately. All necessary excavation and restoration of pavement, sidewalk and expansion joint, and fill to its original condition will be included in the unit price. This work will be paid for at the contract unit price per lineal foot, as per the contract, for CONCRETE FOUNDATION, 20" DIAMETER.

MATERIAL SPECIFICATION  
1465 1467 1533

DRAWING  
565 830 11825



**TRAFFIC SIGNAL POST**

1. DESCRIPTION. This item will consist of furnishing and installing an aluminum post, for supporting a traffic signal, upon a concrete foundation, at the location shown on the plans, as specified herein, or as directed by the Engineer. The post installation itself must be consistent in construction to the post shown on Drawing Number 526 for the installation of a post for a traffic signal.
2. MATERIALS. The material of the post must meet the requirements of Material Specification 1385 and of Standard Drawing Number 526.
3. INSTALLATION. The post and base must be mounted on the foundation so that the handhole faces away from the curb. The nuts on the foundation must be tightened to secure the post to the foundation such that there is no space separating the post from the foundation. There must be no double nutting. The post must be plumb; the use of shims will not be permitted. The post cap must be secured by three 5/16-18 X3/4" hex head stainless steel set screws.

The height of the post will be as indicated on the plans.

4. METHOD OF MEASUREMENT. This work will be measured per each unit installed on a foundation, complete with bolt covers, handhole door, base casting, aluminum pipe, and post cap.
5. BASIS OF PAYMENT. This work will be paid for at the contract unit price each for a TRAFFIC SIGNAL POST, ALUMINUM, for the height specified which will be payment in full for furnishing and installing the post complete in place.

MATERIAL SPECIFICATION  
1385

DRAWING  
526

**POLE STEEL, ANCHOR BASE, 10" DIAMETER, 3 GAUGE, 34'-6"**

**STEEL POLE, TYPE 1**

**STEEL POLE, TYPE 2**

**Description.** This item will consist of furnishing, installing, and setting plumb a steel anchor base pole to which equipment may be attached for the extension of the City street light and traffic signal systems. Steel Pole, Type 1 refers to the work associated with furnishing and installing a CDOT "Pole Steel, Anchor Base, 11" Diameter, 3 Gauge, 34'-6" type anchor base pole. Steel Pole, Type 2 refers to the work associated with furnishing and installing a CDOT "Pole Steel, Anchor Base, 12.5" Diameter, 3 Gauge, 34'-6" type anchor base pole. These poles shall meet the requirements specified, herein.

**Material.** The material of the pole must meet the requirements of Material Specification 1447.

**Installation.** The pole must be installed on the concrete foundation designed for the particular pole usage as indicated on the plans or as directed by the Engineer. Double nut construction must be used as shown on Drawing 837. Double nut construction provides the proper ventilation, as well as providing a way to plumb the pole. Any exposed portions of anchor rods extending above the nuts which interfere with the installation of the bolt covers must be cut off to provide the necessary clearance. The excess must not be burned off. The pole must be set secure, properly orientated, and plumb using the nuts and washers provided with the anchor bolts. The bolt covers, handhole cover, and pole cap must be securely attached.

The contractor will utilize non-abrasive slinging materials and will otherwise exercise due care in erecting the pole and mast arm to minimize any possible damage to the finish. When necessary, the contractor will utilize, at his own expense, factory approved touch-up materials and methods to restore the finish to like new appearance and durability.

**Method of Measurement.** This item will be measured per each unit installed, complete with anchor bolt covers, pole cap, and handhole cover.

**Basis of Payment.** This work will be paid for at the Contract unit price each for a POLE STEEL, ANCHOR BASE, 10" DIAMETER, 3 GAUGE, 34'-6", STEEL POLE, TYPE 1, OR STEEL POLE, TYPE 2 which will be payment in full for furnishing and installing the pole complete in place. Light standard foundations, mast arms, and luminaires will not be included in this pay item but will be paid for separately.

MATERIAL SPECIFICATION  
1447

DRAWING  
837 827  
808 824

**SIGNAL HEAD, POLYCARBONATE, LED, 3-SECTION, BRACKET MOUNTED**

**SIGNAL HEAD, POLYCARBONATE, LED, 5-SECTION, BRACKET MOUNTED**

**Description.** This item will consist of furnishing and installing a traffic signal head or combination of heads on a street light pole, a traffic signal pole, or a traffic signal post as shown on the plans, as specified herein, or as directed by the Engineer. Specific installations and configurations are shown on Drawing Numbers 834 and 835, entitled "Standard Traffic Signal Mounting Details".

The type of installation will be as indicated on the plans. The number of signal faces, the number of signal sections in each signal face, any dual-indication sections, and the method of mounting will be as indicated in the plans and in the standard drawings.

Each signal face must be pointed in the direction of the approaching traffic that it is to control and must be aimed to have maximum effectiveness for an approaching driver located at a distance from the stop line equal to the normal distance traversed while stopping.

During construction and until the installation is placed in operation, all signal faces must be hooded. The hooding material must be securely fastened so it will not be disturbed by normal inclement weather or wind.

**Material.** The traffic signal must meet the requirements of Material Specification 1493 for LED signals. The mounting brackets must meet the requirements of Material Specification 1495.

**Installation.** The signals must be mounted using pole mounting brackets banded to the pole with two strips of 3/4" stainless steel banding single wrapped, one at the top and one at the bottom of the brackets, each secured with a stainless steel banding clip. The banding and clips will be coated with a baked-on black finish. The mounting configuration connecting the signals to the mounting bracket must consist polycarbonate brackets specifically made for mounting signal heads to the side of poles, to create the designated structure. When the signals are to be mounted on a square pole or flat surface, the bracket used will be bolted to the flat pole or surface using 3/8" drive studs

where permissible or using a 3/8" studs in a tapped hole.

The bottom mounting bracket must be accurately located to cover an opening 1" in diameter, for cable entrance, drilled into the pole or standard at a calculated height to position the bottom signal face at a standard height of 10 feet, or a height indicated on the plans. The opening must be reamed or filed to remove all sharp edges or burrs which might damage cable during installation, or through vibration when the signals are in operation.

Cable. The Contractor must provide and install a length of 8/C #16 AWG, as per Specification 1475, flexible electrical cord, medium duty, of sufficient length to extend without strain or stress from the terminal strip in the "Green" section of the signal head to the terminal strip in the junction box mounted on the pole. The number of conductors in the cord, and the color coding of the conductors, must be sufficient to match the requirements of the signal head being installed, and must be connected in accordance with Specification 1493. Both ends of the cable length must be carefully stripped of six inches (6") of jacket and one inch (1") of insulation, and each conductor properly tinned. The service cable from the signal heads must enter the pole through the bottom mounting bracket and enter the long sweep elbow to terminate by attachment to the terminal strip in the junction box in accordance with connector schematic, Bureau of Electricity Drawing Number 12268-A

**Method of Measurement.** This work will be measured per each unit installed, complete.

**Basis of Payment.** This work will be paid for at the contract unit price for each SIGNAL HEAD, POLYCARBONATE, LED, #-SECTION, BRACKET MOUNTED, which price will be payment in full for furnishing and installing the signal head complete, including all necessary wiring.

MATERIAL SPECIFICATION	DRAWING
1475	834 12268a
1493	835 740
1495	741

**SIGNAL HEAD, POLYCARBONATE, LED, 3-SECTION, MAST ARM MOUNTED**

**SIGNAL HEAD, POLYCARBONATE, LED, 5-SECTION, MAST ARM MOUNTED**

**Description.** This item will consist of furnishing and installing a traffic signal head on a traffic signal monotube mast arm, as shown on the plans, as specified herein, or as directed by the Engineer. Specific installations and configurations are shown on Drawing 834 entitled "Standard Traffic Signal Mounting Details".

Each signal face must be pointed in the direction of the approaching traffic that it is to control and must be aimed to have maximum effectiveness for an approaching driver at a distance from the stop equal line to the normal distance traversed while stopping. The optically programmed signal face must be programmed in accordance with the visibility requirements of the Traffic Engineer.

During construction, and until the installation is placed in operation, all signal faces must be hooded. The hooding material must be securely fastened so it will not be disturbed by normal inclement weather or wind.

**Material.** The traffic signal head construction must meet the requirements of Material Specification 1493 for LED traffic signals. The material for a programmed LED traffic signal head must meet the Material Specification 1543. The mast arm bracket must meet the requirements of Material Specification 1463. The cable must meet the requirements of Material Specification 1475.

**Installation.** The signal must be mounted on the mast arm at the position indicated on the drawing in the manner shown on Drawing 834. The bracket must be banded to the mast arm with the 5/8" banding as shown on Drawing Number 834. The banding and clips must have a baked-on black finish. The bracket must be located over a hole drilled into the mast arm for the installation of cable. The hole must be reamed or filed to remove any sharp edges or burrs which might damage cable during installation, or through vibration when the signals are in operation.

**Cable.** The contractor must provide and install a length of 8/C #16 flexible electrical cord, of sufficient length to extend without strain or stress from the terminal strip in the "Green" section of the signal head to the terminal strip in the junction box mounted on the pole. The number of conductors in the cord, and the color coding of the conductors, must be sufficient to match the requirements of the signal head being installed, and must be connected in accordance with Material Specification 1493 for LED traffic signals, or Material Specification 1543 for optically programmed LED traffic signals. Both ends of the cable length must be carefully stripped of six inches (6") of jacket and one inch (1") of insulation, and each conductor properly tinned. The service cable from the signal heads must enter the traffic signal mast arm through the hole from the mounting bracket, whence it will continue and enter the pole through the hole for mast arm wiring,

then extend downward through the pole to enter the long sweep elbow to terminate by attachment to the terminal strip in the junction box in accordance with the terminal strip connector schematic, Bureau of Electricity Drawing Number 12268-A.

The mast arm brackets must be painted gloss black or another color as indicated in the plans.

**Method of Measurement.** This work will be measured per each signal unit installed, completely wired and operational.

**Basis of Payment.** This work will be paid for at the contract unit price each for SIGNAL HEAD, POLYCARBONATE, LED, #-SECTION, MAST ARM MOUNTED of the type specified which price will be payment in full for furnishing and installing the signal head, or the optically programmed signal head, complete.

MATERIAL SPECIFICATION  
1463 1543  
1475  
1493

DRAWING  
834  
12268A

**PEDESTRIAN SIGNAL HEAD, LED, 1-FACE, BRACKET MOUNTED WITH  
COUNTDOWN TIMER**

**Description.** This item will consist of furnishing and installing a pedestrian signal on a street light pole, a traffic signal pole or a traffic signal post as shown on the plans, as specified herein, or as directed by the Engineer. The signal may be installed as a single unit on a pole or in combination with other pedestrian signals or with traffic signals of various types and sizes. Specific installations and configurations are shown on Drawing Numbers 834 and 835 entitled "Standard Traffic Signal Mounting Details".

The method of mounting will be indicated on the plans, or as directed by the engineer. Each signal face must be pointed in the direction of the marked cross-walk area for the pedestrians it is intended to control.

**Material.** The pedestrian signal head material must be consistent with the requirements of Bureau of Electricity Material Specification 1494. The countdown pedestrian signal must meet the requirements of Material Specification 1545. All housing units must be made of polycarbonate. The light source must be LED. Mounting hardware must meet the requirements of Material Specification 1495. Cable must meet the requirements of Material Specification 1475.

**Installation.** The signal must be mounted using pole mounting brackets banded to the pole with two strips of 3/4" stainless steel banding, single wrapped, one at the top and one at the bottom of the bracket, each secured with a stainless steel banding clip. The banding and clips must have a baked-on black finish. The mounting configuration connecting the signals to the mounting bracket must consist of polycarbonate brackets specifically made for mounting signal heads to the side of poles, to create the designated structure.

The bottom mounting bracket must be accurately located to cover a hole 1" in diameter for the cable entrance drilled into the pole at a height calculated to position the bottom signal face at a standard height of 10 feet, or a height indicated on the plans. The hole must be reamed or filed to remove all sharp edges or burrs which might damage cable during installation, or through vibration when the signals are in operation.

When the pedestrian signal is attached below a traffic signal head, the separate opening for cable may be omitted to eliminate additional weakening of the pole and the pedestrian signal cord will be installed using the same opening as the traffic signal cord.

**Cable.** The Contractor must provide and install a length of 8/C #16 AWG flexible electric cord, of sufficient length to extend without strain or stress from the terminal strip in the signal head to the terminal strip in the junction box mounted on the pole. The number of conductors in the cord, and the color coding of the conductors, must be sufficient to match the requirements of the signal head being installed, and must be so connected in

accordance with Material Specification 1494. Both ends of the cable must be carefully stripped of six inches (6") of jacket and one inch (1") of insulation, and each conductor properly tinned. The service cord from the signal head must enter the pole through the bottom mounting bracket and enter the long sweep elbow to terminate by attachment to the terminal strip in accordance with the terminal strip connector schematic, Bureau of Electricity Drawing Number 12268-A.

During construction and until the installation is placed in operation, all signal faces must be hooded. The hooding material must be securely fastened so it will not be disturbed by inclement weather or wind

**Method of Measurement.** This work will be measured per each signal unit installed, completely wired and operational.

**Basis of Payment.** This work will be paid for at the contract unit price each for PEDESTRIAN SIGNAL HEAD, LED, 1 FACE, LED, BRACKET MOUNTED WITH COUNTDOWN TIMER, which price will be payment in full for furnishing and installing the signal head complete.

MATERIAL SPECIFICATION	DRAWING
1494 1545	12268-A
1495	740 834
1475	741 835



**JUNCTION BOX, POLE OR POST MOUNTED**

**Description.** This item will consist of furnishing and installing a Junction Box on each traffic signal post, traffic signal pole, or street light pole on which a signal head is mounted, as shown on the plans, specified herein, or directed by the Engineer.

**Material.** The Junction Box must conform to the requirements of Material Specification Number 1407 and to Drawing Number 954. The box will contain a 20 conductor terminal strip, securely fastened to an aluminum channel. Two Number 10 stainless steel machine screws will be used to mount the channel to the junction box.

**Installation.** The junction box must be mounted to the side of the pole away from the roadway, or as directed by the Engineer. The center of the box must be located approximately fifty-eight inches (58") above the adjacent sidewalk. Two long sweep elbows must be attached to the box, one to the top and one to the bottom, unless otherwise directed by the Engineer. Each will be attached with four (4) #10-24x3/4" stainless steel screws. The lower long sweep elbow will be properly positioned over a hole 1 1/2 inches in diameter drilled in the pole approximately 48" above the sidewalk, for the installation of cable. Another 1 1/2 inch hole must be drilled for the upper elbow. The holes must be reamed or filed to remove all sharp edges or burrs which might damage cable during installation, or through vibration when the signals are in operation. A stainless steel, banding bracket, Drawing Number 11984, must be attached to the center of the back of the box with a 5/16"-18 x 1" stainless steel machine screw. The entire unit must be banded to the pole with five (5) 3/4" stainless steel bands, one through the banding bracket and one each at the top and bottom of each elbow. The banding and clips must have a baked-on black finish.

**Method of Measurement.** This work will be measured per each junction box unit installed, complete with elbow(s).

**Basis of Payment.** This work will be paid for at the contract unit price each for a JUNCTION BOX, POLE OR POST MOUNTED, which price will be payment in full for furnishing and installing the junction box complete with its component parts and appurtenances. Connection of cables and wires to the terminal strip will not be part of the cost of the junction box but will be considered part of the installation of the underground cable and the installation of signal heads.

MATERIAL SPECIFICATION  
1407

DRAWING  
954 834  
11984

**MAST ARM, STEEL, MONOTUBE, 26 FOOT**

**MAST ARM, STEEL, MONOTUBE, 30 FOOT**

**MAST ARM, STEEL, MONOTUBE, 35 FOOT**

**Description.** This item will consist of furnishing and installing a steel, monotube, mast arm for the purpose of supporting traffic signals, and/or illuminated signs on an anchor base pole at the locations shown on the plans, or as specified or directed by the Commissioner. The length of the mast arm and the angular orientation of the arm relative to the centerline of the roadway will be as indicated on the plans.

A mast arm must be installed only on a 3 gauge pole, and the length of the mast arm will govern the minimum base diameter of the pole on which the arm is to be installed, in accordance with the following chart:

MAST ARM LENGTH (feet)	POLE BASE DIAMETER (inches)
16	10
20	10
26	10
30	11
35	12.5
40	12.5
44	12.5

**Material.** The mast arm must be 7 gauge steel meeting the requirements of Standard Drawing 870 and Material Specification 1454.

**Installation.** The mast arm must be mounted on the pole at the height specified on Drawing 834, or at a different height if specified on the plans, or as directed by the Engineer. A one inch (1") diameter opening for the installation of cable must be field drilled in the pole in line with the orientation of the mast arm. The hole must be reamed or filed to remove all sharp edges or burrs which might damage cable during installation, or through vibration when the signals are in operation. A neoprene grommet must be inserted into the finished hole prior to the installation of the cable.

Two holes must be field drilled in the pole at 180 degrees relative to the orientation of the pole for installation of locator shear pins, provided with the back plate, to prevent rotation of the mast arm. These holes must be drilled after the mast arm is in place in order that the position of the holes will match the location of the locator bushings attached to the back half of the clamp.

All signals, signs, and electrical equipment must be attached in the correct relative position to the mast arm, with service cord in place, prepared to be installed on the pole, prior to the attachment of the mast arm to the pole. The installation of the cord in the pole must be coordinated with the attachment of the mast arm to the pole. The clamp bolts must be tightened securely so that there is no slippage of the mast arm either upward or downward to exert a vertical force on the shear pins. The end cap must be secured in place with the attachment screws provided.

The mast arm must be delivered completely finished with a factory applied black powder coat per Material Specification 1454. The contractor must utilize non-abrasive slinging materials and must otherwise exercise due care in erecting the pole and mast arm to prevent any damage to the finish.

**Method of Measurement.** This work will be measured per each monotube arm installed on a traffic pole.

**Basis of Payment.** This work will be paid for at the contract unit price for each MAST ARM, STEEL, MONOTUBE of the length indicated, and will be payment in full for furnishing and installing a steel mast arm in place, complete. Attachment of signals and signs will not be part of this pay item.

MATERIAL  
1454

DRAWING  
870  
834

**PEDESTRIAN PUSH BUTTON POST (CHICAGO)**

1. **DESCRIPTION.** This item will consist of furnishing and installing a steel post, for supporting a push button for pedestrian traffic, in a concrete sidewalk, at the location shown on the plans, or as directed by the Engineer. The post installation itself must be consistent in construction to the post shown on Drawing Number 963, "Pedestrian Push Button Post".
2. **MATERIALS.** The post will be three inch (3") galvanized rigid steel conduit meeting the requirements of Material Specification 1462. The top of the post will be threaded for a length of two inches (2"). The bottom of the post will be threaded for a length of three and one-half inches (3.5"). A threaded conduit cap will be provided for the top. The base material will consist of a three and one-half inch (3.5") length of threaded conduit coupling circumferentially welded to a base plate. The base plate will be dimensioned as shown on Standard Drawing 963. The base plate will be made of a high strength low alloy steel meeting the requirements of ASTM A595, Grade A. The post, base, and cap must be powder coated black. Post threads must not be painted. The painting method must be pre-approved by the Engineer.
3. **INSTALLATION.** A hole must be drilled into the post at the proper height and location for the pedestrian push button wiring. The post must be screwed into the base. The post may be tack welded to the base to insure the two parts do not loosen. The post and base must be mounted in the sidewalk using a minimum of 1/2" concrete anchors of the appropriate length. ( Please note that cable must be pulled into the post before the post is mounted to the sidewalk.) The nuts on the rods must be tightened to secure the post to the sidewalk such that there is no space separating the post from the sidewalk. There must be no double nutting. The post must be plumb; the use of shims will not be permitted. The post cap must be secured by screwing into the top of the pipe. After the post is erected, the Engineer will determine if touch-up paint is required.
4. **METHOD OF MEASUREMENT.** This work will be measured per each unit installed, complete with anchors, nuts, base, steel pipe, and post cap. Concrete work, wiring, and push buttons will not be included in this item.
5. **BASIS OF PAYMENT.** This work will be paid for at the contract unit price each for a PEDESTRIAN PUSH BUTTON POST (CHICAGO), which will be payment in full for furnishing and installing the post complete in place.

MATERIAL  
1462

DRAWING  
963

**ELECTRIC CABLE IN CONDUIT NO. 4, 2/C**

**ELECTRIC CABLE IN CONDUIT NO. 14 19/C**

**ELECTRIC CABLE IN CONDUIT NO. 18 4/C**

**Description.** This work will consist of furnishing and installing electric cable for traffic signals of the type, size and number of conductors as specified on the plans. The cable will be rated 600 volts and comply with the following requirements.

**Traffic Signal Cable.** All cable must conform to the requirements of Material Specification number 1537, for Traffic Signal Cable.

**Installation.** All cable must be installed in conduit, as indicated on the plans, with care to prevent damage to the insulation or cable. Suitable devices must be used in pulling the cable, and only approved lubricants should be used. All cables installed in conduit will be from the power source to the traffic signal controller cabinet, from the traffic controller cabinet to the traffic signal junction box, or from junction box to junction box. For cable terminating in a traffic signal controller cabinet or traffic signal junction box the following procedures must be followed:

a. **Controllers.**

1. Remove thirty-six inches (36") of neoprene jacket.
2. Wrap vinyl electrical tape on two inches (2") of the neoprene jacket and two inches (2") on the exposed conductors.
3. Remove one inch (1") of insulation and scrape copper conductor.
4. Train cables neatly along the base and back of cabinet.
5. Connect conductors to proper terminal lugs.

b. **Traffic Signal Junction Box.**

1. Remove twenty-four inches (24") of neoprene jacket.
2. Wrap vinyl electrical tape on two inches (2") of neoprene jacket and two inches (2") on the exposed conductors.
3. Remove one inch (1") of insulation and scrape copper conductor.
4. Train cables neatly along the side and back of the box.
5. Connect all conductors to terminal strip.

**Cable Slack.**

The length of cable slack that must be provided will be in accordance with the following schedule:

<u>Location</u>	<u>Length of Slack Cable (feet)</u>
Base of Controller	7
Detector, Junction Box	1
Base of Traffic Signal Post or Traffic Signal Pole	4
City Handhole	6
City Manhole	12
Commonwealth Edison Manhole	25

Cable slack in manholes/handholes must be trained and racked in the holes. If racks are non-existent, racks must be provided, and considered incidental and a part of this pay item.

No cable splices will be allowed for traffic signal cable, with the exception of 7 conductor interconnect cable. These splices must be indicated on the plans.

**Method of Measurement.** The length of measurement must be the distance horizontally measured between changes in direction, and will include cable slack. All vertical cables will not be measured for payment.

**Basis of Payment.** This work will be paid for at the contract unit price per lineal foot for ELECTRIC CABLE IN CONDUIT, SIGNAL NO. 4, 2/C, ELECTRIC CABLE IN CONDUIT, SIGNAL NO. 14 19/C, or ELECTRIC CABLE IN CONDUIT, SIGNAL NO. 18 4/C. This price will be payment in full for furnishing, installing, connecting, splicing, and testing of cable, and will include all labor, materials, equipment, tools, and incidentals necessary to complete the work, as specified herein, and as shown on the plans.

MATERIAL SPECIFICATION  
1537

**REMOVE EXISTING TRAFFIC SIGNAL EQUIPMENT, SPECIAL**

**Description.** This work will consist of removing all the existing traffic signal equipment at the intersections listed on the plans.

**Removal.** The items to be removed will include traffic signal arms, traffic signal poles, traffic signal heads, traffic signal controllers, and all associated equipment and cable.

The traffic signal items, except for traffic signal cable, are to remain the property of the City of Chicago. The Contractor must deliver the obsolete traffic signal equipment to the City of Chicago Yard at 4101 South Cicero Avenue, Chicago, Illinois. Twenty-four hour advance notice to Engineer, attention Mr. Dan Grigas at 312-744-4608 is necessary before delivery. The traffic signal cable must be removed and become the property of the Contractor and must be disposed of by him/her, outside the right-of-way, at his sole expense.

The Contractor must provide three (3) copies of a list of equipment that is to remain the property of the City, including model and serial numbers where applicable. He must also provide a copy of the contract plan, or special provisions, showing the quantities and type of equipment. The Contractor will be responsible for the condition of the traffic control equipment from the time of removal until its acceptance by a receipt drawn by the City indicating that the items have been returned.

**Method of Measurement.** This item will be measured as one unit per project contract, depending upon the contract conditions. The breaking down of foundations and manholes will not be considered part of this item.

**Basis of Payment.** This work will be paid for at the contract lump sum price for REMOVE EXISTING TRAFFIC SIGNAL EQUIPMENT, SPECIAL. This price will be payment in full for removing the equipment and disposing of it as required, The salvage value of the cable retained by the Contractor must be reflected in this contract lump sum price.

## **EQUIPMENT CABINET**

**Description.** This work will consist of furnishing and installing an Advanced Transportation Controller (ATC) with a battery powered back-up system and associated equipment in a cabinet onto a foundation and making all necessary connections.

**Material.** The material must meet the requirements of Material Specification 1560, "Advanced Transportation Controller and Cabinet with Uninterruptible Power Supply". The cabinet will be a Super P cabinet 16 load bays. Each load bay must include a load switch. A battery powered uninterruptible power supply (UPS) system must be included. Communications interface equipment, if required, will be included under a separate item.

**Procurement.** The contractor must provide Request for Inspection of Material forms for traffic signal controllers and cabinets as requested for specific projects. The Division of Electrical Operations will review and comment on the submitted material. The Division of Electrical Operations will approve the purchase of the material from a supplier. Final material approval will be made in accordance with Chicago Department of Transportation specifications. The Contractor must provide proof of purchase to the Resident Engineer within seven (7) days following approval by the Division of Electrical Operations. Payment will be withheld in accordance with the terms and conditions of this contract, until such time that the Commissioner determines the requirements are met.

The controllers and cabinets are to be delivered to the Division of Electrical Operations within ninety (90) days of purchase. If the controllers and cabinets are not delivered, payment will be withheld until such time that the controllers and cabinets are delivered.

The Division of Electrical Operations will notify the Contractor when the material has been inspected and approved. If a railroad interconnect is involved, a representative from the Illinois Commerce Commission will also need to review and inspect the controller at the Division's facilities. Within forty-eight (48) hours of notification, the Contractor must pick-up the controllers and cabinets from the Division. The controllers and cabinets will be stored at a facility, approved by the Commissioner, at the contractor's expense.

**Installation.** The controller will be programmed to provide the sequencing and timing of operation as shown on the plans. The controller must be enclosed in a housing and installed in a completely wired cabinet. The model and serial numbers of the controller must be affixed on the front of the controller housing and be readily visible.

The cabinet must be set onto a pad foundation designed specifically for the cabinet, and affixed with bolts provided with the foundation. Electric cables inside the cabinet must be neatly trained along the base and back of the cabinet. Each conductor used must be connected individually to the proper terminal, and the spare conductors must be



insulated and bound into a neat bundle. Each cable must be marked with suitable identification and recorded on a copy of the plans for the intersection and submitted to the Engineer. Signal indications for each direction must be wired to a separate circuit whether or not the signal plans call for a split movement. The absolute zero for time coordination will be set in the field by City personnel after obtaining the appropriate City time-tone reference.

When properly installed, all signals will be connected and controlled by the controller, and the sequencing and timing of the signals will be as set forth in the plans.

All conduit entrances into the cabinet must be sealed with a pliable waterproof material to restrict moisture entrance into the cabinet.

Division of Electrical Operations and Division of Safety personnel from the Chicago Department of Transportation must be present when the new signal equipment is put into operation.

**Basis of Payment.** This work will be paid for at the contract unit price for each EQUIPMENT CABINET, which price will be payment in full for furnishing and installing the controller and cabinet complete and operational, with the UPS system and cabinet including all wiring and connections as specified.

## **VIDEO DETECTION SYSTEM**

**DESCRIPTION.** This work consists of installing a single hemispherical video detection system which detects vehicles on multiple roadway approaches at an intersection using only video images of vehicle traffic and is compatible with solid state pre-timed or actuated traffic signal control equipment and cabinet environments.

As applicable, this work includes all labor, materials and equipment required to install or remove the necessary wiring, mounting brackets, mounting hardware, conduit, cable connectors, grounding and any other material required to ensure a complete installation or removal as specified for a location.

**MATERIALS.** Provide materials, as directed by the Engineer, necessary to provide a complete and operating job. Provide materials in accordance with sections Material Specification 1556 and this special provision.

### 1. System Requirements.

A. System Hardware. Provide a hemispherical video detection system that is composed of these principal items:

- (1) Hemispherical camera(s);
- (2) A field communications link consisting of a single CATSe cable between each camera and the video imaging vehicle detection system (VIVDS) processor;
- (3) VIVDS processor along with a video monitor and connection cable or associated equipment required to setup the VIVDS processor and software to communicate to the VIVDS processor.

B. System Software. Provide a VIVDS processor that is either NEMA TS 2 TYPE 1 or NEMA TS 2 TYPE 2 with a RS 485 synchronous data link control (SDLC). Ensure the VIVDS processor has at least four processing cores of 2.8 Gigahertz (GHz) or greater, a minimum of 3 Gigabyte (GB) random access memory (RAM), and at least 32 GB of onboard storage.

### 2. Functional Capabilities.

A. Provide system software that is able to detect either approaching or departing vehicles in multiple traffic lanes and have a minimum of 24 detector outputs per VIVDS processor. Ensure each zone and output is user definable through interactive graphics by drawing arbitrarily shaped polygons using the field setup computer or central control. Ensure the user is able to redefine previously

defined detection zones.

B. Ensure the VIVDS processor provides real time vehicle detection (within 500 milliseconds (ms) of vehicle arrival).

C. Ensure the system can detect the presence of vehicles in up to 64 detection zones per camera.

D. Ensure detection zones are sensitive to the direction of vehicle travel and the direction to be detected by each detection zone is user programmable.

E. Ensure the VIVDS processor unit can compensate for minor camera movement (up to 2 percent of the field of view at 400 feet) without falsely detecting vehicles and that the camera movement is measured on the unprocessed video input to the VIVDS processor.

F. Provide a camera that operates while directly connected to VIVDS processor unit.

G. Ensure the video detection system operates with the monitoring equipment (monitor and/or laptop) disconnected or on-line once the detector configuration has been downloaded or saved into the VIVDS processor.

H. Ensure when the monitoring equipment is directly connected to the VIVDS processor, it can view vehicle detections in real time as they occur on the field setup computers color video graphics adapter (VGA) display or the video monitor.

I. Provide a VIVDS processor that supports 1 or 2 omnidirectional view cameras. If equipped with 1 omnidirectional view camera, ensure the VIVDS processor is also capable of simultaneously supporting up to four more traditional view cameras for special needs such as advance detection or underpass detection.

### 3. Vehicle Detection.

#### A. Detection Zone Placement.

(1) Provide a hemispherical video detection system with flexible detection zone placement anywhere within the combined field of view of the image sensors. Ensure that preferred presence detector configurations are arbitrarily shaped polygons, including simple boxes, drawn across lanes of traffic or placed in line with lanes of traffic.

(2) Ensure a single detector is able to replace one or more conventional

detector loops or conventional traffic signal detection cameras.

B. Detection Zone Programming.

- (1) Ensure that a graphical interface video image of the roadway is used for the placement of detection zones.
- (2) Ensure the monitor shows images of the detection zones superimposed outlined or filled, with a visible change indicating detection on the video image of traffic while the VIVDS processor is running verifying proper operation of the detection system. Provide a VIVDS processor with a display that will indicate proper operation of the detection zones with the absence of video.
- (3) Ensure the detection zones are created using the mouse or keypad to draw detection zones on the monitor and are capable of being sized and shaped to provide optimal road coverage and detection. Ensure that detector configurations can be uploaded to the VIVDS processor and that the detector configuration that is currently running can be retrieved from the VIVDS processor.
- (4) Ensure that the mouse or keypad can be used to edit previously defined detector configurations so as to fine tune the detection zone placement, size and shape. Ensure that detection continues to operate from the detector configuration that is currently called while fine-tuning is being done.
- (5) Ensure that the hemispherical video detection system is sensitive to the direction of vehicle travel with the direction to be detected by each detection zone to be user programmable. Ensure the vehicle detection zone does not activate from cross-street traffic, wrong way traffic, or from a vehicle traveling any direction other than the one specified for detection occupies the detection zone.
- (6) Ensure detection zones have the option for the user to define that calls can be made with a side entrance (90 degrees or less angled entrance).

C. Design Field of View. Ensure the hemispherical video detection system can reliably detect vehicle presence in the design field of view. Ensure the design field of view is defined as the sensor view when the image sensor is mounted 30 feet or higher above the roadway, when the camera is adjacent (within 15 feet) to the edge of the nearest vehicle travel lane, and when the length of the detection area is not greater than 5 times the mounting height of the image sensor. Within this design field of view, ensure the VIVDS processor unit is capable of setting up

a single detection zone for point detection (equivalent to the operation of a 6-foot by 6-foot inductive loop). Ensure a single camera, placed at the proper mounting height, is able to monitor up to and including 5 traffic lanes simultaneously. Ensure a single omnidirectional camera, placed at the proper mounting height, is able to monitor detection zones in at least intersection approaches.

D. Detection Performance. Ensure detection accuracy of the video detection system is comparable to properly operating inductive loops. Detection accuracy must include the presence of any vehicle in the defined detection zone regardless of the lane, which the vehicle is occupying. Occlusion produced by vehicles in the same or adjacent lanes is not considered a failure of the VIVDS processor, but a limitation of the camera placement. Ensure detection accuracy (a minimum of 95 percent) is enforced for the entire design field of view on a lane by lane and on a time period basis. When specified on the plans, furnish up to 24 continuous hours of recorded video of all installed intersection cameras within the 30 day test period for verification of proper camera placement, field of view, focus, detection zone placement, processor setup and operation. The video from each camera must show vehicle detections for all zones.

#### 4. VIVDS Processor.

- A. Provide a VIVDS processor that is shelf mountable.
- B. Provide a VIVDS processor that has a modular electrical design.
  - (1) The VIVDS processor must operate within a range of 89 to 135 volts alternating current (VAC), 60 Hertz (Hz) single phase. Ensure power to the VIVDS processor is from the transient protected side of the AC power distribution system in the traffic control cabinet in which the VIVDS processor is installed.
  - (2) Ensure communications to the field setup computer are through an Ethernet port. Ensure this port is able to download the real time detection information needed to show detector actuations.
  - (3) Ensure the VIVDS processor has an Ethernet connection on the front of the unit for the connection to the first camera. If a second camera is installed at the intersection, the camera will connect with the VIVDS processor through a connector mounted on the side of the processor.
  - (4) Provide a unit that is equipped with a single VGA video output. Ensure this output is capable of displaying the operation and detections of the VIVDS processor.
  - (5) Ensure the change log for all software upgrades and/or changes are

presented on a readily assessable internet site with unencumbered public access.

- (6) The unit software and the supervisor software must include diagnostic software to allow testing the VIVDS functions. This must include the capability to set and clear individual detector outputs and display the status of inputs to enable setup and troubleshooting in the field.

C. Provide camera interface panel capable of being mounted to sidewalls of a controller cabinet for protection of the VIVDS processor and camera CAT5e connection. The panel must consist of, as a minimum, 2 CAT5e cable surge protection connections.

D. Environmental Requirements.

- (1) Provide a VIVDS processor that is designed to operate reliably in the adverse environment found in the typical roadside traffic cabinet.
- (2) Ensure that the VIVDS processor meets the environmental requirements set forth by the latest NEMA TS1 and TS2 standards.
- (3) Ensure the operating temperature is from -30 degrees Fahrenheit (F) to +165 degrees F at 0 percent to 95 percent relative humidity, non-condensing.

## 5. Hemispherical Camera Assembly.

A. Provide a hemispherical camera that:

- (1) Uses high resolution, color image sensors as the video source for real time vehicle detection;
- (2) Uses cameras that are approved for use with the VIVDS processor unit by the supplier of the hemispherical video detection system.
- (3) As a minimum, provides the following capabilities:
  - (a) Ensure images are produced with a complementary metal-oxide semiconductor (CMOS) sensing element with horizontal resolution of at least 2580 lines and vertical resolution of at least 1920 lines. Ensure images are output in digital format as Motion Joint Photographic Experts Group (MJPEG) image.
  - (b) Ensure the useable video and resolvable features in the video

image are produced when those features have luminance levels as low 1.0 lux for color, for night use and as high as 10,000 lux during the day.

- (c) Ensure the camera includes an electronic shutter control based upon average scene luminance and is equipped with fixed field of view and fixed focus lens which does not require opening the camera enclosure. Ensure the fixed focus lens is always in focus without any required end-user adjustments.

B. Provide a camera and lens assembly that is housed in an environmental enclosure that provides the following capabilities:

- (1) Ensure the enclosure is waterproof and dust tight to the latest NEMA 4 specifications.
- (2) Ensure the enclosure allows the camera to operate satisfactorily over an ambient temperature range from -30 degrees F to +165 degrees F while exposed to precipitation as well as direct sunlight.
- (3) Ensure the enclosure includes a provision for connection of the CAT5e cable. Ensure input power to the environmental enclosure is included in the Ethernet interface.
- (4) Provides a thermostatically controlled heater at the front of the enclosure to prevent the formation of ice and condensation. The heater must not interfere with the operation of the camera electronics, and it must not cause interference with the video signal.
- (5) Ensure the enclosure is light colored or unfinished and is designed to minimize solar heating. Any plastics used in the enclosure must include ultra violet inhibitors.
- (6) Ensure the total weight of the image sensor in the environmental enclosure is less than 10 pounds.
- (7) Provides waterproof quick disconnect connectors to the camera for the CAT5e connection.
- (8) Provides camera mounting hardware that allows for vertical or horizontal mounting to the camera enclosure.

6. Field Communication Link.

- A. Provide a field communications link that supports a two-way communications connection from the camera to the VIVDS processor.
- B. In locations where the plans indicate CAT5e cable is required as the primary communications link, ensure this cable is burial grade as well as suitable for above ground direct sunlight applications.
- C. Ensure all connection cables are continuous from the equipment cabinet to the camera connector.
- D. Install lightning and transient surge suppression devices on the processor side of the field communications link to protect the peripheral devices. Ensure the suppression devices are all solid state. The devices must present high impedance to, and must not interfere with, the communications lines during normal operation. The suppression devices must not allow the peak voltage on any line to exceed 300 percent of the normal operating peak voltage at any time. The response time of the devices must not exceed 5 nanoseconds.

#### 7. Sample.

One camera, mount and processor of the manufacture proposed to be furnished must be submitted along with specification sheets within fifteen (15) business days upon request of the Chief Procurement Officer. The sample must be delivered to the Division of Electrical Operations, 2451 South Ashland Avenue, Chicago, Illinois 60608.

#### 8. Warranty.

Provide materials with a 3-year manufacturer's warranty, transferable to CDOT, that the supplied materials are free from all defects in materials and workmanship. Furnish the warranty and other applicable documents from the manufacturer, and a copy of the invoice showing the date of shipment, to the Engineer prior to acceptance.

### 3. CONSTRUCTION REQUIREMENTS.

Install the hemispherical video detection system as indicated on the plans or as directed by the Engineer. All work must comply with this special provision and the applicable details provided in the plans.

- 1. Ensure the hemispherical video detection system is installed as recommended by the manufacturer and documented in installation materials provided by the manufacturer. If the camera is to be mounted to a mast arm or luminaire arm, a one-inch diameter hole for cable must be drilled at the proper height and location. The hole must be smooth and free of any sharp edges so that cable will not be damaged. The hole must be drilled in a location that lessens the possibility of water intrusion. The camera mount must be positioned directly over the hole.



2. Ensure the camera equipment is not installed until all other signal equipment has been installed and inspected for correctness. Premature installations of camera equipment that need to be moved in order to make the system operate will be moved at the Contractor's expense. This movement will not qualify for extra payment or for time extensions. Deliver the VIVDS processor to the Division of Electrical Operations at 2451 South Ashland, Chicago, Illinois 60608.
  3. Install or remove the hemispherical video detection system as indicated on the plans which includes the VIVDS processor, hardware, fittings, cable, connectors, grounding and all other material required to complete the work.
  4. Install or remove the hemispherical video detection camera as indicated on the plans which includes the video detection camera, enclosure, mounting bracket, hardware, cable, connectors, and other material required to complete the work.
4. METHOD OF MEASUREMENT. This work will be measured per each system unit installed, complete. One VIDEO DETECTION SYSTEM will be installed at each intersection indicated in the plans. Cable, mounting hardware, processor, pole assembly, and other items associated with the system will not be measured separately.
5. BASIS OF PAYMENT. This work will be paid for at the contract unit price for each VIDEO DETECTION SYSTEM, which will be payment in full for furnishing all labor and equipment required to ensure a complete and operating job, as shown in the plans or as directed by the Engineer. This work includes mounting, cabling, wiring and testing, and installation of all materials, equipment, tools, labor and incidentals necessary to complete the work. installing the controller complete and operational, with all wiring and connections as specified.

## **REMOVE EXISTING HANDHOLE**

**Description.** Work under this item will include breaking down an existing handhole or manhole and filling in the affected area to grade.

**Demolition.** This work will consist of removing the frame and cover of an existing handhole or manhole, breaking down the handhole/manhole walls, removing large debris, and backfilling the hole with screenings or other approved material. Backfill must be installed in 6 inch layers and tamped. If the handhole/manhole is in a parkway, the hole must be filled level to the existing grade. The top six inches of fill must be of an approved soil mixture. If the handhole/manhole is in sidewalk or in pavement, the sidewalk or pavement must be restored under a different pay item. If the frame or cover is deemed re-useable by the Engineer, the frame and/or cover must be delivered to the Bureau of Electricity at a location identified by the Engineer. Any debris, including the frame and cover must be disposed of off-sight in an approved manner. The contractor will pay for all disposal fees.

**Method of Measurement.** This work will be paid for per each manhole or handhole removed. All backfill will be considered as part of the manhole breakdown.

**Basis of Payment.** This work will be paid for at the contract unit price per each for REMOVE EXISTING HANDHOLE, which price will be payment in full for all labor and materials necessary to complete the work as described. Salvaging of the frame and cover will be considered incidental to this item.

**REMOVE EXISTING CONCRETE FOUNDATION**

**Description.** The work will consist of removing a concrete foundation for the specific item referenced. The foundation must be completely removed or broken down to a point three feet below grade, disposing of the debris off-sight in an approved manner, backfilling the excavation with screenings or other approved backfill material, and reconstructing the surface area. If the foundation is in a parkway, the parkway must be properly restored with dirt to the existing level. If the foundation is in sidewalk, the sidewalk must be restored under a different pay item and will not be considered as part of this work. Debris must be disposed of according to Section 202.03 of the Standard Specifications. Backfill must meet the requirements of Section 1003.04 of the Standard Specifications.

**Method of Measurement.** This work will be measured per each foundation removed, which will also include proper disposal and backfill.

**Basis of Payment.** This work will be paid for at the contract unit price each for REMOVE EXISTING CONCRETE FOUNDATION, of the type specified, which price will be payment in full for all labor and materials necessary to complete the work as described above. No additional payment will be made for backfill or disposal of debris.

## **SERVICE CONNECTION TO CECO LINE**

**Description.** This work will consist of providing a service connection from City cable to a Commonwealth Edison secondary cable. For an aerial service, this will be on a wood pole. For an underground service, this will be in a CECO manhole.

**Installation.** This work will consist of splicing or terminating City service cable to a Commonwealth Edison secondary cable, as directed by the Engineer. The contractor must obtain permission from Edison for the service at the required location. The contractor will inform Edison of the load required. Edison will make the connections, unless Edison gives the contractor permission to make the connections. Any costs associated with the connection will be reimbursed according to Article 109.05 of the IDOT Standard Specifications for Road and Bridge Construction.

This work will also include furnishing and installing the UL 50, NEMA Type 4X unfinished single door design, pole mount cabinet with circuit breaker(s). The cabinet shall be sized to adequately house all required components with extra space for arrangement and termination of wiring. The cabinet shall be channel mounted to a wooden utility pole using assemblies recommended by the vendor. Circuit breakers shall be standard UL listed molded case, thermal-magnetic bolt-on type circuit breakers with trip free indicating handles. Unless directed otherwise, the main disconnect circuit breaker for the traffic signal controller shall be rated 60 amperes, 120 V and the auxiliary circuit breakers shall be rated 10 amperes, 120 V.

**Method of Measurement.** The service connection will be counted as one unit, and will include all labor and material needed to make a successful service connection.

**Basis of Payment.** This work will be paid for at the contract unit price for each SERVICE CONNECTION TO CECO LINE, which payment will be in full for providing all material and labor to install the electric service installation and make the necessary connections.

DRAWING  
11925

**PEDESTRIAN PUSH-BUTTON, SPECIAL**

1. DESCRIPTION. This work will consist of furnishing and installing an audible pedestrian push button station to be mounted on a traffic signal pole or post.
2. MATERIAL. The audible pedestrian signal station must conform to Material Specification 1553.
3. INSTALLATION. The contractor must follow specific manufacturer's installation instructions. The sound level and message must be programmed as directed by the Traffic Engineer. The location of the station will be as indicated on the plans. The push button station must be mounted to the pole so that the push button is at a height of 42 inches from top of sidewalk to meet the current ADA requirements. A hole must be drilled and tapped in the pole to accept a 1/4-20 stainless steel hex head bolt that will attach the station to the pole. A three-quarters-inch (3/4") to one inch (1") diameter hole must be drilled into the pole at the proper height for the cable entrance. The size of the hole will be as directed by the Engineer. The hole must be reamed or filed to remove all sharp edges or burrs which might damage the cable. A weatherproof flexible caulking must be applied between the hole in the pole and the station housing to protect the cable.
4. METHOD OF MEASUREMENT. This work will be measured per unit for each push button station mounted to a pole or post. Wiring will be addressed under a separate pay item.
5. BASIS OF PAYMENT. This work will be paid for at the contract unit price each for PEDESTRIAN PUSH-BUTTON, SPECIAL of the type specified, which price will be payment in full for furnishing and installing the unit complete.

MATERIAL  
1553

**AUDIBLE PEDESTRIAN PUSH-BUTTON SYSTEM CONTROLLER INTERFACE UNIT**

1. DESCRIPTION. This work will consist of furnishing and installing an audible pedestrian traffic signal controller which will be installed in the traffic signal controller cabinet. This controller will be the interface between the traffic signal controller and the audible push button stations at the intersection.
2. MATERIAL. The audible pedestrian traffic signal controller must conform to Material Specification 1554.
3. INSTALLATION. The contractor must follow specific manufacturer's installation instructions.
4. METHOD OF MEASUREMENT. This work will be measured per unit for each audible traffic signal controller installed in a controller cabinet, completely wired to the traffic controller. Wiring to each station will be measured separately under a different item.
5. BASIS OF PAYMENT. This work will be paid for at the contract unit price each for AUDIBLE PEDESTRIAN PUSH-BUTTON SYSTEM CONTROLLER INTERFACE UNIT, which price will be payment in full for furnishing and installing the unit complete with all necessary connections, mounting, and adjustments required for proper operation. Wiring from the push button stations to the controller will be addressed under a separate pay item.

MATERIAL  
1554

## **ETHERNET MANAGE SWITCH**

### **DESCRIPTION**

This specification details the requirements for a managed Ethernet switch that is hardened to operate in an outdoor field environment in the City of Chicago. The switch shall be provided with all required mounting hardware, power supplies, cables, patch cords, and jumpers.

#### **1. GENERAL REQUIREMENTS**

- 1.1 The Ethernet switch shall be an environmentally hardened Ethernet switch compliant with IEEE 802.3af and IEEE 802.3at (10/100/1000 Mbps).
- 1.2 The Ethernet switch shall be suitable for an outdoor cabinet without the need for special environmental conditioning equipment.

#### **2. OPERATING ENVIRONMENTAL REQUIREMENTS**

- 2.1 The Ethernet switch shall be capable of operating properly over an ambient temperature range of -40°C to +85°C without the use of internal or external cooling fans in accordance with IEC 60068-2-1 and 60068-2-2.
- 2.2 The Ethernet switch shall be capable of operating properly in relative humidity conditions of 95% non-condensing at 55°C in accordance with IEC 60068-2-30.
- 2.3 The Ethernet switch shall meet the environmental requirements of traffic control equipment in accordance with NEMA TS 2 (2003), Section 2: Environmental Requirements, including NEMA TS 2 2003 (Section 2.2.8).
- 2.4 The Manufacturer shall provide written evidence of independent testing verifying performance in compliance with requirements.
- 2.5 The Ethernet switch shall be capable of operating properly when exposed to radiated electric fields of up to 10 V/m continuously and magnetic fields of up to 40 A/m continuously.
- 2.6 The Ethernet switch shall comply with the EMI Immunity requirements given in IEC 61850-3 and IEEE1613.
- 2.7 The Ethernet switch shall pass the minimum EMC immunity requirements of EN61800-3, the IEC standard for Adjustable Speed Electrical Power Drive Systems.

- 2.8 The Ethernet switch shall comply with the atmospheric, vibration, shock and bump requirements outlined in Table 1. This compliance shall be demonstrated by type withstands tests (i.e. 'type tests') as outlined in Table 1 and summarized in a Type Test Report per the test report requirements of each of the standards given in Table 1.

<b>Table 1: Environmental Tests</b>				
Test	Description		Test Level	Severity
IEC 60068-2-1	Cold Temp	Test Ad	-40° C (-40° F), 16 hours	N/A
IEC 60068-2-2	Dry Heat	Test Bd	85° C (185° F), 16 hours	N/A
IEC 60068-2-30	Humidity	Test Db	95% (non-condensing), 55° C (131° F), 6 cycles	N/A
IEC 60255-21-1	Vibration		2 g @ 10-150 Hz	Class 2
IEC 60255-21-2	Shock		30 g @ 11 ms	Class 2

### 3. PORT REQUIREMENTS

- 3.1 The Ethernet switch shall have a minimum of:
- (1) 8 - 10/100/1000Base TX ports
  - (2) 4 – 10/100/1000Base TX POE+ ports
  - (3) 2 – 100/1000Base X small form pluggable (SFP) slots
- 3.2 All fiber optic link ports shall be capable of multimode or single mode.
- 3.3 The Ethernet switch shall support the following requirements and options:
- (1) 10/100/1000Base TX ports:
    - a. RJ45 connectors
    - b. Cable type: Category 5, unshielded twisted pair (CAT 5 UTP)
    - c. Segment Length: 100m
    - d. Auto-negotiation support (10/100Mbps)



- e. Auto MDIX crossover capability
  - f. TVS (Transient Voltage Suppression) between Line +/-, Line+/- ground, to protect the circuitry
  - g. Full Duplex operation (IEEE 802.3x)
- (2) SFP modules (2) shall match the connected fiber type.
- a. LC connectors
  - b. Optical Characteristics 1310/1550 nm single mode, 1300/1310/850 nm multimode
  - c. Support fiber type 9/125µm single mode fiber, 62.5/125 or 50/125 µm multimode fiber
  - d. Optical budget single mode fiber: min. 34.5dB @ 1310nm
  - e. Full duplex operation (IEEE802.3x)
  - f. Cable distance 0.5 km multimode, 70 km single mode

#### **4. NETWORK REQUIREMENTS**

- 4.1 The Ethernet switch shall support automatic address learning of up to 8192 MAC addresses.
- 4.2 The Ethernet switch shall support the following advanced layer 2 functions:
- (1) IEEE 802.1Q VLAN, with support for up to 255 VLANs
  - (2) IEEE 802.1 p priority queuing
  - (3) IEEE 802.1w rapid spanning tree
  - (4) IEEE 802.1Q-2005 MSTP (formerly 802.1s)
  - (5) IEEE 802.1Q-VLAN tagging
  - (6) IEEE 802.3x flow control
  - (7) IEEE 802.3ad-Link Aggregation

- (8) IGMPv2
- (9) Port Rate Limiting
- (10) Configuration via test file which can be modified through standard text editor
- (11) DHCP Option 82
- (12) 20 Gbps full duplex bandwidth12 - 10/100/1000Base TX ports

4.2 The Ethernet switch shall provide the following network management functions:

- (1) SNMPv1, SNMPv2c, SNMPv3
- (2) RMON
- (3) GVRP
- (4) Port Mirroring
- (5) 802.1x port security
- (6) SSL – Secure Socket Layer
- (7) SSH – Secure Shell
- (8) TACACS+
- (9) TFTP
- (10) Network Time Protocol (NTP)
- (11) Simple Network Time Protocol (SNTP)
- (12) Management via web or Telnet
- (13) Tracing operation of protocols including but not be limited to the following: STP, MAC, IGMP

## 5. **PROGRAMMABLE CRITICAL FAILURE RELAY**

5.1 The Ethernet switch shall provide a programmable critical failure out relay

that may be configured to activate upon critical error detection such as loss of link or detection of critical system errors.

- 5.2 The programmable critical failure out relay function shall be user enabled and programmable.
- 5.3 The output contacts shall be available in a Form-C configuration with Max Current at 2A @ 30VDC.

## **6. POWER SUPPLY REQUIREMENTS**

- 6.1 The Ethernet switch shall be supplied with provisions for operation at the following power supply inputs, 85 to 264 VAC (50/60Hz).
- 6.2 The power supply shall be internal to the Ethernet switch and shall have isolation.
- 6.3 A power cord of not less than 5 feet in length shall be supplied.
- 6.4 The Ethernet switch shall require no more than 27W of power.

## **7. MOUNTING REQUIREMENTS**

- 7.1 The Ethernet switch shall provide options for DIN Rail mounting or panel mounting via brackets.

## **8. WARRANTY**

- 8.1 The Ethernet switch shall be warranted for defects in material and workmanship for five (5) years after shipment.
- 8.2 The Warranty shall include software updates and 24 x 7 phone support for the 5-year warranty period.

## **9. SAFETY REQUIREMENTS / AGENCY APPROVALS**

- 9.1 The Ethernet switch shall comply with electrical safety requirements or equivalents: UL 60950 or CSA C22.2 No. 60950 (safety requirements for IT equipment).
- 9.2 The Ethernet switch shall have CE (Europe) qualification.
- 9.3 The Ethernet switch shall also comply with FCC Part 15 Class A for EMI emissions.

**10. CONSTRUCTION**

- 10.1 Contractor shall securely mount the Ethernet switch inside the cabinet at the locations indicated on the plans.
- 10.2 Open space surrounding the switch shall be maintained for heat dissipation as recommended by the manufacturer.
- 10.3 Contractor shall neatly route and secure all power cords, patch cords, and jumpers within the cabinet and make connections as indicated on the plans. Cabling shall be handled without applying damaging strain.
- 10.4 Contractor shall position the switch so that the LED indicators are visible. Sufficient cable slack shall be provided to temporarily move the switch to access the cable connections for maintenance.
- 10.5 Contractor shall configure the Ethernet switch with enabled security and interoperability with the existing City network as directed by the Engineer. Administrative account login credentials shall be provided to the Engineer.
- 10.6 Contractor shall provide field troubleshooting support during integration and testing by the CDOT ATMS administrator.

**11. BASIS OF PAYMENT**

- 11.1 This work will be paid for at the contract price, each, for ETHERNET MANAGE SWITCH, which price will be payment in full for furnishing and installing the switch complete and operational, with all wiring and connections as specified herein.

## **CELLULAR MODEM**

### **DESCRIPTION**

This work consists of furnishing, installing, integration and testing an environmentally hardened cellular modem rated for outdoor use. Work requires service coordination with the Chicago Department of Innovation and Technology (DoIT) to complete an end-to-end, broadband cellular communications link between field device locations and the Chicago Traffic Management Center (TMC).

#### **1. GENERAL REQUIREMENTS**

- 1.1 This work shall be performed in accordance with the Chicago Department of Transportation (CDOT) standard specifications, except as modified herein.
- 1.2 The cellular modem shall provide Ethernet connectivity from field devices to the TMC.
- 1.3 The modem shall be provided with all required components, including power supply, antennas, and antenna cables necessary to provide complete functionality in all respects, without additional expense to the City.
- 1.4 The Contractor shall coordinate with DoIT and provide all information required to obtain cellular data service for cellular modems including cell service types. Cellular data service will be provided by the DoIT citywide cellular data service provider agreement.
- 1.5 Final equipment selection, procurement, and provisioning shall be coordinated with DoIT and CDOT.
- 1.6 The modem model shall be approved by selected wireless carrier for use on their network.
- 1.7 Identical and completely interchangeable equipment shall be used at each field location.
- 1.8 The modem shall include the manufacturer's installation and operations manuals in hardcopy and electronic PDF formats.
- 1.9 Contractor shall provide documentation of exact equipment model and serial numbers in hardcopy and electronic PDF formats.
- 1.10 The modem shall have the following general functions:

- (1) Support Virtual Private Network (VPN) connections
- (2) Support firewall capabilities, such as, Internet Protocol (IP) block/allow listings
- (3) Provide an “always-on” connection, without dialing
- (4) Support local and remote management
- (5) Domain name addressable
- (6) Port Filtering
- (7) Generic Routing Encapsulation (GRE) Tunneling
- (8) IP Filtering
- (9) Media Access Control (MAC) Address Filtering

## **2. MATERIAL REQUIREMENTS**

2.1 Modem transceiver shall support full duplex operation.

2.2 The modem shall be static IP addressable.

2.3 Frequency Band and Cellular Network Interface.

- (1) Fourth Generation (4G) Long Term Evolution (LTE) models:
  - a. Tri-band support for 700/1900/2100 megahertz (MHz)
  - b. Backward compatible with: evolved High Speed Packet Access (HSPA+), High Speed Packet Access (HSPA), Enhanced Data-rates for GSM Evolution (EDGE), General Packet Radio Service (GPRS) or Evolution Data Only (EV-DO) (Rev. A), Code Division Multiple Access (CDMA) EV-DO (Rev. 0), CDMA 1x Radio Transmission Technology (RTT) based on the selected provider’s network.
  - c. LTE auto-fallback to CDMA / GSM / HSPA.
- (2) Third Generation (3G) CDMA models:
  - a. Dual-band support for both 800 MHz and 1900 MHz

- b. Backward compatible with CDMA 1xRTT and CDMA Interim Standard (IS)-95.

(3) 3G HSPA+ models:

- a. Tri-band support for 850/1900/2100 MHz or quad-band support for 850/900/1800/1900 MHz
- b. Backward compatible with: HSPA, universal mobile telecommunications system (UMTS), EDGE, GPRS, and Global System for Mobile communications (GSM)

2.4 Ethernet Interfaces

- (1) Support Transmission Control Protocol (TCP)/IP and User Datagram Protocol (UDP)/IP.
- (2) Registered Jacks (RJ)-45, IEEE 802.3 standard 10 Base-T Ethernet port for 3G cellular modems and 100 Base-TX Ethernet ports for 4G modems.
- (3) Include network cables that are Electronic Industries Alliance (EIA)/Telecommunications Industry Association (TIA)-568-A compliant.

2.5 Antenna

- (1) Omnidirectional external antenna rated for outdoor use and fully compatible with the modem. Contractor shall select the specific antenna that provides optimal signal reception at each site as recommended by the modem manufacturer.
- (2) 50-Ohm Sub Miniature version A (SMA) male connector.
- (3) Include an antenna cable with required adapters per the manufacturer's recommendation.
- (4) Minimum Antenna gain of 2 database interface (dBi).
- (5) Right-angle swivel connector that allows for the antenna to be upright when connected to the cellular modem.
- (6) Operating Frequencies of 698-896 and 1700-2700 MHz.

2.6 Power

- (1) Include compatible power supply and connections as recommended by the modem manufacturer.

## 2.7 Mounting Hardware

- (1) Include mounting hardware recommended by the modem manufacturer to securely mount the modem in designated locations as shown on the plans.

## 2.8 Environmental

- (1) Operating temperature for the modem and all associated field components shall be -22° F to 158° F.
- (2) Storage temperature for the modem and all associated field components shall be -22° F to 158° F.
- (3) The modem and all associated field components shall operate in relative humidity of 5 percent to 95 percent non-condensing.

## 2.9 Management, Security and Diagnostic

- (1) Support real-time 2-way communications for remote management and shall include management software by the modem manufacturer.
- (2) Light-emitting diode (LED) indicators for Ethernet, power, cellular link/activity and signal strength.
- (3) Support signals for Transmit Data (TXD), Receive Data (RXD), Request To Send (RTS), Clear To Send (CTS), Data Terminal Ready (DTR), Data Set Ready (DSR), Data Carrier Detect (DCD) and hardware and software flow control.
- (4) Compatibility with Hypertext Transfer Protocol (HTTP)/HTTP Secure (HTTPS), Dynamic Host Communications Protocol (DHCP), Simple Network Management Protocol (SNMP) v2 or v3, Simple Mail Transfer Protocol (SMTP), Secure Socket Layer (SSL), Secure Shell (SSH)-2.
- (5) Web-based Graphical User Interface (GUI).
- (6) Command Line Interface (CLI) access via TELNET connection.
- (7) SNMP Management Information Base (MIB)-II and SNMP Traps.



2.10 Warranty

- (1) The cellular modem shall include a standard manufacturer's warranty, transferable to CDOT. Transfer shall be completed prior to final written acceptance.
- (2) The cellular modem warranty shall cover parts, shipping, software, and labor for a period of 3 years from the date of shipment with at least 2 years of warranty remaining at the start of integration burn-in testing.
- (3) Written warranty and other applicable documents from the manufacturer, and a copy of the invoice showing the date of shipment, shall be provided to the Engineer prior to final written acceptance.

**3. CONSTRUCTION**

3.1 General

- (1) Contractor shall securely mount the cellular modem inside the cabinet at locations indicated on the plans. Open space surrounding the modem shall be maintained for heat dissipation as recommended by the manufacturer.
- (2) Contractor shall conduct a cellular site survey and submit to the Engineer for acceptance prior to the procurement of materials. The purpose of the survey is to measure the signal strength and throughput of cellular coverage at the project locations. Testing must include upload/download throughput, latency, and received signal strength and the assessment of communications quality to support the connected field devices. Contractor shall identify any sites where communications quality is inadequate. This testing is included with the cellular modem at no additional cost to the City.
- (3) Contractor shall first install antenna(s) inside the cabinet and assess signal quality. Cabinet wall penetrations for external cabinet-mounted antennas are allowed only if required to achieve reliably consistent signal communications quality and with written approval by the Engineer. Penetration location shall avoid being directly above electronic components, wiring conductors, or terminals. Final location to be approved by the Engineer. External antenna mounting connections shall be made watertight with UV-resistant, outdoor-rated sealant. Installation shall avoid damage to internal cabinet components. Cable length shall be minimized to reduce signal attenuation.

- (4) Contractor shall neatly route and secure all cabling with the cabinet. Cabling shall be handled without applying damaging strain.
- (5) Contractor shall position the cellular modem so that the LED indicators are visible. Sufficient cable slack shall be provided to temporarily move the modem to access the cable connections for maintenance.
- (6) Contractor shall configure the cellular modem with enabled security and interoperability with the existing City network as directed by the Engineer, including VPN settings, local IP address, port forwarding and Network Address Translation (NAT), and IP-based filtering. Administrative account login credentials shall be provided to the Engineer.
- (7) Contractor shall provide field troubleshooting support during integration and testing by the CDOT ATMS administrator.
- (8) Contractor shall provision the modem on the City's cellular provider's (currently Verizon) private network, with an IP address provided by DoIT. Cellular service shall be included for three years. Cellular service costs will be paid by DoIT after the initial three years.

#### **4. BASIS OF PAYMENT**

This work will be paid for at the contract price, each, for CELLULAR MODEM, which price will be payment in full for furnishing and installing the modem complete and operational for three years, coordination with and payments to cellular service provider, with all wiring and connections as specified herein.

**CABLE, SPECIAL**

**Description.** This item will consist of furnishing and installing cable in traffic signal poles to connect traffic signals or illuminated signs to a junction box on the pole. The cable shall be harness cable, No. 16 8/C.

**Material.** The cable must meet the requirements of Material Specification 1475.

**Installation.** The contractor must install the cable from the required signal or sign terminal strip through the pole and mast arm to the terminal strip in the junction box. The contractor must properly terminate the cable at the terminal strips as directed by the Engineer. Sufficient cable will be provided so as not to unduly strain the cable during installation, and to provide sufficient cable for easy termination.

**Method of Measurement.** This work will be measured per lineal foot of cable installed. Cable terminations will be considered incidental to this pay item.

**Basis of Payment.** This work will be paid for at the contract unit price per lineal foot for CABLE, SPECIAL, which payment will be in full for furnishing and installing the cable.

## **ELECTRIC SERVICE INSTALLATION**

**Description.** This item shall consist of installing an electric service installation on an existing Com Ed wood pole for the City of Evanston proposed street lighting controllers and meter pedestals as indicated on the plans or as directed by the Engineer.

**Construction Method.** The electric service installed in accordance with Section 804 of the Standard Specifications and the Contract Drawings. The electric service shall consist of the proposed conduit/conduit straps mounted to the wood pole, vertical span of cable (including cable coiled for Com Ed to connect to existing aerial cables), u-guard, ground rod, ground clamp and ground wire.

All work shall be in accordance with National Electric Code (NEC), Chicago Electric Code and Standard Specifications.

**Method of Measurement.** This item shall be measured per each electric service installation.

**Basis of Payment.** This work shall be paid for at the contract unit price per each ELECTRIC SERVICE INSTALLATION, which shall include all work as described herein.

Removal of existing electric service installations shall be paid for separately.

**ELECTRIC UTILITY SERVICE CONNECTION (COM ED)**

**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 Method.** 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.

**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.

**VIDEO SURVEILLANCE SYSTEM, COMPLETE**

**Description.** This work shall consist of furnishing and installing a remote-controlled video camera equipment at a location indicated on the plans. The work shall include a static cameras, PTZ camera, license plate recognition (LPR) camera, NEMA 3R enclosure, all mounting hardware, fiber optic terminations, connectors, cables, power injectors, connection to existing City of Evanston fiber optic network, and all related equipment necessary to complete the installation.

**Materials.** The equipment shall consist of the following, or as directed by the City of Evanston:

<b>Description</b>	<b>Manufacturer</b>	<b>Model No.</b>
NEMA 3R Enclosure	L-Com	NB201611-1HF
Pole Mount Kit	L-Com	HGX-PMT29
Power Supply for Injector	Mean Well	SDR-240-48
60W PoE Power Injector	TrendNet	TI-IG60
Ethernet 10-Port PoE Switch	Comtrol	ES7510-XT
Static Position Camera	HikVision	DS-2CD2142FWD-I
Static Position Camera Wall Mounting Bracket	HikVision	DS-1272ZJ-110B
PTZ Camera	Dahua	DH-SD59230U-HNI
PTZ Camera Bracket Arm	Dahua	DH-PFB310W
License Plate Recognition (LPR) Camera	HikVision	DS-2CD4A26FWD-IZHS8/P
Pole Mount Bracket	Dahua	DH-PFA150
64GB Micro SDXC Storage Card	SanDisk	SDSQUAR-064G-GN6MA

A separate NEMA 3R Enclosure shall be provided to house termination and splicing tray (with SC connector types), strain relief clamps, retaining guides, and ground bar. The enclosure shall be sized to accommodate the required number of fiber terminations and splices.

**Installation.** The Contractor shall contact the City of Evanston Information Security Officer (Mr. Dmitry Shub), Chief of Police and Engineer prior to installing any camera equipment to confirm camera equipment location(s), orientation and mounting configuration. If the Contractor begins work without coordinating with the City of Evanston and Engineer, he/she shall assume all expenses to adjustment and revision equipment layout.

The equipment shall be installed in accordance with the manufacturer recommendations and as shown on the plans. The equipment shall be installed so that the cameras are

provided with a minimum of 12-inches clear space between the face of the pole and the camera housing. All mounting equipment shall be stainless steel.

All fibers terminated in the splicing tray mounted to the light pole shall be labeled at the connector and also at the termination points indicated on the plan. The label shall include the direction and also the fiber number (e.g. S1, S2, N11, N12).

A minimum of 13 feet of slack cable shall be provided in each termination enclosure. The slack cable shall be stored as directed by the Traffic Engineer. The quality of the fiber optic cable, including all splices and terminations, shall be verified by testing and documentation according to Article 801.13(d) of the "Standard Specifications", to the satisfaction of the Traffic Engineer.

Multimode Terminations: The Contractor shall coordinate with the equipment supplier, and shall terminate as many multimode fibers as are necessary to establish proper communications between new and/or existing video transmission equipment. The Contractor shall provide four spare multimode fiber terminations in the enclosure. All multimode terminations shall be SC compatible connectors with ceramic ferrules.

Singlemode: The Contractor shall splice and/or terminate the number of singlemode fibers shown on the contract drawings, if any, according to the following requirements:

Singlemode Fiber Terminations: All singlemode fiber terminations shall utilize pre-fabricated, factory-terminated (SC compatible with ceramic ferrules) pigtails fusion spliced to bare fibers. The pre-fabricated pigtails shall have all of their fibers color coded to match the singlemode fibers in the fiber optic cable. Connector bulkheads shall be the proper type for the fiber enclosure at the location, and shall be properly secured to the enclosure.

Singlemode Fiber Splices: 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.

Splices shall be secured in fiber optic splice trays within the enclosure. 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 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.

All optical fibers shall be spliced to provide continuous runs. Splices shall only be allowed in enclosures, unless otherwise directed by the Engineer.

Proposed switches and power injector shall be located in a NEMA 3R enclosure. The Contractor shall furnish and install the required number of power injectors for the quantity of cameras, operation of the camera heater, and all required mounting hardware, connectors, patch cables, and power supplies.

Contractor shall furnish and install rubber grommets for all holes drilled into traffic signal and/or light poles for mounting the proposed camera equipment. The Contractor shall coordinate any traffic signal or lighting circuit shut-downs necessary to drill existing poles to install the proposed equipment.

Included in this work is connection to the City of Evanston's existing fiber optic network. The Contractor shall:

- 1) Connect proposed fiber optic cable to the equipment located in the electric room within the Levy Senior Center, at 300 Dodge Avenue, as indicated on the plans. The Contractor shall reuse existing 4" metal conduits located within the building to route the proposed fiber optic cables to the existing IT equipment/rack. The Contractor shall furnish a 19-inch rack mounted fiber optic terminal box and coordinate integration of the equipment with the City of Evanston.
- 2) Furnish and install a fiber optic termination panel in a NEMA 3R enclosure at the following intersections:
  - a. Howard Street and Dodge Avenue
  - b. Howard Street and Asbury Avenue
  - c. Howard Street and Ridge Avenue
  - d. Howard Street and Elmwood Avenue
  - e. Howard Street and Custer Avenue
- 3) Furnish and install a fiber optic termination panel in a NEMA 3R enclosure on an existing light pole located on the NE corner of Custer Avenue and Brummel Street.
- 4) Contractor shall coordinate disconnection of existing cellular equipment prior to removing the equipment at the following locations:
  - a. Light pole located on the NE corner of Custer Avenue and Brummel Street
  - b. Light pole located on the NW corner of Howard Street and Elmwood Avenue

**Method of Measurement.** This item shall be measured per each location.

**Basis of Payment.** This work shall be paid for at the contract unit price per each VIDEO SURVEILLANCE SYSTEM, COMPLETE, which shall include all work as described herein and as directed by the City of Evanston.



## **MAINTENANCE OF EXISTING LIGHTING SYSTEM**

Replace Article 801.11 and 801.12 of the Standard Specifications with the following:

**Description.** Effective the date the Contractor's activities (electrical or otherwise) at the job site begin, the Contractor shall be responsible for the proper operation and maintenance of all existing and proposed lighting systems which are part of, or which may be affected by the work until final acceptance or as otherwise determined by the Engineer.

At least one week prior to the beginning of construction the Contractor shall conduct and inspection of the existing lighting units with a representative of the agency responsible for maintenance. The inspection shall reveal defective lighting items such as cable, mast arms, luminaires, poles, and all other appurtenances that combine for a complete operating unit. The Contractor shall not be responsible for any defective items identified during the inspection. In case the Contractor fails to contact the maintaining agency for this inspection, the Contractor shall be held responsible for all items that are found defective at the completion of the contract.

The Contractor shall become responsible for the maintenance of the existing lighting units on a date mutually agreed upon between the Contractor and the maintaining agency representative, but no later than the beginning of any construction within the limits of the project. If any mobilization or any type of work begins on the project, the Contractor shall assume complete maintenance at that point, and assume all deficiencies at their own expense. This maintenance shall remain in effect until written notice of final acceptance of the proposed lighting system is issued by the Engineer. Only after this requirement has been satisfied may the Contractor begin removal operations of the existing lighting units.

### **Maintenance of Existing Lighting Systems**

**Existing lighting systems.** Existing lighting systems is defined as any lighting system or part of a lighting system in service prior to this contract. The contract drawings indicate the general extent of any existing lighting, but whether indicated or not, it remains the Contractor's responsibility to ascertain the extent of effort required for compliance with these specifications and failure to do so will not be justification for extra payment or reduced responsibilities.

### **Existing Lighting Systems Requiring Maintenance.**

**City of Chicago – Howard Street and Sacramento Avenue – Full Maintenance:**

- Lighting Controller on southwest corner of Howard Street and Sacramento Avenue (CDOT Com Ed Atlas No. I-4, Group 14)
- Eighteen arterial roadway light poles

- Three roadway luminaires mounted to combination light poles at Sacramento Avenue
- Two roadway luminaires mounted to combination light poles at California Avenue

City of Chicago – Howard Street and Rockwell Avenue – Full Maintenance:

- Lighting Controller on southwest corner of Howard Street and Rockwell Avenue (CDOT Com Ed Atlas No. J-4, Group 13)
- Eighteen arterial roadway light poles
- Eight arterial roadway light poles along the alley for The Park Terrace Apartment Complex
- Ten residential roadway light poles along Rockwell Street, east on Jerome Avenue
- Three Florentine light poles (in front of Gulliver's Pizza)
- Two roadway luminaires mounted to combination light poles at California Avenue
- Two roadway luminaires mounted to combination light poles at Western Avenue

City of Chicago – Howard Street and Ridge Boulevard – Full Maintenance:

- Lighting Controller on Howard Street just west of Ridge Boulevard (CDOT Com Ed Atlas No. K-4, Group 1)
- Ten arterial roadway light poles
- Seven Gateway light poles
- One Gateway light pole along Seeley Avenue
- Five Chicago 2000 pedestrian light poles
- Two roadway luminaires mounted to combination light poles at Western Avenue
- Four roadway luminaires mounted to combination light poles at Ridge Boulevard

City of Chicago – Howard Street and Wolcott Avenue – Full Maintenance:

- Lighting Controller on Howard Street just west of Chicago and Northwestern Railroad (CDOT Com Ed Atlas No. L-4, Group 1)
- Four Gateway light poles
- Four Gateway luminaires mounted to combination light poles at Damen Avenue
- Nine Chicago 2000 pedestrian light poles

City of Evanston – Howard Street and Dodge Avenue – Full Maintenance:

- Lighting Controller north of Howard Street on the east side of Dodge Avenue
- Seven davit style roadway light poles Dodge Avenue
- Eight davit style roadway light poles along Howard Street

City of Evanston – Howard Street and Asbury Avenue – Full Maintenance:

- Lighting Controller north of Howard Street on the east side of Asbury Avenue
- Eight pedestrian light poles Asbury Avenue
- Eight davit style roadway light poles along Howard Street

City of Evanston – Howard Street and Ridge Avenue – Full Maintenance:

- Lighting Controller north of Howard Street on the east side of Ridge Avenue
- Seventeen pedestrian light poles Ridge Avenue

- Three davit style roadway light poles along Howard Street

City of Evanston – Howard Street and Custer Avenue – Full Maintenance:

- Lighting Controller on the northwest corner of Howard Street and Custer Avenue
- Eleven Gateway light poles along Howard Street
- Fourteen Chicago 2000 pedestrian light poles along Howard Street
- Two Chicago 2000 pedestrian light poles along Custer Avenue

Extent of Maintenance.

Partial Maintenance. Unless otherwise indicated, if the number of circuits affected by the contract is equal to or less than 40% of the total number of circuits in a given controller and the controller is not part of the contract work, the Contractor needs only to maintain the affected circuits. The affected circuits shall be isolated by means of in-line waterproof fuse holders as specified elsewhere and as approved by the Engineer.

Full Maintenance. If the number of circuits affected by the contract is greater than 40% of the total number of circuits in a given controller, or if the controller is modified in any way under the contract work, the Contractor shall maintain the entire controller and all associated circuits.

**Maintenance of Proposed Lighting Systems**

Proposed Lighting Systems. Proposed lighting systems shall be defined as any lighting system or part of a lighting system which is to be constructed under this contract.

The Contractor will be fully responsible for maintenance of all items installed under this contract. Maintenance shall include, but not be limited to, any equipment failures or malfunctions as well as equipment damage either by the motoring public, Contractor operations, or other means. The potential cost of replacing or repairing any malfunctioning or damaged equipment shall be included in the bid price of this item and will not be paid for separately.

**Lighting System Maintenance Operations**

The Contractor's responsibility shall include all applicable responsibilities of the Electrical Maintenance Contract, City of Chicago Division of Engineering - Electrical Section, and State of Illinois Department of Transportation, Division of Highways, District One. These responsibilities shall include the maintenance of lighting units, cable runs and lighting controls. In the case of a pole knockdown or damage caused by normal vehicular traffic, the Contractor shall promptly clear the lighting unit and circuit discontinuity and restore the system to service.

Responsibilities shall also include weekly night-time patrol of the lighting system, with patrol reports filed immediately with the Engineer and with deficiencies corrected within 24 hours of the patrol. Patrol reports shall be presented on standard forms as designated by the Engineer. Uncorrected deficiencies may be designated by the Engineer as necessitating emergency repairs as described elsewhere herein.

The following chart lists the maximum response, service restoration, and permanent repair time the Contractor shall be allowed to perform corrective action on specific lighting system equipment.

<b>INCIDENT OR PROBLEM</b>	<b>SERVICE RESPONSE TIME</b>	<b>SERVICE RESTORATION TIME</b>	<b>PERMANENT REPAIR TIME</b>
Control cabinet out	1 hour	4 hours	7 Calendar days
Hanging mast arm	1 hour to clear	na	7 Calendar days
Radio problem	1 hour	4 hours	7 Calendar days
Motorist caused damage or leaning light pole 10 degrees or more	1 hour to clear	4 hours	7 Calendar days
Circuit out – Needs to reset breaker	1 hour	4 hours	na
Circuit out – Cable trouble	1 hour	24 hours	21 Calendar days
Outage of 3 or more successive lights	1 hour	4 hours	na
Outage of 75% of lights on one tower	1 hour	4 hours	na
Outage of light nearest RR crossing approach, Islands and gores	1 hour	4 hours	na
Outage (single or multiple) found on night outage survey or reported to EMC	na	na	7 Calendar days
Navigation light outage	na	na	24 hours

- **Service Response Time** -- amount of time from the initial notification to the Contractor until a patrolman physically arrives at the location.

- **Service Restoration Time** – amount of time from the initial notification to the Contractor until the time the system is fully operational again (In cases of motorist caused damage the undamaged portions of the system are operational.)
- **Permanent Repair Time** – amount of time from initial notification to the Contractor until the time permanent repairs are made if the Contractor was required to make temporary repairs to meet the service restoration requirement.

Failure to provide this service shall result in liquidated damages of \$500 per day per occurrence. In addition, the Department reserves the right to assign any work not completed within this timeframe to an Electrical Maintenance Contractor of their choice. All costs associated to repair this uncompleted work shall be the responsibility of the Contractor. Failure to pay these costs to this Electrical Maintenance Contractor within one month after the incident shall result in additional liquidated damages of \$500 per month per occurrence. Unpaid bills shall be deducted from the cost of the Contract. Repeated failures and/or a gross failure of maintenance shall result in the State's Electrical Maintenance Contractor being directed to correct all deficiencies and the resulting costs deducted from any monies owed the Contractor.

Damage caused by the Contractor's operations shall be repaired at no additional cost to the Contract.

### **Operation of Lighting**

The lighting shall be operational every night, dusk to dawn. Duplicate lighting systems (such as temporary lighting and proposed new lighting) shall not be operated simultaneously. Lighting systems shall not be kept in operation during long daytime periods. The Contractor shall demonstrate to the satisfaction of the Engineer that the lighting system is fully operational prior to submitting a pay request. Failure to do so shall be grounds for denying the pay request.

**Method of Measurement.** This item will be measured per each lighting system maintained by the City within the project limits, and shall include all labor and materials to maintain each installation in full operation throughout the duration of the construction of this project, or as indicated by the Engineer.

**Basis of Payment.** Maintenance of lighting systems shall be paid for at the contract unit price each for MAINTENANCE OF EXISTING LIGHTING SYSTEM, which shall include all work as described herein.

**BASE COVER LIGHT POLE**

**Description.** This item is for removing damaged light pole base, and furnishing, supplying and installing a new light pole base cover, at locations indicated on the plans or as directed by the Engineer.

**Material.** The handhole covers shall be in accordance with Material Specification 1512 and 1513. The light pole base covers shall have the appearance of Standard Drawing 928 and 930A.

**Method of Construction.** The light pole base cover shall be installed in accordance with the manufacturer's recommendations. The Contractor shall remove and replace light pole base covers at locations indicated on the plans or as directed by the Engineer.

Removed base covers shall be disposed of in accordance with Article 202.03 of the Standard Specifications.

**Method of Measurement.** This item shall be paid for at the contract unit price per each light pole base cover removed and replaced.

**Basis of Payment.** This work shall be paid for at the contract unit price each for BASE COVER LIGHT POLE, which shall include all work described herein.

MATERIAL SPECIFICATIONS  
1505 1512 1513

STANDARD DRAWING  
928 930A

**CABLE IN CONDUIT, TRIPLEX, 2-1/C NO. 6 AND 1-1/C NO. 8 GROUND**

**Description.** This work shall consist of furnishing and installing electric conductors that are in a triplex cable assemblies. The conductors shall be rated at 600 volts and must consist of two #6 AWG conductors and one #8 AWG conductor for the triplex cable assembly. The cable will be installed underground in conduit between CDOT owned and maintained light poles as indicated on the plans.

**Material.** The cable shall meet all requirements of Material Specification 1534 of the Division of Engineering - Electrical Section. Cable splices shall meet the requirements of Section 800 and Section 1066.06 of the Standard Specifications. All materials shall be approved by the Engineer before implementation.

**Construction Method.** All cables shall be installed with care to prevent damage to the cable. Any defects found in the cable shall be reported to the resident engineer. Damaged cable shall be replaced.

The cable shall be pulled into the conduit with a minimum of dragging on the ground or pavement. This shall be accomplished by means of reels mounted on jacks or other suitable devices located for unreeling cable directly into duct. Lubricants shall be used to facilitate installation if deemed necessary by the Contractor.

Bends in the cable shall conform to the recommended minimum radii as outlined in the National Electric Code.

Cable passing through manholes shall be trained and racked around the sides of the manhole into a permanent position. If are no existing racks or if the existing are in poor condition, the Contractor shall install new racks. The material shall be approved by the resident engineer. Any material and labor involved in training and racking the cable shall be considered incidental to the cost of this pay item.

Where cable runs continue from manhole to manhole without tapping within a light pole, they shall be continuous without splices unless authorized by the resident engineer.

The cable installation shall be color coded so that each lead of all circuits may be easily identified and are connected to the proper leg of the luminaires circuits. The lighting triplex cable assembly shall have one phase conductor color coded black and the other color coded red. The equipment grounding conductor (#8) shall be color coded green, and neutral conductors shall be color coded white or grey as indicated on the plans.

All wire or cable in the distribution panels and control cabinets shall be properly trained and shall have sufficient slack provided for any rearrangement of equipment or future additions.

There shall be at least three feet of slack in a street light pole base or street light controller base. A handhole shall have at least five feet of slack and a manhole at least ten feet of slack.

Splices shall be located in light pole base. Splices shall be made with materials that are compatible with conductors and insulation. The connectors shall be UL listed, and sized properly for the quantity and size of the conductors to be spliced. Splices shall be as shown on the plans.

The Contractor shall label all wires with wire markers indicating the circuit identifier in every controller, pole base, manhole, handhole and splice/connection point.

**Method of Measurement.** The length of triplex cable furnished and installed, including three feet for cable entering and leaving a light pole or lighting controller cabinet, plus any slack in manholes or handholes.

**Basis of Payment.** This work will be paid for at the contract unit price per lineal foot for CABLE IN CONDUIT, TRIPLEX, 2-1/C NO. 6 AND 1-1/C NO. 8 GROUND, which shall include all material, labor, splices, terminations, and incidentals necessary to complete the work as described herein.

MATERIAL SPECIFICATION  
1534



**STREET LIGHTING CABLE, 1/C NO. 6, CITY OF CHICAGO**

**STREET LIGHTING CABLE, 1/C NO. 2**

**STREET LIGHTING CABLE, 1/C NO. 2/0**

**Description.** This work shall consist of furnishing and installing electric cable as specified. The cable shall be rated at 600V and shall be installed in conduit underground between CDOT owned and maintained light poles as indicated on the plans.

**Material.** The cable shall meet all requirements of Material Specification 1534 of the Division of Engineering - Electrical Section, City of Chicago. Cable splices shall meet the requirements of Section 800 and Article 1066.06 of the Standard Specifications. All materials shall be approved by the Engineer before installation.

**Construction Method.** All cables shall be installed with care to prevent damage to the cable. Any defects found in the cable shall be reported to the Resident Engineer. Damaged cable shall be replaced.

The cable shall be pulled into the conduit with a minimum of dragging on the ground or pavement. This shall be accomplished by means of reels mounted on jacks or other suitable devices located for unreeling cable directly into duct. Lubricants shall be used to facilitate installation if deemed necessary by the Contractor.

Bends in the cable shall conform to the recommended minimum radii as outlined in the National Electric Code.

Cable passing through manholes shall be trained and racked around the sides of the manhole into a permanent position. If there are no existing racks or if the existing are in poor condition, the Contractor shall install new racks. The material shall be approved by the Resident Engineer. Any material and labor involved in training and racking the cable shall be considered incidental to the cost of this pay item.

Where cable runs continue from manhole to manhole without tapping within a light pole, they shall be continuous without splices unless authorized by the Resident Engineer.

The cable insulation shall be color coded in accordance with Article 1066.02 of the Standard Specifications so that each cable installed may be easily identified. Tape on the conductors or color striping of cables shall not be acceptable in lieu of the specified color coding means.

All wire or cable in the distribution panels and control cabinets shall be properly trained and shall have sufficient slack provided for any rearrangement of equipment or future

additions. There shall be at least three feet of slack in a light pole base or light controller base. Handholes shall have at least five feet of slack and manholes at least ten feet of slack. Service cables shall include vertical conduit rises along Com Ed service poles to service disconnect/junction cabinet. Cables coiled above the service disconnect/junction cabinet, to connect to Com Ed secondary cables, shall be paid for separately and shall not be included in this pay item.

Splices shall be located in light pole base. Splices shall be made with materials that are compatible with conductors and insulation. The connectors shall be UL listed, and sized properly for the quantity and size of the conductors to be spliced. Splices shall be as shown on the plans.

The Contractor shall label all wires with wire markers indicating the circuit identifier in every controller, pole base, manhole, handhole and splice/connection point.

**Method of Measurement.** The length of cable furnished and installed will be measured as the length of conduit plus three feet for cable entering and leaving a light pole or lighting controller cabinet, plus any slack in manholes or handholes. Also included in this pay item are all splices located in the light pole bases or manhole/handhole.

**Basis of Payment.** This work will be paid for at the contract unit price per lineal foot for STREET LIGHTING CABLE, CITY OF CHICAGO or STREET LIGHTING CABLE, of the size specified, which shall include all material, labor, splices, terminations, and incidentals necessary to complete the work as described herein.

MATERIAL SPECIFICATION  
1534

## **ROD AND CLEAN DUCT IN EXISTING CONDUIT SYSTEM**

**Description and Scope.** This work shall consist of inserting a duct rod or electrical fish rod or tape of sufficient length and rigidity into an electrical conduit opening in one electrical manhole or handhole and pushing the said rod through the conduit to emerge at the next or a subsequent manhole in the conduit system at the location shown on the plans. The duct rod may be inserted and removed by any standard construction method which causes no damage to the conduit system. The size of the conduit may vary from two inch (2") to four inch (4"), but there shall be no differentiation in cost for the size of the conduit.

The conduit system which is to be rodded and cleaned may exist with various amounts of standing water in the manholes. The Contractor shall pump the water or sufficient water from the manholes to drain the conduit and to afford compatible working conditions for the installation of the duct rods and/or cables. The pumping of the manholes shall be included in the cost of rodding and cleaning of the conduit and shall not become a separate pay item.

Any manhole which, in the opinion of the Engineer contains excessive debris, dirt or other materials to the extent that conduit rodding and cleaning is not feasible, shall be cleaned and paid for as directed by the Engineer.

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

**Method of Measurement.** This work shall not be measured separately for payment.

**Basis of Payment.** This work shall be included in the contract unit price per lineal foot for ELECTRIC CABLE IN CONDUIT INSTALLED (OF THE SIZE SPECIFIED) installed in existing conduit. Such price shall include furnishing all necessary tools, equipment, and polyethylene line as required to prepare a conduit for installation of cable. When the number of cables to be installed require the use of more than one conduit in the same run, each additional conduit required shall be rodded and cleaned. Conduit which is not

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intended to be utilized in the specific installation shall not be rodded and cleaned as spares.

## **PAINT EXISTING STREET LIGHT/TRAFFIC EQUIPMENT COMPLETE**

**Description.** This work shall consist of field painting existing steel and aluminum structures including poles and arms that support street light fixtures and traffic control signals, street lighting control cabinets, traffic signal control cabinets and red light cameras, traffic signal head housing, and street light luminaire housings.

**Material.** All paints and painting materials intended for applications specified herein shall be certified by the Contractor to be of highest quality, shall be from the same manufacturer, and shall conform to the following, as applicable:

**Naptha.** The solvent to be used for wiping down all metallic surfaces prior to application of paint shall be NAPTHA conforming to ASTM Standard D838.

**Primer.** This paint shall meet the requirements of Section 4 (composition) and Section 5 (properties) of the Steel Structures Painting Council's Paint Specification No. 25 for red iron oxide, zinc oxide, raw linseed oil and alkyd primer as outlined in Volume 2, Systems and Specifications, Third Edition.

**Intermediate Coat.** The paint shall meet the same requirements as the primer except that it shall contain a contrasting shade of iron oxide or be tinted or shaded to produce a distinct contrast of at least 10 Hunter Delta E units compared to the primer.

**Finish Coat.** This paint shall meet the requirements of Section 4 (composition) and Section 5 (properties) of the Steel Structures Painting Council's Paint Specification No. 21 for lead free white or colored silicone alkyd paint, Type 1, high gloss as outlined in Volume 2, Systems and Specifications, Third Edition.

**Color.** A paint sample shall be submitted for approval prior to authorization to paint. The color shall match the proposed street light poles and equipment. The sample shall be in the form of a 4" by 8" color chip. The Contractor shall provide a field-painted sample, if requested by the Engineer. The field sample shall be of the same type of equipment to be painted and shall be chosen by the Engineer. Color shall be black.

**Product Data.** The Contractor shall submit the manufacturer's technical information, label analysis, and application instructions for each material proposed for use. Each material shall be listed and cross-referenced for the specific coating, finish system, and application. Each material shall include the manufacturer's catalog number.

**Delivery, Storage, and Handling.** The Contractor shall deliver, store, and handle the paint as herein specified.

The materials shall arrive at the job site in the manufacturer's original, unopened packages and containers bearing the manufacturer's name label, product name, product

description, manufacturer's stock number, date of manufacture, contents by volume for pigment and vehicle constituents, thinning instructions, application instructions, and color name and number.

Materials to be stored shall be kept in tightly covered containers in a well-ventilated area at a minimum ambient temperature of 45° Fahrenheit.

### **Preparation of Surfaces.**

Steel Surfaces. Remove loose or scaling paint, dirt, oil grease, rust and foreign matter, as necessary, to receive paint. Wire brushing, where specified herein, shall be done with an approved power tool operated from a portable power source. After wire brushing, the complete surface shall be thoroughly wiped with a rag containing NAPTHA.

Aluminum Surfaces. Remove loose scale and paint, dirt, oil, grease and foreign matter, as necessary, to receive paint. Wire brush surfaces, where necessary, to remove loose scale. Wire brushing, where specified herein, shall be done with an approved power tool operated from a portable power source. After wire brushing, the complete surface shall be thoroughly wiped with a rag containing NAPTHA.

Weather Conditions. Do not apply paint coatings when temperature is below 40° F, or during periods of rain, fog, snow, or when relative humidity is above 85 %.

Application Conditions. Surfaces to be painted shall be clean, dry, and relatively smooth. Each paint coating shall be applied smoothly and worked out evenly. Paint shall be thoroughly mixed just prior to application. Thinning shall be held to a minimum, and shall be done only when required for proper application. Thinners to be used shall be the manufacturer's recommended thinner for the paints used; mixed thoroughly to assure complete blending with the coating. Spray painting shall not be permitted when wind conditions are greater than 15mph. Painting shall be done as soon after cleaning as possible.

### **Detail Painting Requirements.**

All work shall be performed in place. Contractor shall not be allowed to remove any poles or pole mounted equipment to allow, or accommodate, for field painting.

Street Light Poles. Street light poles to be painted under these specifications are steel structures which shall vary from twenty-seven (27) to thirty-five (35) feet in height, with average surface required to be painted of approximately forty-eight (48) square feet. The Contractor shall be required to wire-brush any areas that are rusting and/or are bare. The pole shall be thoroughly wiped with NAPTHA, and the finish coating applied.

Luminaire Mast Arms. Luminaire mast arms which are attached to the existing street light poles, or combination traffic signal/light poles, will consist of 2-inch steel pipe sections which will vary between eight feet (8') and fifteen feet (15') in length. Mast arms in twelve foot (12') and 15 foot (15') sizes will have a supporting strut of two inch (2") steel pipe. Surface scale and rust shall be wire-brushed, and these mast arms thoroughly wiped with NAPTHA, and finish painted.

Street Light Controllers. The control cabinets shall be cast aluminum and are approximately 18"x14"x30" in size. Cabinets will be mounted atop a three foot six inch (3'-6") high post or base mounted. The Contractor shall be wire-brushed, as necessary, and thoroughly wiped down cabinets and castings with NAPTHA, prior to applying a finish coat.

Traffic Signal Post. Aluminum and steel posts will consist of five inch (5") pipe sections atop a conical base or base flange sixteen inches (16") in diameter, and will vary in height from three feet six inches (3' - 6") to twenty feet (20'). Spot scaling shall be wire-brushed and the posts thoroughly wiped with NAPTHA, and finish painted.

Traffic Signal Poles with Mast Arms. Traffic signal poles to be painted under these Specifications are steel structures and size varies. Contractor shall be responsible for determining the total area to be painted. Spot scaling shall be wire brushed and the posts thoroughly wiped with NAPTHA, and finish painted.

Traffic Signal Heads. Traffic signal heads to be painted under these Specifications are steel or aluminum housing with various configurations and number of signal indicators. Contractor shall be responsible for determining the total area to be painted. Spot scaling shall be wire brushed and the signal heads thoroughly wiped with NAPTHA, and finish painted. Care shall be taken to ensure that the signal faces, lenses, back plates and visors are not damaged by paint or equipment. Contractor shall protect lenses during painting to avoid getting any paint on the signal lenses.

Traffic Signal Controllers. The traffic signal control cabinets to be painted under these specifications are typically cast aluminum, approximately 50"x30"x16" in size, and are pedestal or concrete mounted. The Contractor shall wire brush cabinet, as necessary, and thoroughly wipe the cabinet and casting with NAPTHA, prior to applying the finish coat.

Method of Measurement. Each existing light pole, street lighting controller, traffic signal pole (including all signal heads and equipment mounted to the pole) will count as one unit. Any labor, and equipment necessary to remove existing equipment, signage, etc. to paint the installations will be included in the unit price.

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**Basis of Payment.** This work shall be paid for at the contract unit price each for PAINT EXISTING STREET LIGHT/TRAFFIC EQUIPMENT COMPLETE, which shall include all work as described herein.



**ROADWAY LIGHT POLE, INSTALL ONLY**

**Description.** This item shall consist of reinstalling an existing light pole on an existing concrete foundation, after the existing foundation has been drilled for a new conduit raceway, at the location indicated on the plans.

**Installation.** An existing light pole which has been disconnected and removed to drill an existing concrete foundation, shall be reinstalled on an existing concrete foundation in accordance with Section 830 of the Standard Specifications.

The Contractor may only install the light pole once the existing foundation has been reviewed by the Engineer or Owner's Representative.

**Method of Measurement.** This item shall be measured per each light pole installed.

**Basis of Payment.** This work shall be paid for at the contract unit price per each ROADWAY LIGHT POLE, INSTALL ONLY, which shall include all work as described herein.

Removal of an existing light pole and drilling of existing concrete foundation shall be paid for separately.

## **REMOVE EXISTING STREET LIGHTING EQUIPMENT**

### **REMOVAL OF LIGHTING LUMINAIRE, SALVAGE**

**Description.** This work shall consist of the removal, salvage, and delivery of existing electrical equipment including, but not limited to: light poles, luminaires, luminaire arms, signs, signals, controllers, and enclosures as specified on the plans, or as directed by the Engineer.

**General Requirements.** Electrical equipment to be removed and salvaged shall be disassembled as required for the complete removal and safe transport of the item from the work site. Existing luminaires that are to be salvaged shall be boxed in new containers, approved by the Engineer. All electrical equipment shall be hoisted, loaded and secured to transportation with care to prevent damage. Removal shall include all work and items associated with the equipment as directed by the Engineer.

CDOT luminaires to be salvaged shall be delivered to the CDOT's yard at 2451 S. Ashland Ave., or to another City of Chicago location as directed by the Engineer.

City of Evanston luminaires to be salvaged shall be delivered to Public Works located at 2020 Asbury Avenue, or as directed by the Engineer.

Where light poles are removed to drill existing concrete foundation, the Contractor shall disassemble the light poles, box/protect existing light poles, luminaire arms and luminaires as required for transport to be stored offsite should the work not be completed within the same day. The existing light pole shall not be stored adjacent to the roadway, unless otherwise directed by the Resident Engineer.

**Method of Measurement.** Electrical equipment to be removed and salvaged shall be measured per each unit removed and salvaged.

**Basis of Payment.** This work shall be paid for at the contract unit price each for the REMOVE EXISTING STREET LIGHTING EQUIPMENT OR REMOVAL OF LIGHTING LUMINAIRE, SALVAGE, which shall include work necessary for the complete removal, salvage, and transportation to complete the work as described herein.

Disposal, if necessary, and disposal fees will be included in the cost of this work and shall not be paid for separately.

**LUMINAIRE, LED, SPECIAL**

**Description.** This work shall consist of furnishing and installing a CDOT owned and maintained LED street lighting luminaire, as specified on the plans or as directed by the Engineer. The luminaire shall be complete with LED array, integral electrical components, electronic driver, surge protection, fuses, internal smart lighting node, mounting hardware, pole wire and house side shield (at locations indicated on the Plans or as directed by Engineer).

**Material.** The luminaire shall meet the requirements of Material Specification 1613. The luminaire shall be black to match existing light pole.

Smart light control node shall be in accordance with Division of Engineering - Electrical Section Material Specification 1608.

The pole wire shall meet the requirements of Material Specification 1351, and the fuses shall meet the requirements of Material Specification 1464.

**Installation.** This work shall meet the applicable requirements of Sections 801 and 821 of the Standard Specifications. Each luminaire shall be installed per the manufacturer's instructions. Luminaires shall be securely attached to the end of a two inch diameter pipe arm and leveled to provide the proper illumination.

The proposed pole wiring shall be connected to the luminaire terminal block, or quick disconnect, in accordance with the Material Specifications and the manufacturer's recommendation. Pole wiring shall consist of 3- 1/C No. 12 AWG wires with 150 degree C. irradiated polyefin, insulation. Pole wires shall be spliced to the field wires at the base of the pole using splicing methods approved by the Engineer, and as detailed under related DEO Construction Specification numbers 247, 249 and 250. The pole wires shall be of sufficient length to connect the luminaire to the field wires at the base of the pole.

Where luminaire is mounted to existing luminaire arm/light pole, the luminaire shall connect existing pole wiring to the terminal blocks in the new luminaire.

**Method of Measurement.** Each luminaire, complete with electrical components, pole wire, fuses, and any appurtenances necessary, to make the luminaire function once connected into the street light circuit, will count as one unit. Any labor, and equipment necessary will be included.

**Basis of Payment.** This work shall be paid for at the contract unit price per each LUMINAIRE, LED, SPECIAL, which shall include all work as described herein.

**MATERIAL SPECIFICATIONS**

1351 1464 1613

**DRILL EXISTING MANHOLE, HEAVY DUTY HANDHOLE, OR MEDIAN WALL  
JUNCTION BOX**

**Description.** This work shall consist of drilling a hole in an existing handhole or manhole for the installation of a new conduit. Work under this item shall be performed in accordance with Section 879 of the Standard Specifications and subsequent special provisions except as herein modified.

**Construction.** The size of the hole shall be as close as possible to the size of the conduit to be installed. The conduit shall be installed in the drilled hole with a bushing before the hole is grouted. The conduit shall be covered by a separate item. The space between the conduit and the handhole or manhole wall shall be caulked with a waterproof grout. City of Chicago Standard Drawing 814 provides additional information.

Cleaning existing manhole and handhole structures for the purpose of drilling and installing new conduit shall be performed in accordance with Clean Existing Manhole or Handhole special provision, and paid for separately.

**Method of Measurement.** Drill existing manhole, heavy duty handhole, or median wall junction box shall be measured per each hole drilled.

**Basis of Payment.** This work shall be paid for at the contract unit price each for DRILL EXISTING MANHOLE, HEAVY DUTY HANDHOLE, OR MEDIAN WALL JUNCTION BOX, which shall include drilling the hole, furnishing and installing the conduit and bushing, grouting, and any additional work required or as described herein.

STANDARD DRAWING  
814

## **TRENCH BACKFILL, SPECIAL**

**Description.** This work shall consist of excavating a trench for the installation of conduit and backfilling with limestone screenings as a portion of the total backfill of the trench, all as shown in Division of Electrical Operations Standard Drawings No. 579 and No. 813. This work shall meet all applicable requirements of Article 819 of the Standard Specifications.

**Material.** Underground Cable Marking Tape shall meet the requirements of Section 1066.05 of the Standard Specifications. Backfill shall meet the requirements of Section 1003.04 of the Standard Specifications.

**Construction Requirements.** The trench shall be deep enough to provide thirty inches (30") of cover over the conduit to be installed. The trench shall not exceed twelve inches (12") in width unless approved by the Resident Engineer. The bottom of the trench shall be tamped, and the trench inspected by the Resident Engineer before conduit is installed. All trenches shall be backfilled as soon as possible after the installation of the conduit or cable. Any material excavated from the trenches that in the opinion of the Resident Engineer is satisfactory backfill, may be used for backfill above the layer of screenings. The limestone screenings shall be used to fill the bottom of the trench to a depth of one foot above the top of the conduit or duct encasement. Cinders, rocks, or other inappropriate materials shall not be permitted to be used as backfilling material. Backfilling material, beginning with limestone screenings shall be deposited in the trench in layers not to exceed six inches (6") in depth, and shall be thoroughly compacted with a mechanical tamper before the next layer is deposited in the trench. All trenches for conduit shall be backfilled as per this specification. Unsuitable material shall be disposed of according to the requirements of Section 202.03 of the Standard Specifications. Underground cable marking tape shall be installed twelve inches (12") below the finished grade for all conduit runs.

**Method of Measurement.** This work will be measured in feet along the centerline of the trench. Trench and backfill will not be measured for payment for conduit which is installed by pushing or by directional boring. Where more than one (1) conduit is installed in a single trench, only one run will be measured for payment.

**Basis of Payment.** This work will be paid for at the contract unit price per cubic yard for TRENCH BACKFILL, SPECIAL, which shall include excavation, furnishing and placing backfill material, and disposal of all surplus excavated material.

Removal and replacement of sidewalk, driveway pavement or pavement shall be paid for separately.

STANDARD DRAWINGS  
579 813

**CONCRETE FOUNDATIONS, GROUND MOUNT**

**Description.** The Contractor shall install a concrete foundation for a base mounted street light or festoon receptacle controller cabinet, as shown on City of Chicago Standard Drawing Number 880 or 973 respectively.

**Material.** Concrete shall be portland cement concrete, IDOT Class SI, meeting the requirements of Article 1020 of the Standard Specifications. Ground rods shall meet the requirements of Material Specification 1465. Conduit shall be PVC meeting the requirements of Material Specification 1533. Anchor rods shall meet the applicable requirements of Material Specification 1467.

**Construction.** The Contractor shall install the concrete foundation as shown on City of Chicago Standard Drawing 880 or 973. Work under this item shall be performed in accordance with Article 825 of the Standard Specifications.

The foundation shall have a minimum depth of at least forty-eight inches (48") below grade and shall have large radius PVC conduit elbows in quantity, size and type shown. The elbow ends above ground shall be capped with standard conduit bushings. The Contractor shall furnish anchor bolts, hardware, conduit elbows, and all other material shown on the foundation construction drawing.

All excavation and restoration of parkway shall be included in this item. If the foundation is in sidewalk, an expansion joint shall be required between the sidewalk and the foundation.

**Method of Measurement.** Concrete foundations will be measured for payment in cubic yards in place. The length measured will be limited to the dimensions shown on the plans or as authorized by the Engineer.

Relocation of a foundation due to an obstruction and any shaft excavation to that point will not be measured for payment.

**Basis of Payment.** This work shall be paid for at the contract unit price cubic yards for CONCRETE FOUNDATION, GROUND MOUNT, which shall include conduit elbows, excavation, restoration of parkway/sidewalk, and all work listed herein.

Removal of sidewalk or pavement will be paid for separately.

MATERIAL SPECIFICATIONS  
1465 1467 1533

STANDARD DRAWING  
880 973

## **ELECTRIC SERVICE INSTALLATION, SPECIAL**

**Description.** This work shall consist of furnishing and installing 100A-240V electric service drop, on a Com Ed owned wood pole, for a CDOT owned and maintained street lighting controller per City of Chicago Drawing Number 11925 and 893.

### **Material and Construction.**

**Service Junction Cabinet:** The cabinet shall be cast from corrosion resistant metal, subject to approval. Its dimension shall not exceed 8 ½ inches in width, 18 inches in height and 9 ½ inches in depth, and it shall be weather proof. It shall contain a two (2) pole disconnecting device, such as Milbank Manufacturing Company 100 ampere size test block, Number 420, with bridge contacts and barrier strip, subject to approval. A suitable ground lug, subject to approval, to accommodate a 1/C #2/0 AWG stranded copper conductor shall be provided. The completed cabinet shall be as shown on City of Chicago Standard Drawings Number 893, and shall meet the requirements of Material Specification 1473. Any alternate cabinets which are considered to this may be considered.

**Cable Grip:** A one and one quarter (1 ½") cable grip fitting shall be installed at top of cabinet to accommodate a 3/C #2 AWG service cable. Fitting shall be Pyle National Company.

**Service Riser:** The Contractor shall install a three (3) inch rigid galvanized steel conduit riser along the Com Ed service pole, as shown on City of Chicago Standard Drawing Number 11925. The conduit riser shall terminate in the service junction cabinet and at the base of the pole at a rigid galvanized steel elbow, which connects to the horizontal conduit lateral leading to the control cabinet. The riser, elbow, and attachments shall be considered incidental to the work for a complete Com Ed pole mounted service junction cabinet. The laterals shall be paid for separately under different pay items.

**Cable:** A sufficient length of three (3) conductor service entrance cable shall be coiled at the top of the box in order to reach the Com Ed secondary wires for connection. The three (3) conductor service entrance cable shall meet the requirements of Material Specification 1457. The black and red conductors shall be connected to the disconnect device and the white conductor to the ground lug, for the 240 volt street lighting service installation.

**Cables in Service Riser:** Cables shall extend continuously from the load side of the disconnect device, down the riser and elbow, and in the conduit lateral to the control cabinet. Payment for cables in riser and elbow shall be included in separate pay items, and shall not be considered as part of this pay item.

**Method of Measurement.** This work shall be measured per each service installation at the location(s) indicated on the plans.

**Basis of Payment.** This work shall be paid for at the contract unit price each for SERVICE INSTALLATION, SPECIAL, which shall include all work as described herein.

MATERIAL SPECIFICATIONS  
1457 1462 1473 1534

STANDARD DRAWINGS  
893 11925



## **CONDUIT SPLICE**

**Description.** This item shall consist of splicing a proposed conduit to existing at the location shown on the plans.

**Materials.** Coupler shall be rated for joining the conduit(s) material types and be UL listed.

**Installation.** Prior to splicing, the ends of the conduits shall be beveled, and the coupler shall be installed per the manufacturer's installation requirements.

The Contractor shall record location of the conduit splice and detail the location on the Record Drawings.

**Method of Measurement.** This item shall be measured per each conduit splice installed.

**Basis of Payment.** This work shall be paid for at the contract unit price per each CONDUIT SPLICE, which shall include all work as described herein.

## **GROUND EXISTING HANDHOLE**

**Description.** This item will consist of grounding an existing handhole or manhole, or at any location as indicated on the plans or as directed by the Engineer.

**Material.** The grounding equipment shall meet the requirements of Standard Specifications Section 806. The grounding conductor number shall be 8 AWG solid, soft drawn bare copper wire. Stainless steel bolts, nuts and washers shall be provided. All equipment shall be UL listed.

**Construction.** Existing handholes shall be grounded in accordance with the Plans. All work shall be in accordance with National Electric Code (NEC), Chicago Electric Code and Standard Specifications.

**Method of Measurement.** This item shall be measured per each handhole grounded.

**Basis of Payment.** This work shall be paid for at the contract unit price per each GROUND EXISTING HANDHOLE, which shall include all work as described herein.

## **HANDHOLE, PORTLAND CEMENT CONCRETE (SPECIAL)**

**Description.** This item is for supplying and installing an electrical handhole 30" in diameter with a 24" frame and lid or a handhole 36" in diameter with a 24" frame and lid in a parkway or sidewalk, or a handhole 36" in diameter with a 30" frame and lid in pavement or in a driveway.

**Material.** The frame and lid shall meet the requirements of Material Specification 1458. The handhole shall meet the requirements of Material Specification 1528. A 24" frame and lid shall meet the requirements of City of Chicago Standard Drawing 872. A 30" frame and lid shall must meet the requirements of City of Chicago Standard Drawings 874 and 10927. Bricks shall meet the requirements of Article 1041 of the Standard Specifications. All other materials used shall meet the appropriate material requirements of the Standard Specifications.

**Method of Construction.** The handhole will be a precast concrete structure, or, if conditions merit, a cast in place concrete structure, complete with cast iron frame and cover, and conforming in detail with either City of Chicago Standard Drawing Number 867, 866, or 871, except that the number of conduit openings shall be as shown on the construction plans.

Each handhole shall be installed at the location specified on the plans or at the location identified by the Resident Engineer.

The area where the handhole is to be placed shall be properly excavated. All disposable material shall be properly disposed of per Section 202.03 of the Standard Specifications. Each handhole shall be set or constructed on a foundation of loose stone not less than eight inches (8") deep. The 36" handhole for pavement installation shall have a floor as shown in City of Chicago Standard Drawing Number 871. The frame casting shall be accurately set on a full bed of mortar to the finished elevation so that no subsequent adjustment will be necessary. It is desirable not to use a neck for the frame. However, if approved by the Resident Engineer, mortar and brick, or mortar and concrete rings, may be used to adjust to the proper grade. Adjustment rings, bricks, and frames shall be set in a full mortar bed. Use of partial bricks will not be allowed. Bricks must be laid in full header courses only. Mortar must be mixed in a proportion of one (1) part of cement to three (3) parts sand by volume of dry materials. After entering laterals have been installed in place in the handhole, the openings in the wall shall be plugged in an approved manner flush with the inner surface. If backfill is required, screenings shall be used and properly compacted. Parkway shall be restored to the proper grade. Pavement shall be properly restored to the correct grade. Patching of the pavement shall be done with high early strength concrete meeting the requirements of Articles 1001 and 1020 of the Standard Specifications. Sidewalks shall be restored to the proper grade using a 5 inch thickness of concrete. The inside of the handhole shall be clean of all debris.

**Method of Measurement.** This item shall be paid for at the contract unit price per each unit installed.

**Basis of Payment.** This work shall be paid for at the contract unit price each for HANDHOLE, PORTLAND CEMENT CONCRETE (SPECIAL), which shall include all work described herein and excavation, backfilling, and restoration of parkway/pavement, in accordance with the specifications. No additional payment will be allowed for restoring parkway, sidewalk, or pavement.

Removal of sidewalk or pavement shall be paid for separately.

MATERIAL SPECIFICATIONS  
1458 1528

STANDARD DRAWING  
867 872 10927

**REPLACE HANDHOLE COVER**

**Description.** This item is for removing damaged light pole base handhole covers, and furnishing, supplying and installing a new handhole cover, at locations indicated on the plans or as directed by the Engineer.

**Material.** The handhole covers shall be in accordance with Material Specification 1512 and 1513. The handhole shall have the appearance of Standard Drawing 928 and 930A.

**Method of Construction.** The handhole shall be installed in accordance with the manufacturer's recommendations. The Contractor shall remove and replace handhole covers at locations indicated on the plans, or as directed by the Engineer.

Removed handhole covers shall be disposed of in accordance with Article 202.03 of the Standard Specifications.

**Method of Measurement.** This item shall be paid for at the contract unit price per each handhole cover removed and replaced.

**Basis of Payment.** This work shall be paid for at the contract unit price each for REPLACE HANDHOLE COVER, which shall include all work described herein.

Replacement of existing base covers shall be paid for separately.

MATERIAL SPECIFICATIONS  
1505 1512 1513

STANDARD DRAWING  
928 930A

## **LIGHTING CONTROLLER, SPECIAL**

**Description.** This work shall consist of furnishing and installing a unmetred, aluminum, constant power street lighting controller cabinet mounted to a ballast housing base, and containing various electro-mechanical devices to automatically control and protect street lighting circuits. The street lighting controller cabinets shall be owned and maintained by CDOT.

**Material and Assembly.** The aluminum controller cabinet shall be a Hennessy Co. G cabinet for a 200 Amp controller. The cabinet shall meet the requirements of Material Specification 1606 and City of Chicago Standard Drawing 983 and 984. The ballast housing base shall meet the requirements of Material Specification 1375.

The electro-mechanical devices within the cabinet shall be attached to a ½- inch thick phenolic, linen base, bakelite panel drilled to accommodate the various devices with allowable clearances, and secured in the cabinet with 5/16" - 18 NC x 7/8" stainless steel machine screws.

The circuit breakers, single-pole, two-pole, or three-pole shall meet the requirements of Material Specification 1428. The lighting contactor shall be as indicated on the referenced drawings.

**Installation.** The street lighting controller shall be wired as shown on City of Chicago Standard Drawing 983 and 984, or as indicated on the plans. The street lighting controller main circuit breaker and contactor shall each have a 200 Amp rating, and the branch circuit breakers shall be rated as indicated on the plans.

The cabinet ground/neutral bus bars shall be Thomas and Betts Company "LUGIT TERMINAL" or equivalent, accepting conductor sizes from #14 to #2/0 AWG. The ground/neutral bus bar shall be attached inside the lower left hand side of the cabinet, and provided with enough lugs to terminate all proposed neutral and ground conductors. Double-lugging shall not be allowed. The bus bar shall be installed with a 5/16" x 1" brass or stainless steel machine screw in a hole drilled and tapped for this purpose. A bare solid copper #6 AWG ground wire shall be connect between the ground lug and the ground clamp on the ground rod.

The cabinet shall be installed on a ballast housing base, 20 inches in height secured to a concrete foundation as shown on Drawing 880, at the location indicated on the plans. The ballast housing shall be part of this pay item. The foundation, including anchor rods, washers, and nuts shall be paid for separately.

The installation of feeder cables and branch circuit cables shall be performed in a neat and workmanlike manner with all cable trained around the cabinet, secured to the

proper terminals and identified either by tagging of the cables, or by identification of the branch breakers, all incidental to this pay item. Separate payment shall not be made.

**Method of Measurement.** Each street lighting controller, including ballast housing base, shall count as one complete unit.

**Basis of Payment.** This work shall be paid for at the contract unit price each for a LIGHTING CONTROLLER, SPECIAL, which shall include all work as described herein.

MATERIAL SPECIFICATIONS  
1375 1428 1606

STANDARD DRAWINGS  
736 785 880 983 984

**LIGHT POLE, SPECIAL**

**Description.** This item shall consist of furnishing and installing a proposed City of Evanston standard roadway lighting unit, including all mounting hardware and accessories as shown on the Contract Drawings.

**Material.** The Contractor shall also furnish and install pole wiring, grounding connections, and fuse holders/ fusing in accordance with the contract plan drawings and Sections 1065.01 and 1066.09 of the Standard Specifications.

The light pole, luminaire and all components shall be factory painted black and as shown on the contract plan drawings.

**Installation.** All work shall be installed in accordance with the manufacturer's recommendations, Sections 821 and 830 of the Standard Specifications, the Contract Drawings, NEC, and local ordinances.

**Method of Measurement.** This item shall be measured per unit installed.

**Basis of Payment.** The work shall be paid for at the contract unit price each for LIGHT POLE, SPECIAL, which shall include all work listed herein and as directed by the Engineer.



**LIGHT POLE FOUNDATION, 24" DIAMETER, OFFSET**

**Description.** This work shall consist of furnishing and installing a 24 inch diameter reinforced offset concrete light pole foundation for the City of Evanston's proposed roadway lighting standards, at the locations indicated on the plans. All work related to the installation of the foundation shall be included (excavation, reinforcement, ground rod, concrete, anchor bolts, raceways, backfilling, and disposal of surplus excavate material, etc.) shall be included.

**Material.** All materials shall be in accordance with the contract plan drawings and Sections 1020 and 1070 of the Standard Specifications.

**Installation.** All work shall be installed as shown on the contract plan drawings and in accordance with Sections 836 of the Standard Specifications.

The Contractor shall be responsible for coordinating all work with the Engineer and Utility Companies.

**Method of Measurement.** Concrete foundations shall be measured for payment in feet in place, along the horizontal and vertical centerlines with no overlap.

**Basis of Payment.** The work shall be paid for at the contract unit price each for LIGHT POLE FOUNDATION, 24" DIAMETER, OFFSET, which shall include all work listed herein and as directed by the Engineer.

## **CONTROLLER (SPECIAL)**

**Description.** This work shall consist of furnishing and installing a Com Ed metered aluminum cabinet mounted to a ballast housing base, and containing various electro-mechanical devices to automatically control and protect pole mounted festoon receptacle circuits. The festoon controller cabinets will be owned and maintained by CDOT.

**Material and Assembly.** The aluminum controller cabinet shall be a Hennessy Co. G cabinet for a 100 Amp controller. The cabinet shall meet the requirements of Material Specification 1590 and City of Chicago Standard Drawing 973. The ballast housing base shall meet the requirements of Material Specification 1375.

The electro-mechanical devices within the cabinet shall be attached to a ½- inch thick phenolic, linen base, bakelite panel drilled to accommodate the various devices with allowable clearances, and secured in the cabinet with 5/16" - 18 NC x 7/8" stainless steel machine screws.

The Contractor shall coordinate new service request with Com Ed to provide an electric meter for the proper billing charges as directed by the neighborhood business consortium. Meter fittings shall be CECHA approved.

The circuit breakers, single-pole, two-pole, or three-pole shall meet the requirements of Material Specification 1428. The lighting contactor shall be as indicated on the referenced drawings.

**Installation.** The controller shall be wired as shown on City of Chicago Standard Drawing 974, or as indicated on the plans. The controller Com Ed utility meter, main circuit breaker and contactor shall each have a 100 Amp rating, and the branch circuit breakers shall be rated as indicated on the plans.

The cabinet ground/neutral bus bars shall be Thomas and Betts Company "LUGIT TERMINAL" or equivalent, accepting conductor sizes from #14 to #2/0 AWG. The ground/neutral bus bar shall be attached inside the lower left hand side of the cabinet, and provided with enough lugs to terminate all proposed neutral and ground conductors. Double-lugging shall not be allowed. The bus bar shall be installed with a 5/16" x 1" brass or stainless steel machine screw in a hole drilled and tapped for this purpose. A bare solid copper #6 AWG ground wire shall be connect between the ground lug and the ground clamp on the ground rod.

The cabinet shall be installed on a ballast housing base, 20 inches in height secured to a concrete foundation as shown on Drawing 973, at the location indicated on the plans.

The ballast housing shall be part of this pay item. The foundation, including anchor rods, washers, and nuts shall be paid for separately.

The installation of feeder cables and branch circuit cables shall be performed in a neat and workmanlike manner with all cable trained around the cabinet, secured to the proper terminals and identified either by tagging of the cables, or by identification of the branch breakers, all incidental to this pay item. Separate payment shall not be made.

The receptacle circuit will be placed in operation as soon as practicable with the Contractor being charged for the energy charges until the cabinet is accepted by the City of Chicago, Department of Transportation.

**Method of Measurement.** Each festoon receptacle controller, including ballast housing base, shall count as one complete unit.

**Basis of Payment.** This work shall be paid for at the contract unit price each for a CONTROLLER (SPECIAL), which shall include all work as described herein.

MATERIAL SPECIFICATIONS  
1375 1428 1590

STANDARD DRAWINGS  
736 785 973 974

**FIBER OPTIC CABLE IN CONDUIT, NO. 62.5/125, MM12F SM24F**

**Description.** The Contractor shall furnish and install fiber optic cable, including all accessories and connections required.

**Material.** All materials shall be in accordance with the contract plan drawings and Sections 871 of the Standard Specifications.

**Installation.** All work shall be installed as shown on the contract plan drawings and in accordance with Sections 871 of the Standard Specifications.

The Contractor shall be responsible for coordinating all work with the Engineer, the City of Evanston's IT Department and the Chief of Police.

**Method of Measurement.** Cable shall be measured for payment in feet in place. Cable will be measured horizontally and vertically between the changes in direction, vertical installed within light poles/conduits, and slack cable. 3ft of slack cable shall be allowed when terminating at a terminal box, light pole, handhole and junction box.

**Basis of Payment.** The work shall be paid for at the contract unit price per foot for FIBER OPTIC CABLE IN CONDUIT, NO. 62.5/125, MM12F SM24F, which shall include all work listed herein and as directed by the Engineer.

The cable warning tags shall be included in the cost of the fiber optic cable.

**REMOVE AERIAL CABLE**

**Description.** This work shall consist of the removal and disposal of existing electrical cable including, wire racks, cross arms, and clamps as specified on the plans or as directed by the Engineer.

**General Requirements.** Electrical equipment to be removed shall be disassembled as required for the complete removal of the item from the work site. Removal shall include all incidental work and items associated with the electrical equipment as directed by the Engineer. Contractor shall dispose of all removed equipment in accordance with Article 202.03 of the Standard Specifications.

**Method of Measurement.** Cable shall be measured per foot of all cables removed from conduit, or aurally. Cables shall not be paid to be removed individually. Cables to be removed shall be measured by horizontal distances only from point to point, and will not include slack, sag, or other vertical dimensions.

**Basis of Payment.** The work shall be paid for at the contract unit price per foot of REMOVE AERIAL CABLE, which shall include all work listed herein.

## **DECORATIVE LIGHT TYPE A**

**Description.** This work shall consist of furnishing and installing a historic pedestrian style light pole at the locations shown; an ornamental pole base for the pedestrian pole; and a LED acorn type ornamental luminaire with Type III light distribution, as specified on the plans or as directed by the Engineer. The luminaire shall be complete with LED array, integral electrical components, electronic driver, surge protection, fuses, internal smart lighting node, mounting hardware, pole wire and house side.

**Materials.** The pole shall meet the requirements of Material Specification 1504. The pole shall have the appearance as that shown on City of Chicago Standard Drawing 928.

The pole base material shall be fiberglass meeting the applicable requirements of Material Specification 1512 and City of Chicago Standard Drawing 928.

Luminaire materials shall meet the requirements of the Division of Engineering - Electrical Section Material Specification 1351 for pole wire, 1464 for the fuses, 1612 for the luminaire, and 1608 for the smart lighting node. The luminaire shall have the general appearance of City of Chicago Standard Drawing 932.

**Installation.** Installation shall be according to the applicable requirements of Sections 801 and 830 of the Standard Specifications.

### **Chicago 2000 Pedestrian Light Pole**

The light pole shall be set plumb on a concrete foundation using the double nut construction. The nuts and washers shall be considered incidental to the foundation item. The handhole shall be orientated so that workings accessing the handhole shall face oncoming traffic directly or located on the backside of the pole facing the roadway.

Any exposed portions of the anchor rods extending above the nuts which may interfere with setting the ornamental base shall be cut off to provide the necessary clearance. The excess shall not be burned off.

The contractor shall utilize non-abrasive slinging materials and shall otherwise exercise due care in erecting the pole to minimize any possible damage to the finish. When necessary, and approved by the Engineer, the contractor shall utilize, at his own expense, factory approved touch-up materials and methods to restore the finish to like new appearance and durability.

### **Chicago 2000 Pedestrian Light Pole Base**

The base shall be installed after the pole is erected. The base halves shall be set around the pole shaft and secured to each other. The base shall be set so that it sits

evenly around the pole shaft. The base shall be level and plumb so that it appears to be integral with the pole shaft. The base should sit level on the concrete foundation. Set screws shall be used to keep the base from shifted about the shaft, and to attach the base to the pole as shown on City of Chicago Standard Drawing 928.

The contractor shall exercise due caution in installing the base to minimize any possible damage to the finish. When necessary, and when approved by the Engineer, the contractor shall utilize, at his own expense, factory approved touch-up materials and methods to restore the finish to like new appearance and durability.

Luminaire, LED, 240V, Ornamental Acorn, Type III

Installation shall meet all applicable requirements of Section 801 and Article 821.03 of the Standard Specifications. The luminaire shall be properly mounted to a 3 inch high by 3 inch diameter tenon with set screws. The Contractor shall level and adjust the luminaire for proper optic orientation as indicated on the plans.

A 20 amp festoon receptacle shall be furnished and installed within the luminaire die cast aluminum pod fitter access door, as shown on the plans. The festoon receptacle shall be provided a separate polarized quick disconnect connector mounted to the pole pod fitter per manufacturer's recommendation.

The proposed pole wiring shall be connected to the luminaire terminal block, or quick disconnect, in accordance with the Material Specifications and the manufacturer's recommendation. Pole wiring shall consist of 3- 1/C No. 12 AWG wires with 150 degree C. irradiated polyefin, insulation. Pole wires shall be spliced to the field wires at the base of the pole using splicing methods approved by the Engineer, and as detailed under related special provisions. The pole wires shall be of sufficient length to connect the luminaire to the field wires at the base of the pole.

Fuses and in-line fuse holders shall be provided and installed in accordance with Section 800 and Article 1065.01 of the Standard Specifications.

**Method of Measurement.** This work shall be measured per each complete lighting unit installed, (consisting of a light pole, base, luminaire and smart node) and shall include all labor and material required.

**Basis of Payment.** This work shall be paid for at the contract unit price per each for DECORATIVE LIGHT TYPE A, which shall include all work listed herein.

MATERIAL SPECIFICATIONS  
1351 1464 1608 1612  
1504 1512

STANDARD DRAWING  
932 928

## **DECORATIVE LIGHT TYPE B**

**Description.** This item shall consist of furnishing and installing an ornamental City of Chicago 34'-6" steel light pole, Chicago 2000 base, teardrop luminaire, luminaire arm with scroll, and mast head and finial. The luminaire shall be complete with an LED array, integral electrical components, electronic driver, fuses, surge suppressor, internal smart lighting node, arm fitter, mounting hardware, pole wire and house side shield (at locations indicated on plans). The installation shall be as directed by the Engineer.

**Material.** The light pole shall meet the requirements of Material Specification 1447. The pole shall have the appearance as shown on City of Chicago Standard Drawings 808. The light pole shall be provided with a 2-bolt mast arm attachment as shown on City of Chicago Standard Drawing 659.

The luminaire arm material shall meet the requirements of Material Specification 1514 and City of Chicago Standard Drawing 930. Smart light control node shall be in accordance with Division of Engineering - Electrical Section Material Specification 1608.

The base shall be fiberglass meeting the appropriate requirements of Material Specification 1513 and City of Chicago Standard Drawing 930A. The castings shall be properly sized to fit the appropriate pole diameter.

The mast head assembly shall meet the requirements of Material Specification 1505 and City of Chicago Standard Drawing 930C.

The luminaire shall meet the requirements of Material Specification 1611 and City of Chicago Standard Drawing 931. The pole wire shall meet the requirements of Material Specification 1351, and the fuses shall meet the requirements of Material Specification 1464.

### **Installation.**

#### **Chicago 2000 Mast Head and Finial Assembly**

The mast head and finial shall be securely mounted to the pole and luminaire arm as shown on City of Chicago Standard Drawings 930 and 930C.

The Contractor shall exercise caution in installing the mast head and finial to minimize any possible damage to the finish. When necessary, and when approved by the Resident Engineer, the Contractor shall utilize, at his own expense, factory approved touch-up materials and methods to restore the finish to like new appearance and durability.



34'-6", 7-Gauge Steel Light Pole

Installation shall be in accordance with the applicable parts of Sections 801 and 830 of the Standard Specifications. The light pole shall be set plumb on a concrete foundation using double nut construction. The nuts and washers shall be part of the foundation item. The pole shall be set with proper orientation of the handhole and mast arm support. The handhole shall be orientated so that workings accessing the handhole shall face oncoming traffic directly or located on the backside of the pole facing the roadway. Any exposed portions of the anchor rods extending above the nuts which may interfere with setting the ornamental base shall be cut off to provide the necessary clearance. The excess shall not be burned off.

The Contractor shall utilize non-abrasive slinging materials and shall otherwise exercise due care in erecting the pole to minimum any possible damage to the finish. When necessary, and approved by the Engineer, the Contractor shall utilize, at their own expense, factory approved touch-up materials and methods to restore the finish to like new appearance and durability.

Chicago 2000 Luminaire Arm, 8 Foot, with Scroll

The arm shall be mounted to the pole simplex plate with two-bolt mast arm attachment supplied under this item. The scroll shall be attached to the pole and the arm with brackets as shown on City of Chicago Standard Drawing 930. The scroll shall provide support to the arm and luminaire.

The Contractor shall exercise due caution in erecting the pole and mast arm to minimize any possible damage to the finish. When necessary, and when approved by the Engineer, the Contractor shall utilize, at his own expense, factory approved touch-up materials and methods to restore the finish to like new appearance and durability.

Light poles shall not be left in place without arm(s) or luminaire(s).

Chicago 2000 Pole Base

The base shall be installed after the steel pole is erected. The base halves shall be set around the pole shaft and secured to each other. The base shall be set so that it sits evenly around the pole shaft. The base shall not be allowed to have gaps around the attachment to the pole shaft. The Contractor shall be responsible for correcting any gaps between the pole shaft and base, as directed by the Engineer, with manufacturer recommended material and construction methods.

The base shall be level and plumb so that it appears to be integral to the pole shaft. The base should sit level on the concrete foundation. Set screws shall be used to keep the base from shifting about the shaft, and to attach the base to the pole as shown on City of Chicago Standard Drawing 930A.

The Contractor shall exercise due caution in installing the base to minimize any possible damage to the finish. When necessary, and when approved by the Engineer, the Contractor shall utilize, at his own expense, factory approved touch-up materials and methods to restore the finish to like new appearance and durability.

Chicago 2000 Teardrop Luminaire, LED, 240V LED, Type III

This work shall meet the applicable requirements of Sections 801 and 821 of the Standard Specifications. Each luminaire shall be installed per the manufacturer's instructions. Luminaires shall be securely attached to the end of a two inch diameter pipe arm and leveled to provide the proper illumination.

The proposed pole wiring shall be connected to the luminaire terminal block, or quick disconnect, in accordance with the Material Specifications and the manufacturer's recommendation. Pole wiring shall consist of 3-1/C No. 12 AWG wires with 150 degree C. irradiated polyefin, insulation. Pole wires shall be spliced to the field wires at the base of the pole using splicing methods approved by the Engineer, and as detailed under related special provisions. The pole wires shall be of sufficient length to connect the luminaire to the field wires at the base of the pole.

Fuses and in-line fuse holders shall be provided and installed in accordance with Section 800 and Article 1065.01 of the Standard Specifications.

**Method of Measurement.** This work shall be measured per each complete lighting unit installed (consisting of light pole, base, luminaire, luminaire arm, banner arms, pendants, finials, smart node, etc.) and shall include all labor and material required.

**Basis of Payment.** This work shall be paid for at the contract unit price per each for DECORATIVE LIGHT TYPE B, which shall include all work listed herein.

MATERIAL SPECIFICATION	STANDARD DRAWINGS
1351 1447 1464 1505	659 808 837 930 930A
1513 1514 1608 1611	930B 930C 931

## **DECORATIVE LIGHT TYPE B1**

**Description.** This work shall consist of furnishing and installing new Chicago 2000 teardrop type LED luminaire, luminaire mast arm with scroll, mast head and finial assembly, and decorative pole base on an existing combination traffic signal/light pole as directed by the Engineer.

**Material.** The Chicago 2000 teardrop type luminaire shall meet the requirements of the Division of Engineering - Electrical Section Material Specification 1611 and City of Chicago Standard Drawing 931. Smart light control node shall be in accordance with Division of Engineering - Electrical Section Material Specification 1608. The Chicago 2000 mast head and finial assembly shall meet the requirements of Material Specification 1505 and City of Chicago Standard Drawings 930 and 930C.

The Chicago 2000 luminaire mast arm shall meet the requirements of the Material Specification 1514 and City of Chicago Standard Drawing 930.

The Chicago 2000 base shall be fiberglass meeting the appropriate requirements of Material Specification 1513 and City of Chicago Standard Drawing 930A. The castings shall be properly sized to fit the appropriate pole diameter.

### **Installation.**

**Existing Luminaire and Luminaire Arm:** Existing luminaire shall be disconnected from existing pole wires, removed, and boxed in new containers, approved by the Engineer, prior to transporting. The luminaire mast arm shall be disassembled, as required for safe removal and transport. Both the existing luminaire and luminaire mast arm shall be delivered to the entity that owns and maintains the luminaire (see locations indicated under the Removal of Lighting Unit, Salvage special provision). All other removed material and equipment shall be disposed by the Contractor in accordance with Article 202.03 of the Standard Specifications.

The existing 2-bolt simplex pole plate and attachments shall remain, and are required to attach the proposed luminaire mast arm (see City of Chicago Standard Drawing 930C).

**Chicago 2000 Luminaire Arm:** The proposed luminaire arm shall be securely mounted to existing 2-bolt simplex pole plate with materials supplied under this item. A new grommet shall be provided for the existing drilled hole in the steel pole to pull through pole wiring, only if there is no existing grommet. The proposed luminaire mast arm brackets shall be sized according to the existing pole diameter (the Contractor shall field verify existing pole diameter prior to ordering any material).

The scroll shall be attached to the pole with clamps/brackets as shown on City of Chicago Standard Drawing 930. The scroll shall provide support to the arm and luminaire.

Chicago 2000 Teardrop LED Luminaire: The work to install the luminaire shall meet the applicable requirements of Sections 801 and 821 of the Standard Specifications, and shall be installed per the manufacturer's recommendations. Luminaires shall be securely attached to the end of a two inch diameter pipe arm and leveled to provide the proper illumination. Luminaires shall be connected to existing pole wires only after they have been inspected, and the Engineer has approved their reuse. The Contractor shall be responsible for notifying the Engineer immediately of any deficiencies with existing pole wiring.

Chicago 2000 Mast Head and Finial Assembly: The mast head and finial assembly shall be securely mounted to the existing pole and arm as shown on City of Chicago Standard Drawings 930 and 930C. The Contractor shall field verify existing pole diameters prior to ordering any mast head and finial assemblies.

Splicing: Splices of pole wires (existing or proposed) shall be located in the light pole base. All splice methods shall be approved by the Engineer prior to performing any work, and shall be provided and installed in accordance with Section 800 and Article 1066.06 of the Standard Specifications. Splices shall be made with materials that are compatible with conductors and insulation. The connectors shall be UL listed, and sized properly for the quantity and size of the conductors to be spliced. Splices shall be as shown on the plans. Any splices, taps and grounding connections required for the installation shall be inspected by the Engineer before wires are permanently trained in the light pole.

New fuses and in-line fuse holders shall be provided and installed in accordance with Section 800 and Article 1065.01 of the Standard Specifications.

Chicago 2000 Pole Base: The Contractor shall furnish and install a Chicago 2000 pole base as shown on City of Chicago Standard Drawing 930A. The base halves shall be set around the pole shaft and secured to each other. The base shall be set so that it sits evenly around the pole shaft. The base shall not be allowed to have gaps around the attachment to the pole shaft. The Contractor shall be responsible for coordinating light pole dimensions with base manufacturer. The Contractor shall also be responsible for correcting any gaps between the pole shaft and base, as directed by the Engineer, with manufacturer recommended material and construction methods.

The base shall be level and plumb so that it appears to be integral to the pole shaft. The base should sit level on the concrete foundation. Set screws shall be used to keep the base from shifting about the shaft, and to attach the base to the pole.

**Method of Measurement.** This item shall be measured per each unit installed and shall include furnishing and installing new luminaire, luminaire mast arm assembly with scroll, mast head and finial assembly, pole base, all necessary hardware to attach the new equipment to the existing pole, fusing, splices, and any appurtenances necessary to make the luminaire operational.

**Basis of Payment.** This work will be paid at the contract unit price per each for DECORATIVE LIGHT TYPE B1, which shall include all work listed herein.

Removal of existing luminaire/luminaire arm, field painting of existing pole and pole mounted equipment shall be paid for separately.

MATERIAL SPECIFICATIONS

1351 1464 1513 1514  
1608 1611

STANDARD DRAWINGS

930 930A 930C 931

## **DECORATIVE LIGHT TYPE C**

**Description.** This work shall consist of furnishing and installing new LED acorn type luminaire on an existing Chicago 2000 pedestrian light pole.

**Material.** The Chicago 2000 acorn luminaire shall meet the requirements of the Division of Engineering - Electrical Section Material Specification 1612. The luminaire shall have the general appearance of City of Chicago Standard Drawing 932. Smart light control node shall be in accordance with Division of Engineering - Electrical Section Material Specification 1608.

### **Installation.**

**Chicago 2000 Acorn Type LED Luminaire:** The work to install the luminaire shall meet the applicable requirements of Sections 801 and 821 of the Standard Specifications, and shall be installed per the manufacturer's recommendations. Luminaires shall be securely attached to existing light pole tenon/light pole. Luminaires shall be connected to existing pole wires only after they have been inspected, and the Engineer has approved their reuse. The Contractor shall be responsible for notifying the Engineer immediately of any deficiencies with existing pole wiring.

A 20 amp festoon receptacle shall be furnished and installed within the luminaire die cast aluminum pod fitter access door, as shown on the plans. The festoon receptacle shall be provided a separate polarized quick disconnect connector mounted to the pole pod fitter per manufacturer's recommendation.

The proposed pole wiring shall be connected to the luminaire terminal block, or quick disconnect, in accordance with the Material Specifications and the manufacturer's recommendation. Pole wiring shall consist of 3- 1/C No. 12 AWG wires with 150 degree C. irradiated polyefin, insulation. Pole wires shall be spliced to the field wires at the base of the pole using splicing methods approved by the Engineer, and as detailed under related special provisions. The pole wires shall be of sufficient length to connect the luminaire to the field wires at the base of the pole.

**Splicing:** Splices of pole wires (existing or proposed) shall be located in the light pole base. All splice methods shall be approved by the Engineer prior to performing any work, and shall be provided and installed in accordance with Section 800 and Article 1066.06 of the Standard Specifications. Splices shall be made with materials that are compatible with conductors and insulation. The connectors shall be UL listed, and sized properly for the quantity and size of the conductors to be spliced. Splices shall be as shown on the plans. Any splices, taps and grounding connections required for the installation shall be inspected by the Engineer before wires are permanently trained in the light pole.

New fuses and in-line fuse holders shall be provided and installed in accordance with Section 800 and Article 1065.01 of the Standard Specifications.

**Method of Measurement.** This item shall be measured per each unit installed and shall include furnishing and installing new luminaire, smart node, splicing material, fuses, all necessary hardware to attach the new equipment and any appurtenances necessary to make the luminaire operational.

**Basis of Payment.** This work will be paid at the contract unit price per each for DECORATIVE LIGHT TYPE C, which shall include all work listed herein.

Removal of the existing luminaire and field painting of existing pole and pole mounted equipment shall be paid for separately.

MATERIAL SPECIFICATIONS  
1464 1608 1612

STANDARD DRAWINGS  
928 932

## **ELECTRIC METER**

**Description.** The work shall consist of furnishing and installing an electric meter pedestal at locations indicated on the plans.

**Material.** Electric meter pedestal shall be 100A-240V rated, UL and CECHA approved, direct embedded type with extension kit and supported by galvanized steel unistrut, and provided with manufacturer supplied main/branch circuit breakers.

**Construction.** Electric meter pedestal shall be installed in accordance with the manufacturer's recommendations and Contract Drawings.

All work shall be in accordance with National Electric Code (NEC), Chicago Electric Code and Standard Specifications.

**Method of Measurement.** This item shall be measured per each electric meter pedestal.

**Basis of Payment.** The work shall be paid for at the contract unit price each for ELECTRIC METER, which shall include all work listed herein or as required for a complete installation.



## **CLEANING EXISTING MANHOLE OR HANDHOLE**

**Description.** This item shall consist of furnishing all labor, materials, tools and equipment necessary to clean existing electrical manhole or handhole. Work shall include the removal and disposal of all foreign debris and liquids from the manhole or handhole, and placing/coiling existing cables on cable hook system within the manhole or handhole. Manholes or handholes to be cleaned shall be identified on the plans or by the Engineer.

This work shall conform to the requirements of applicable portions of the Standard Specifications.

**Cleaning.** The inside dimension of the handhole will normally be 30 to 36 inches in diameter and three feet in depth. The inside dimension of the manhole will normally be 3'x4'x4' or 4'x6'x6'. Handholes and manholes of other dimensions may be encountered. Cleaning shall include opening the lid and placing the lid back in place after cleaning. The cables shall not be damaged or disturbed during the cleaning process. All debris removed from the structure shall be properly disposed of in an approved manner, in accordance with Section 202.03 of the Standard Specifications, and not be left in the public way or dumped into the City sewer system.

**Existing Cables.** After cleaning, the existing electric cables shall be placed/coiled on cable racks/hooks. If cable racks/hooks do not exist, the Contractor shall install new cable hook system on interior surfaces, per the City of Chicago Standard Drawings. Cable hook system shall be included in the cost of clean existing electrical manhole or handhole.

**Grounding.** The Contractor shall also verify if the existing manhole or handhole is properly grounded in accordance with CDOT and IDOT's current grounding regulations, the Contract Drawings, and with the Engineer present. At locations where the existing manhole/handhole are determined to not meet current grounding requirements, the Contractor shall be required to make all necessary modifications, including providing all necessary material, as directed by the Engineer.

**Method of Measurement.** This work shall be measured per each manhole/ handhole cleaned.

**Basis of Payment.** This work shall be paid at the contract unit price for each CLEANING EXISTING MANHOLE OR HANDHOLE, which shall include cleaning, cable rack system, debris removal/disposal as described herein.

Grounding of existing manhole or handholes shall be paid for separately.

FAU1334 (Howard Street)  
Section 17-00281-00-RS  
Cook County  
Contract No. 61G30

STANDARD DRAWING  
736

**CONCRETE FOUNDATION, 24" DIAMETER**

**CONCRETE FOUNDATION, 28" DIAMETER**

**Description.** The work shall consist of constructing a poured in place concrete foundation for proposed or relocated street light poles or traffic poles.

Pay item, CONCRETE FOUNDATION, 24" DIAMETER can be used for a traffic pole foundation which can accommodate a 16, 20, or 26 foot monotube arm. The CONCRETE FOUNDATION, 24" DIAMETER work will include 1 ¼" anchor rods and a 15" bolt circle.

**Material.** Concrete shall be portland cement concrete meeting the requirements of Article 1020 of the Standard Specifications for SI Class concrete. Reinforcement bars shall meet the requirements of Section 1006.10 of the Standard Specifications and Material Specification 1541. Anchor rods shall meet the requirements of Material Specification 1467 and the ground rod shall meet the requirements of Material Specification 1465. Conduit elbows shall be PVC conduit meeting the requirements of Material Specification 1533, and have the appearance of City of Chicago Standard Drawing 11825.

**Construction.** Every foundation shall be installed at the location designated and in the manner herein specified or in special cases as specifically directed. The Contractor shall locate foundations as per plan or as directed by the Engineer. The Contractor shall be required to hand dig the first 36" of the hole for the concrete foundations to verify potential utility conflicts. The remaining depth of the foundation shall be augered in undisturbed soil.

Excavated material shall be disposed in accordance with Article 202.03 of the Standard Specifications.

Contractor shall use standard concrete foundations wherever possible. If utility conflicts prohibit the use of standard concrete foundation, or at locations indicated on the plans, an offset concrete foundation shall be installed. The Contractor shall confirm all proposed offset concrete foundation locations and depths with the Engineer prior to installing.

Top surface of these foundations located in a parkway shall be raised two inches (2") above grade, or as required by the Engineer. Care shall be taken to install a level foundation and to ensure adequate anchor rod projections for double-nut installation. The foundations shall be located from the back of the face of the curb to the on center of the foundation, in accordance with dimensions shown on the construction plans.

Foundation raceways shall consist of large radius PVC conduit elbow(s) in quantity (a minimum of two per foundation), size and type as specified on the corresponding City of Chicago Standard Drawing or in the Contract Drawings. At locations indicated on the plans the Contractor shall install additional, large radius, polyvinyl chloride (PVC), Schedule 40, conduit elbows. All conduit elbows shall be included in the pay item. The elbow ends above ground shall be capped with standard conduit bushings. The Contractor shall furnish anchor rods, a ground rod, hardware, conduit elbow(s) and all other material shown on applicable foundation Contract Drawings. Depth of foundation shall be as shown on the appropriate drawing. The top of the concrete foundation shall be provided with 1-inch chamfered/rounded edge, as shown on the City of Chicago Standard Drawing. When the foundation is installed a sidewalk area, the foundation shall be installed flush with the height of the adjacent sidewalk, or as directed by the Engineer. A 1/2 inch expansion joint shall be installed between the sidewalk and the foundation.

Anchor rods shall be set in accordance with applicable construction plans so that when poles are mounted on the foundations, the street lighting mast arm shall be properly oriented as indicated on the construction plans. The anchor rods shall be set by means of a template which shall be submitted for approval before any foundation work is begun. The template shall hold the rods vertical, and in proper position. Anchor rods shall conform in all respects to the appropriate City of Chicago Standard Drawing.

**Method of Measurement.** This item shall be measured for payment in feet for each foundation installed complete.

**Basis of Payment.** This work shall be paid for at the contract unit price per foot of depth of CONCRETE FOUNDATION, 28" DIAMETER, or CONCRETE FOUNDATION, 24" DIAMETER which shall include anchor rods, elbows, ground rods, excavation and restoration of pavement/sidewalk.

Offset foundations shall be paid for separately.

MATERIAL SPECIFICATIONS  
1465 1467 1533 1541

STANDARD DRAWINGS  
736 793A 811 818  
837 953 11825

### **CONCRETE FOUNDATION, 28" DIAMETER, OFFSET**

**Description.** The work shall consist of constructing a poured in place offset concrete foundation to structurally support street light poles.

**Material.** Concrete shall be Portland cement concrete meeting the requirements of Article 1020 of the Standard Specifications for SI Class concrete. Reinforcement bars shall meet the requirements of Section 1006.10 of the Standard Specifications and Material Specification 1541. Anchor rods shall meet the requirements of Material Specification 1467 and the ground rod shall meet the requirements of Material Specification 1465. Conduit elbows shall be PVC conduit meeting the requirements of Material Specification 1533, and have the appearance of City of Chicago Standard Drawing 11825.

**Construction.** Every foundation shall be installed at the location designated and in the manner herein specified or in special cases as specifically directed by the Engineer. The Contractor shall locate foundations as per plan or as directed by the Resident Engineer. The Contractor shall be required to hand dig the first 36" of the hole for the concrete foundations to verify potential utility conflicts. The remaining depth of the foundation shall be augered in undisturbed soil.

Excavated material shall be disposed in accordance with Article 202.03 of the Standard Specifications.

Contractor shall use standard concrete foundations wherever possible. If utility conflicts prohibit the use of standard concrete foundation, or at locations indicated on the plans, an offset concrete foundation shall be installed. The Contractor shall confirm all proposed offset concrete foundation locations with the Engineer prior to installing.

Top surface of these foundations located in a parkway shall be raised two inches (2") above grade, or as required by the Engineer. Care shall be taken to install a level foundation and to ensure adequate anchor rod projections for double-nut installation. The foundations shall be located from the back of the face of the curb to the on center of the foundation, in accordance with dimensions shown on the construction plans. Foundation raceways shall consist of large radius PVC conduit elbow(s) in quantity (a minimum of two per foundation), size and type as specified on the corresponding City of Chicago Standard Drawing or in the Contract Drawings. At locations indicated on the plans the Contractor shall install additional, large radius, polyvinyl chloride (PVC), Schedule 40, conduit elbows. All conduit elbows shall be included in the pay item. The elbow ends above ground shall be capped with standard conduit bushings. The Contractor shall furnish anchor rods, a ground rod, hardware, conduit elbow(s) and all other material shown on applicable foundation Contract Drawings. Depth of foundation shall be as shown on the appropriate drawing. The top of the concrete foundation shall

be provided with 1-inch chamfered/rounded edge, as shown on the City of Chicago Standard Drawing. When the foundation is installed a sidewalk area, the foundation shall be installed flush with the height of the adjacent sidewalk, or as directed by the Engineer. A 1/2 inch expansion joint shall be installed between the sidewalk and the foundation.

Anchor rods shall be set in accordance with applicable construction plans so that when poles are mounted on the foundations, the street lighting mast arm shall be properly oriented as indicated on the construction plans. The anchor rods shall be set by means of a template which shall be submitted for approval before any foundation work is begun. The template shall hold the rods vertical, and in proper position. Anchor rods shall conform in all respects to the appropriate City of Chicago Standard Drawing.

**Method of Measurement.** This item shall be measured per each foundation installed complete.

**Basis of Payment.** This work shall be paid for at the contract unit price per foot CONCRETE FOUNDATION, 28" DIAMETER, OFFSET, which shall include anchor rods, elbows, ground rods, excavation and restoration of pavement/sidewalk.

Standard concrete foundations will be paid for separately.

MATERIAL SPECIFICATIONS  
1465 1467 1533 1541

STANDARD DRAWINGS  
736 793A 811 837  
937 11825

## **ACCESS WELLS**

**Description.** The work shall consist of furnishing and installing a tracer wire access well to provide a direct connection to tracer wire and ground rod, at ground level or adjacent to fiber optic handhole, shown on the plans.

**Material.** Tracer wire access well body shall be made of high-grade ABS rigid plastic and shall have an integral encapsulated magnetic that allow the access well to be located when it is covered by soil, sod and/or pavement. A cast iron collar shall be provided so that the access well is rated to withstand roadway traffic.

The lid shall be made of a non-corrosive, injection molded resin and provided with two connection terminals, one for connection to the tracer wire and the other to the ground rod. The lid shall be provide with a pentagon head bolt or locking mechanism to secure the lid to the body of the access well.

A magnesium ground rod shall be provided with the access well to complete electrical circuits needed for accurate locates. The ground rod shall be provided with a high density polyethylene cap and 20ft of ground wire rated for direct burial.

**Construction.** Access wells shall be installed so that the lid and collar are flush with sidewalk or finish grade, in accordance with the manufacturer's recommendations and plans. Anti-corrosion gel (as supplied with the unit) shall be applied to tracer wire terminal and ground switch jumper to protect connection points. All set screws shall be installed so that the tracer wire and ground wires are secured to applicable terminals.

**Method of Measurement.** This item shall be measured per each access well installed complete and shall include manufacturer's magnesium ground rod.

**Basis of Payment.** The work shall be paid for at the contract unit price each for ACCESS WELLS, which shall include all work listed herein or as required for a complete installation.

### **LUMINAIRE, LED, TYPE 3, SPECIAL**

**Description.** This work shall consist of furnishing and installing new LED Chicago 2000 teardrop type luminaire on an existing Chicago 2000 light pole.

**Material.** The Chicago 2000 teardrop type luminaire shall meet the requirements of the Division of Engineering - Electrical Section Material Specification 1611 and City of Chicago Standard Drawing 931. Smart light control node shall be in accordance with Division of Engineering - Electrical Section Material Specification 1608. The Chicago 2000 mast head and finial assembly shall meet the requirements of Material Specification 1505 and City of Chicago Standard Drawings 930 and 930C.

#### **Installation.**

*Existing Luminaire and Luminaire Mast Arm:* Existing luminaire shall be disconnected from existing pole wires, removed, and boxed in new containers, approved by the Engineer, prior to transporting. The luminaire mast arm shall be disassembled, as required for safe removal and transport. Both the existing luminaire and luminaire mast arm shall be delivered to the entity that owns and maintains the luminaire (see locations indicated under the Removal of Lighting Unit, Salvage special provision). All other removed material and equipment shall be disposed by the Contractor in accordance with Article 202.03 of the Standard Specifications.

The existing 2-bolt simplex pole plate and attachments shall remain, and are required to attach the proposed luminaire mast arm (see City of Chicago Standard Drawing 930C).

*Chicago 2000 Teardrop LED Luminaire:* The work to install the luminaire shall meet the applicable requirements of Sections 801 and 821 of the Standard Specifications, and shall be installed per the manufacturer's recommendations. Luminaires shall be securely attached to the end of a two inch diameter pipe arm and leveled to provide the proper illumination. Luminaires shall be connected to existing pole wires only after they have been inspected, and the Engineer has approved their reuse. The Contractor shall be responsible for notifying the Engineer immediately of any deficiencies with existing pole wiring.

*Splicing:* Splices of pole wires (existing or proposed) shall be located in the light pole base. All splice methods shall be approved by the Engineer prior to performing any work, and shall be in accordance with Section 800 and Article 1066.06 of the Standard Specifications. Splices shall be made with materials that are compatible with conductors and insulation. The connectors shall be UL listed, and sized properly for the quantity and size of the conductors to be spliced. Splices shall be as shown on the plans. Any splices, taps and grounding connections required for the installation shall be inspected by the Engineer before wires are permanently trained in the light pole.



New fuses and in-line fuse holders shall be provided and installed in accordance with Section 800 and Article 1065.01 of the Standard Specifications.

**Method of Measurement.** This item shall be measured per each unit installed and shall include luminaire, mast head and finial assembly, all necessary hardware to attach the new equipment to the existing pole, fusing, splices, and any appurtenances necessary to make the luminaire operational.

**Basis of Payment.** This work will be paid at the contract unit price per each for LUMINAIRE, LED, TYPE 3, SPECIAL, which shall include all work listed herein.

Removal of existing luminaire/luminaire arm, field painting of existing pole and pole mounted equipment shall be paid for separately, and shall not be considered incidental to this pay item

MATERIAL SPECIFICATIONS  
1464 1608 1611

STANDARD DRAWINGS  
930 930C 931

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**RELOCATE EXISTING ITS EQUIPMENT TYPE A**

**Description.** This work shall consist of the removal, storage, and relocation of an existing ITS device from the existing traffic signal installation to the temporary traffic signal installation, and then to the permanent traffic signal installation.

The ITS device shall be removed and relocated as shown in the plans. Any damage sustained to the device during removal, storage, transport, and/or reinstallation operations shall be repaired or replaced in kind to the satisfaction of the Engineer at the Contractor's expense.

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

**Basis of Payment.** This item will be paid for at the contract unit price each for RELOCATE EXISTING ITS EQUIPMENT TYPE A, which price shall be payment in full for disconnecting the existing ITS device, packaging/storing it, transporting it, and relocating it to the new location complete and operating to the satisfaction of the Engineer.

**RELOCATE CLOSED CIRCUIT TELEVISION SURVEILLANCE CAMERA SYSTEM**

**Description.** This work shall consist of the removal, storage, and relocation of an existing remote-controlled video surveillance system from the existing traffic signal installation to the temporary traffic signal installation, and then to the permanent traffic signal installation.

The Contractor will need to provide seven (7) day notice to the City of Evanston Police Department prior to disconnecting and relocating the camera system.

The remote-controlled video surveillance system shall be removed and relocated as shown in the plans. Any damage sustained to the video system during removal, storage, transport, and/or reinstallation operations shall be repaired or replaced in kind to the satisfaction of the Engineer at the Contractor's expense.

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

**Basis of Payment.** This item will be paid for at the contract unit price each for RELOCATE CLOSED CIRCUIT TELEVISION SURVEILLANCE CAMERA SYSTEM, which price shall be payment in full for disconnecting the existing video system, packaging/storing it, transporting it, and relocating it to the new location complete and operating to the satisfaction of the Engineer.

## **UNDERGROUND RACEWAYS**

Effective: March 1, 2015

Revise Article 810.04 of the Standard Specifications to read:

“Installation. All underground conduits shall have a minimum depth of 30-inches (700 mm) below the finished grade.”

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.”

Add the following to Article 810.04 of the Standard Specifications:

“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 300 mm (12”) 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 3 mm (0.125”) 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.”

**WIRE AND CABLE**

Effective: January 1, 2012

Add the following to the first paragraph of Article 1066.02(a):

“The cable shall be rated at a minimum of 90°C dry and 75°C wet and shall be suitable for installation in wet and dry locations, and shall be resistant to oils and chemicals.”

Revise the Aerial Electric Cable Properties table of Article 1066.03(a)(3) to read:

Aerial Electric Cable Properties

Phase Conductor		Messenger wire			
Size AWG	Stranding	Average Insulation Thickness		Minimum Size AWG	Stranding
		mm	mils		
6	7	1.1	(45)	6	6/1
4	7	1.1	(45)	4	6/1
2	7	1.1	(45)	2	6/1
1/0	19	1.5	(60)	1/0	6/1
2/0	19	1.5	(60)	2/0	6/1
3/0	19	1.5	(60)	3/0	6/1
4/0	19	1.5	(60)	4/0	6/1

Add the following to Article 1066.03(b) of the Standard Specifications:

“Cable sized No. 2 AWG and smaller shall be U.L. listed Type RHH/RHW and may be Type RHH/RHW/USE. Cable sized larger than No. 2 AWG shall be U.L. listed Type RHH/RHW/USE.”

Revise Article 1066.04 to read:

“Aerial Cable Assembly. The aerial cable shall be an assembly of insulated aluminum conductors according to Section 1066.02 and 1066.03. Unless otherwise indicated, the cable assembly shall be composed of three insulated conductors and a steel reinforced bare aluminum conductor (ACSR) to be used as the ground conductor. Unless otherwise indicated, the code word designation of this cable assembly is “Palomino”. The steel reinforced aluminum conductor shall conform to ASTM B-232. The cable shall be assembled according to ANSI/ICEA S-76-474.”

Revise the second paragraph of Article 1066.05 to read:

“The tape shall have reinforced metallic detection capabilities consisting of a woven reinforced polyethylene tape with a metallic core or backing.”

## **ROADWAY LUMINAIRE, LED**

Effective: September 1, 2019

### 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 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, 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 33 years' experience manufacturing HID roadway luminaires and shall have a minimum of seven (7) years' experience manufacturing LED roadway luminaires. The manufacturer shall have a minimum of 25,000 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  $\pm 5$  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). If the weight of the luminaire is less than 20 lb (9.07 kg), weight shall be added to the mounting arm or a supplemental vibration damper installed as approved by the Engineer.

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 IP66 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/m<sup>2</sup>). 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  
 HOWARD STREET STA. 55+00 TO 66+00 AND STA. 74+60 TO STA. 86+00**

**GIVEN CONDITIONS**

Roadway Data	Pavement Width	42	Ft
	Number of Lanes Left of Median	<u>(1) Thru (1) Parking</u>	
	Number of Lanes Right of Median	<u>(1) Thru (1) Parking</u>	
	Lane Width	10.5	Ft
	Median Width	0	Ft
	IES Surface Classification	R3	
	Q-Zero Value	0.07	
Mounting Data	Mounting Height	34.5 CDOT/30 Evanston	Ft
	Mast Arm Length	12 CDOT/8 Evanston	Ft
	Pole Set-Back from Edge of Pavement	4	Ft
Luminaire Data	Source	LED	
	Color Temperature	4000	°K
	Lumens	18,362 – 20,246	Min
	Pay Item Lumen Designation	H	
	BUG Rating	B3-U0-G3	
	IES Vertical Distribution	Medium	
	IES Control of Distribution		
	IES Lateral Distribution	Type II	
Total Light Loss Factor	0.676		
Pole Layout Data	Spacing	140 CDOT/280 Evanston	Ft
	Configuration	Opposite	
	Luminaire Overhang over E.O.P.	9 CDOT/5 Evanston	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.

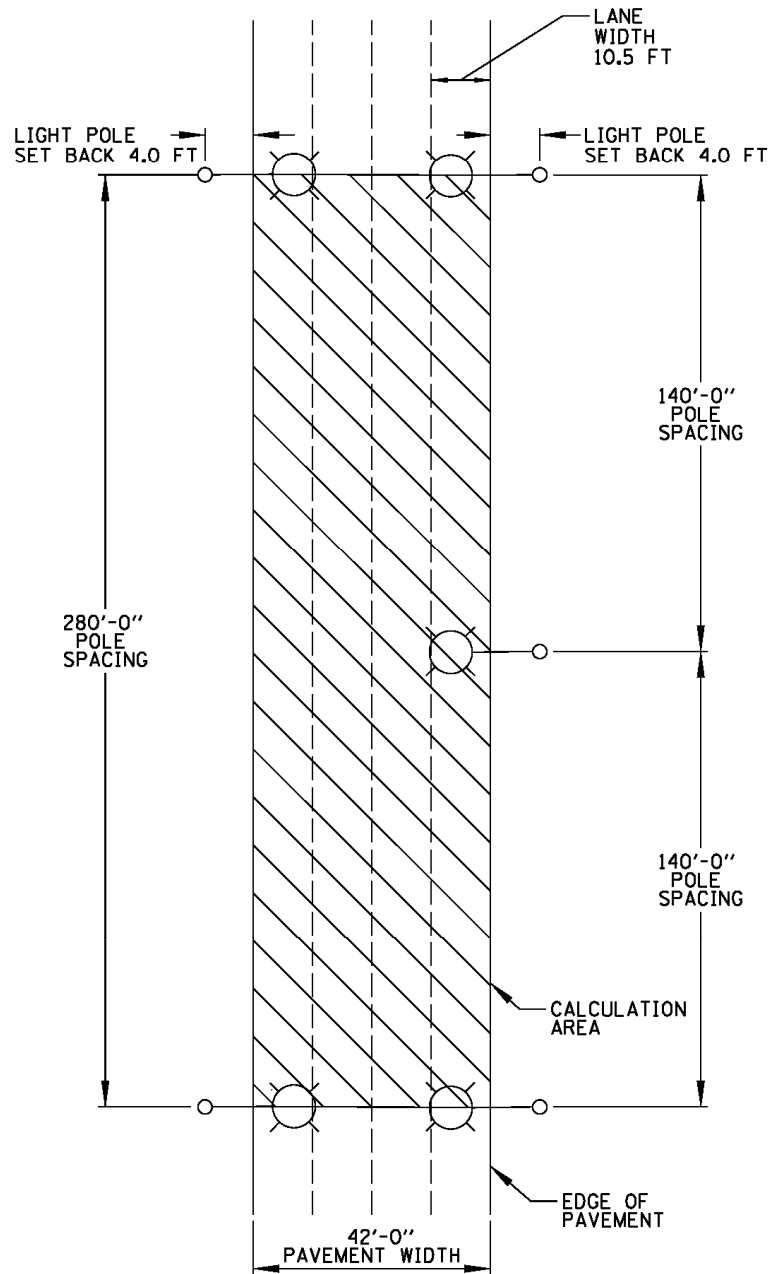
Roadway	Average Luminance, $L_{AVE}$ (Max)	<u>N/A</u>	Cd/m <sup>2</sup>
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Luminance	Average Luminance, $L_{AVE}$ (Min)	<u>1.7</u>	Cd/m <sup>2</sup>
	Uniformity Ratio, $L_{AVE}/L_{MIN}$	<u>3.0</u>	Max
	Uniformity Ratio, $L_{MAX}/L_{MIN}$	<u>5.0</u>	Max
	Veiling Luminance Ratio, $L_V/L_{AVE}$	<u>0.3</u>	Max



# LUMINAIRE PERFORMANCE DIAGRAM FOR 42 FT CROSS SECTION

STA. 55+00 TO 66+00 AND STA. 74+60 TO STA. 86+00



**IDOT DISTRICT 1 LUMINAIRE PERFORMANCE TABLE  
 ROADWAY LIGHTING  
 HOWARD STREET STA. 66+00 TO 74+60 AND STA. 86+00 TO STA. 107+00**

**GIVEN CONDITIONS**

Roadway Data	Pavement Width	<u>44</u>	Ft
	Number of Lanes Left of Median	<u>(1) Thru (1) Bike</u>	
	Number of Lanes Right of Median	<u>(1) Thru (1) Parking (1) Bike</u>	
	Lane Width	<u>8.8</u>	Ft
	Median Width	<u>0</u>	Ft
	IES Surface Classification	<u>R3</u>	
	Q-Zero Value	<u>0.07</u>	
Mounting Data	Mounting Height	<u>30 Gateway/14 Ped</u>	Ft
	Mast Arm Length	<u>8 Gateway/0 Ped</u>	Ft
	Pole Set-Back from Edge of Pavement	<u>4</u>	Ft
Luminaire Data	Source	<u>LED</u>	
	Color Temperature	<u>4000</u>	°K
	Lumens	<u>10,862 – 14,329</u>	Min
	Pay Item Lumen Designation	<u>E &amp; F</u>	
	BUG Rating	<u>B3-U3-G3 (Gateway) B2-U5-G4 (Ped)</u>	
	IES Vertical Distribution	<u>Medium</u>	
	IES Control of Distribution		
	IES Lateral Distribution	<u>Type III</u>	
Total Light Loss Factor	<u>0.668 Gateway/0.676 Ped</u>		
Pole Layout Data	Spacing	<u>85</u>	Ft
	Configuration	<u>Opposite</u>	
	Luminaire Overhang over E.O.P.	<u>5 Gateway/0 Ped</u>	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.

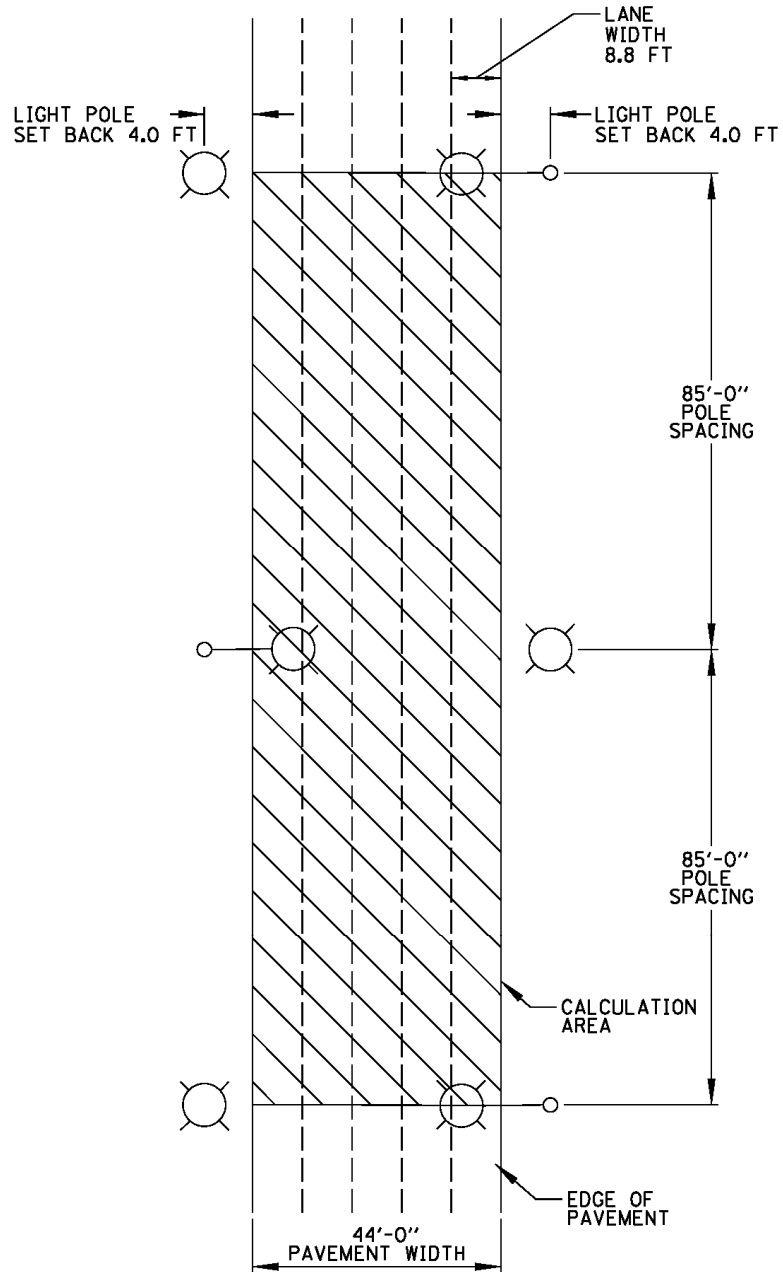
**PERFORMANCE REQUIREMENTS**

**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)	<u>N/A</u>	Cd/m <sup>2</sup>
	Average Luminance, $L_{AVE}$ (Min)	<u>1.7</u>	Cd/m <sup>2</sup>
	Uniformity Ratio, $L_{AVE}/L_{MIN}$	<u>3.0</u>	Max
	Uniformity Ratio, $L_{MAX}/L_{MIN}$	<u>5.0</u>	Max
	Veiling Luminance Ratio, $L_V/L_{AVE}$	<u>0.3</u>	Max

# LUMINAIRE PERFORMANCE DIAGRAM FOR 44 FT CROSS SECTION

STA. 66+00 TO 74+60 AND STA. 86+00 TO STA. 107+00



**IDOT DISTRICT 1 LUMINAIRE PERFORMANCE TABLE  
 ROADWAY LIGHTING  
 HOWARD STREET STA. 107+00 TO STA. 123+50**

**GIVEN CONDITIONS**

Roadway Data	Pavement Width	52	Ft
	Number of Lanes Left of Median	(1) Thru (1) Parking (1) Bike	
	Number of Lanes Right of Median	(1) Thru (1) Parking (1) Bike	
	Lane Width	8.67	Ft
	Median Width	0	Ft
	IES Surface Classification	R3	
	Q-Zero Value	0.07	
Mounting Data	Mounting Height	30 Gateway/14 Ped	Ft
	Mast Arm Length	8 Gateway/0 Ped	Ft
	Pole Set-Back from Edge of Pavement	4	Ft
Luminaire Data	Source	LED	
	Color Temperature	4000	°K
	Lumens	10,862 – 14,329	Min
	Pay Item Lumen Designation	E & F	
	BUG Rating	B3-U3-G3 (Gateway) B2-U5-G4 (Ped)	
	IES Vertical Distribution	Medium	
	IES Control of Distribution		
	IES Lateral Distribution	Type III	
Total Light Loss Factor	0.668 Gateway/0.676 Ped		
Pole Layout Data	Spacing	77.5 (Ave Existing)	Ft
	Configuration	Opposite	
	Luminaire Overhang over E.O.P.	5 Gateway/0 Ped	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.

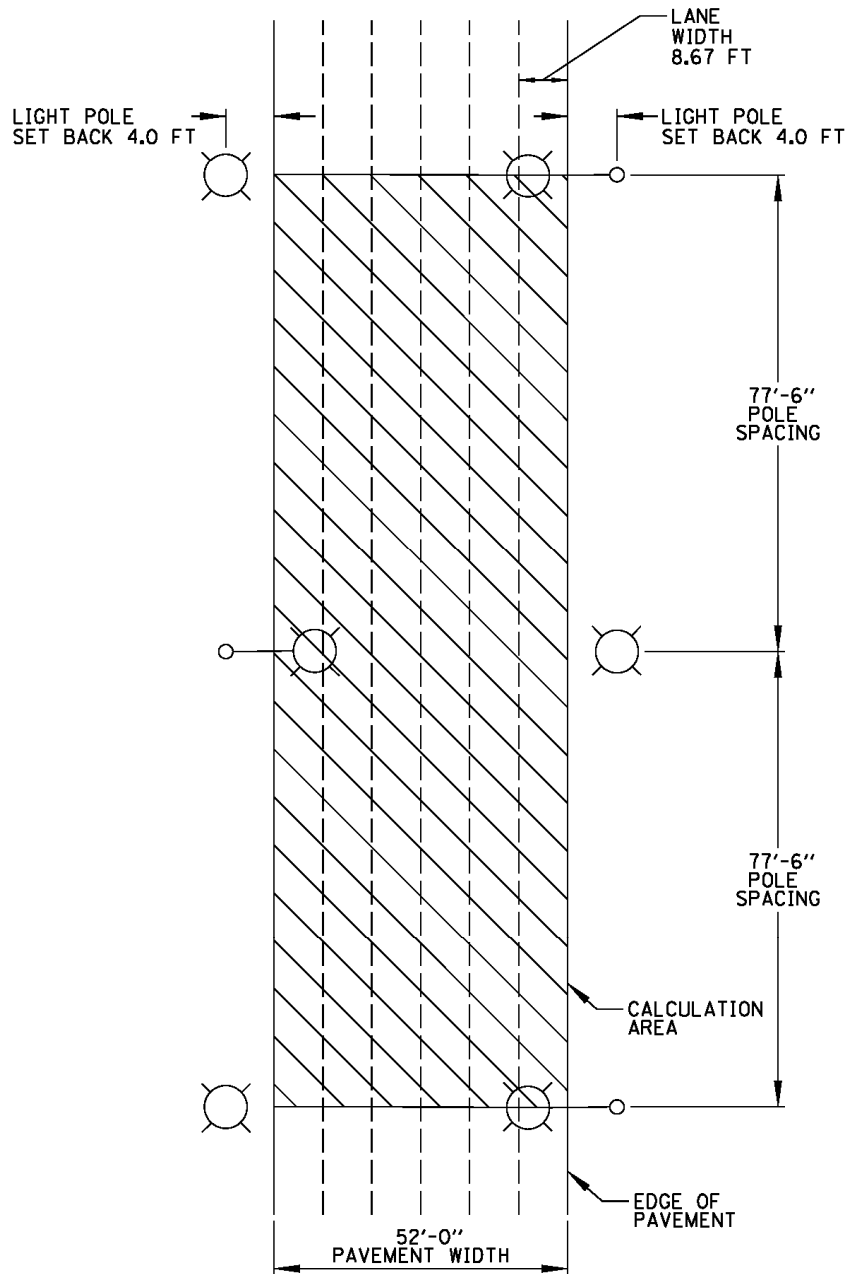
**PERFORMANCE REQUIREMENTS**

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

Roadway	Average Luminance, $L_{AVE}$ (Max)	<u>N/A</u>	$Cd/m^2$
Luminance	Average Luminance, $L_{AVE}$ (Min)	<u>1.7</u>	$Cd/m^2$
	Uniformity Ratio, $L_{AVE}/L_{MIN}$	<u>3.0</u>	Max
	Uniformity Ratio, $L_{MAX}/L_{MIN}$	<u>5.0</u>	Max
	Veiling Luminance Ratio, $L_V/L_{AVE}$	<u>0.3</u>	Max

# LUMINAIRE PERFORMANCE DIAGRAM FOR 52 FT CROSS SECTION

STA. 107+00 TO STA. 123+50



Independent Testing

When a contract has 30 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.

<b>Contract Quantity</b>	<b>Luminaires to be Tested</b>
1-29	0 (unless otherwise noted)
30-80	2
81-130	3
131-180	4
181-230	5
231-280	6
281-330	7

Testing is not required for temporary lighting luminaires.

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.

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.

Two copies of the summary report and the test results including IES photometric files (including CDROM) shall be certified by the test laboratory and shall be sent by certified mail directly to the Engineer.

To: District Engineer  
Attn: Bureau Chief of Traffic Operations  
Illinois Department of transportation  
201 West center Ct.  
Schaumburg, IL 60196

The package shall state "luminaire test reports" and the contract number clearly.

A copy of this material shall be sent to the Contractor and the Resident Engineer at the same time.

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 shipment.** The Contractor shall verify that the Resident Engineer has noted the shipment date in the daily diary. Copy of the shipment documentation shall be submitted.

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.

<b>Designation Type</b>	<b>Minimum Initial Luminous Flux</b>
A	2,200
B	3,150
C	4,400
D	6,300
E	9,450
F	12,500
G	15,500
H	25,200
I	47,250
J	63,300
K	80,000+

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.

## **GENERAL ELECTRICAL REQUIREMENTS**

Effective: September 1, 2019

This special provision replaces Articles 801.01 – 801.07, 801.09 – 801-16 of the Standard Specifications.

**Definition.** Codes, standards, and industry specifications cited for electrical work shall be by definition the latest adopted version thereof, unless indicated otherwise.

Materials by definition shall include electrical equipment, fittings, devices, motors, appliances, fixtures, apparatus, all hardware and appurtenances, and the like, used as part of, or in connection with, electrical installation.

**Standards of Installation.** Materials shall be installed according to the manufacturer's recommendations, the NEC, OSHA, the NESC, and AASHTO's Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals.

All like materials shall be from the same manufacturer. Listed and labeled materials shall be used whenever possible. The listing shall be according to UL or an approved equivalent.

**Safety and Protection.** Safety and protection requirements shall be as follows.

**Safety.** Electrical systems shall not be left in an exposed or otherwise hazardous condition. All electrical boxes, cabinets, pole handholes, etc. which contain wiring, either energized or non-energized, shall be closed or shall have covers in place and be locked when possible, during nonworking hours.

**Protection.** Electrical raceway or duct openings shall be capped or otherwise sealed from the entrance of water and dirt. Wiring shall be protected from mechanical injury.

**Equipment Grounding Conductor.** All electrical systems, materials, and appurtenances shall be grounded. Good ground continuity throughout the electrical system shall be assured, even though every detail of the requirements is not specified or shown. Electrical circuits shall have a continuous insulated equipment grounding conductor. When metallic conduit is used, it shall be bonded to the equipment grounding conductor, but shall not be used as the equipment grounding conductor.

Detector loop lead-in circuits, circuits under 50 volts, and runs of fiber optic cable will not require an equipment grounding conductor.

Where connections are made to painted surfaces, the paint shall be scraped to fully expose metal at the connection point. After the connection is completed, the paint system shall be repaired to the satisfaction of the Engineer.

Bonding of all boxes and other metallic enclosures throughout the wiring system to the equipment grounding conductor shall be made using a splice and pigtail connection. Mechanical connectors shall have a serrated washer at the contact surface.

All connections to structural steel or fencing shall be made with exothermic welds. Care shall be taken not to weaken load carrying members. Where connections are made to epoxy coated reinforcing steel, the epoxy coating shall be sufficiently removed to facilitate a mechanical connection. The epoxy coating shall be repaired to the satisfaction of the Engineer. Where connections are made to insulated conductors, the connection shall be wrapped with at least four layers of electrical tape extended 6 in. (150 mm) onto the conductor insulation.

**Submittals.** At the preconstruction meeting, the Contractor shall submit a written listing of manufacturers for all major electrical and mechanical items. The list of manufacturers shall be binding, except by written request from the Contractor and approval by the Engineer. The request shall include acceptable reasons and documentation for the change.

Major items shall include, but not limited to the following:

Type of Work (discipline)	Item
All Electrical Work	Electric Service Metering Emergency Standby System Transformers Cable Unit Duct Splices Conduit Surge Suppression System
Lighting	Tower Pole Luminaire Foundation Breakaway Device Controllers Control Cabinet and Peripherals
ITS	Controller Cabinet and Peripherals

	CCTV Cameras Camera Structures Ethernet Switches Detectors Detector Loop Fiber Optic Cable
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Within 30 calendar days after contract execution, the Contractor shall submit, for approval, one copy each of the manufacturer's product data (for standard products and components) and detailed shop drawings (for fabricated items). Submittals for the materials for each individual pay item shall be complete in every respect. Submittals which include multiple pay items shall have all submittal material for each item or group of items covered by a particular specification, grouped together and the applicable pay item identified. Various submittals shall, when taken together, form a complete coordinated package. A partial submittal will be returned without review unless prior written permission is obtained from the Engineer.

The submittal shall be properly identified by route, section, county, and contract number.

The Contractor shall have reviewed the submittal material and affixed his/her stamp of approval, with date and signature, for each individual item. In case of subcontractor submittal, both the subcontractor and the Contractor shall review, sign, and stamp their approval on the submittal.

Illegible print, incompleteness, inaccuracy, or lack of coordination will be grounds for rejection.

**Items from multiple disciplines shall not be combined on a single submittal and transmittal. Items for lighting, signals, surveillance and CCTV must be in separate submittals since they may be reviewed by various personnel in various locations.**

The Engineer will review the submittals for conformance with the design concept of the project according to Article 105.04 and the following. The Engineer will stamp the drawings indicating their status as "Approved", "Approved as Noted", "Disapproved", or "Information Only". Since the Engineer's review is for conformance with the design concept only, it shall be 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, or layout drawings by the Engineer's approval thereof. The Contractor shall still be in full compliance with contract and specification requirements.

All submitted items reviewed and marked "Disapproved" or "Approved as Noted" shall be resubmitted by the Contractor in their entirety, unless otherwise indicated within the submittal comments.

Work shall not begin until the Engineer has approved the submittal. Material installed prior to approval by the Engineer, will be subject to removal and replacement at no additional cost to the Department.

Unless otherwise approved by the Engineer, all of the above items shall be submitted to the Engineer at the same time. Each item shall be properly identified by route, section, and contract number.

**Electronic Submittals.** Unless otherwise directed, the Contractor shall utilize the **Traffic Operations Construction Submittal (TOCS)** system.

**Certifications.** When certifications are specified and are available prior to material manufacture, the certification shall be included in the submittal information. When specified and only available after manufacture, the submittal shall include a statement of intent to furnish certification. All certificates shall be complete with all appropriate test dates and data.

**Authorized Project Delay.** See Article 801.08

**Maintenance transfer and Preconstruction Inspection:**

General. Before performing any excavation, removal, or installation work (electrical or otherwise) at the site, the Contractor shall request a maintenance transfer and preconstruction site inspection, to be held in the presence of the Engineer and a representative of the party or parties responsible for maintenance of any lighting and/or traffic control systems which may be affected by the work. The request for the maintenance transfer and preconstruction inspection shall be made no less than fourteen (14) calendar days prior to the desired inspection date. The maintenance transfer and preconstruction inspection shall:

Establish the procedures for formal transfer of maintenance responsibility required for the construction period.

Establish the approximate location and operating condition of lighting and/or traffic control systems which may be affected by the work

Marking of Existing Cable Systems. The party responsible for maintenance of any existing lighting and/or traffic control systems at the project site will, at the Contractor's request, mark and/or stake, once per location, all underground cable routes owned or maintained by the State. A project may involve multiple "locations" where separated electrical systems are involved (i.e. different controllers). The markings shall be taken to have a horizontal tolerance of at least 1 foot (304.8 mm) to either side.. The request for



the cable locations and marking shall be made at the same time the request for the maintenance transfer and preconstruction inspection is made. The Contractor shall exercise extreme caution where existing buried cable runs are involved. The markings of existing systems are made strictly for assistance to the Contractor and this does not relieve the Contractor of responsibility for the repair or replacement of any cable run damaged in the course of his work, as specified elsewhere herein. Note that the contractor shall be entitled to only one request for location marking of existing systems and that multiple requests may only be honored at the contractor's expense. No locates will be made after maintenance is transferred, unless it is at the contractor's expense.

Condition of Existing Systems. The Contractor shall conduct an inventory of all existing electrical system equipment within the project limits, which may be affected by the work, making note of any parts which are found broken or missing, defective or malfunctioning. Megger and load readings shall be taken for all existing circuits which will remain in place or be modified. If a circuit is to be taken out in its entirety, then readings do not have to be taken. The inventory and test data shall be reviewed with and approved by the Engineer and a record of the inventory shall be submitted to the Engineer for the record. Without such a record, all systems transferred to the Contractor for maintenance during construction shall be returned at the end of construction in complete, fully operating condition.”

### **Maintenance and Responsibility During Construction.**

Lighting Operation and Maintenance Responsibility. The scope of work shall include the assumption of responsibility for the continuing operation and maintenance of the existing, proposed, temporary, sign and navigation lighting, or other lighting systems and all appurtenances affected by the work as specified elsewhere herein. Maintenance of lighting systems is specified elsewhere and will be paid for separately

The proposed lighting system must be operational prior to opening the roadway to traffic unless temporary lighting exists which is designed and installed to properly illuminate the roadway.

Energy and Demand Charges. The payment of basic energy and demand charges by the electric utility for existing lighting which remains in service will continue as a responsibility of the Owner, unless otherwise indicated. Unless otherwise indicated or required by the Engineer duplicate lighting systems (such as temporary lighting and proposed new lighting) shall not be operated simultaneously at the Owner's expense and lighting systems shall not be kept in operation during long daytime periods at the Owner's expense. Upon written authorization from the Engineer to place a proposed new lighting system in service, whether the system has passed final acceptance or not, (such as to allow temporary lighting to be removed), the Owner will accept responsibility for energy and demand charges for such lighting, effective the date of authorization. All other energy

and demand payments to the utility shall be the responsibility of the Contractor until final acceptance.

**Damage to Electrical Systems.** Should damage occur to any existing electrical systems through the Contractor's operations, the Engineer will designate the repairs as emergency or non-emergency in nature.

Emergency repairs shall be made by the Contractor, or as determined by the Engineer, the Department, or its agent. Non-emergency repairs shall be performed by the Contractor within six working days following discovery or notification. All repairs shall be performed in an expeditious manner to assure all electrical systems are operational as soon as possible. The repairs shall be performed at no additional cost to the Department.

**Lighting.** An outage will be considered an emergency when three or more lights on a circuit or three successive lights are not operational. Knocked down materials, which result in a danger to the motoring public, will be considered an emergency repair.

Temporary aerial multi-conductor cable, with grounded messenger cable, will be permitted if it does not interfere with traffic or other operations, and if the Engineer determines it does not require unacceptable modification to existing installations.

**Marking Proposed Locations for Highway Lighting System.** The Contractor shall mark or stake the proposed locations of all poles, cabinets, junction boxes, pull boxes, handholes, cable routes, pavement crossings, and other items pertinent to the work. A proposed location inspection by the Engineer shall be requested prior to any excavation, construction, or installation work after all proposed installation locations are marked. Any work installed without location approval is subject to corrective action at no additional cost to the Department.

**Inspection of electrical work.** Inspection of electrical work shall be according to Article 105.12 and the following.

Before any splice, tap, or electrical connection is covered in handholes, junction boxes, light poles, or other enclosures, the Contractor shall notify and make available such wiring for the Engineer's inspection.

**Testing.** Before final inspection, the electrical work shall be tested. Tests may be made progressively as parts of the work are completed, or may be made when the work is complete. Tests shall be made in the presence of the Engineer. Items which fail to test satisfactorily shall be repaired or replaced. Tests shall include checks of control operation, system voltages, cable insulation, and ground resistance and continuity.

The forms for recording test readings will be available from the Engineer in electronic format. The Contractor shall provide the Engineer with a written report of all test data including the following:

- Voltage Tests
- Amperage Tests
- Insulation Resistance Tests
- Continuity tests
- Detector Loop Tests

Lighting systems. The following tests shall be made.

- (1) Voltage Measurements. Voltages in the cabinet from phase to phase and phase to neutral, at no load and at full load, shall be measured and recorded. Voltage readings at the last termination of each circuit shall be measured and recorded.
- (2) Insulation Resistance. Insulation resistance to ground of each circuit at the cabinet, with all loads connected, shall be measured and recorded.

On tests of new cable runs, the readings shall exceed 50 megohms for phase and neutral conductors with a connected load over 20 A, and shall exceed 100 megohms for conductors with a connected load of 20 A or less.

On tests of cable runs which include cables which were existing in service prior to this contract, the resistance readings shall be the same or better than the readings recorded at the maintenance transfer at the beginning of the contract. Measurements shall be taken with a megohm meter approved by the Engineer.

- (3) Loads. The current of each circuit, phase main, and neutral shall be measured and recorded. The Engineer may direct reasonable circuit rearrangement. The current readings shall be within ten percent of the connected load based on material ratings.
- (4) Ground Continuity. Resistance of the system ground as taken from the farthest extension of each circuit run from the controller (i.e. check of equipment ground continuity for each circuit) shall be measured and recorded. Readings shall not exceed 2.0 ohms, regardless of the length of the circuit.
- (5) Resistance of Grounding Electrodes. Resistance to ground of all grounding electrodes shall be measured and recorded. Measurements shall be made

with a ground tester during dry soil conditions as approved by the Engineer. Resistance to ground shall not exceed 10 ohms.

ITS. The following test shall be made in addition to the lighting system test above.

**Detector Loops.** Before and after permanently securing the loop in the pavement, the resistance, inductance, resistance to ground, and quality factor for each loop and lead-in circuit shall be tested. The loop and lead-in circuit shall have an inductance between 20 and 2500 microhenries. The resistance to ground shall be a minimum of 50 megohms under any conditions of weather or moisture. The quality factor (Q) shall be 5 or greater.

**Fiber Optic Systems.** Fiber optic testing shall be performed as required in the fiber optic cable special provision and the fiber optic splice special provision.

All test results shall be furnished to the Engineer seven working days before the date the inspection is scheduled.

**Contract Guarantee.** The Contractor shall provide a written guarantee for all electrical work provided under the contract for a period of six months after the date of acceptance with the following warranties and guarantees.

- (a) The manufacturer's standard written warranty for each piece of electrical material or apparatus furnished under the contract. The warranty for light emitting diode (LED) modules, including the maintained minimum luminance, shall cover a minimum of 60 months from the date of delivery.
- (b) The Contractor's written guarantee that, for a period of six months after the date of final acceptance of the work, all necessary repairs to or replacement of said warranted material or apparatus for reasons not proven to have been caused by negligence on the part of the user or acts of a third party shall be made by the Contractor at no additional cost to the Department.
- (c) The Contractor's written guarantee for satisfactory operation of all electrical systems furnished and constructed under the contract for a period of six months after final acceptance of the work.

The warranty for an uninterruptable power supply (UPS) shall cover a minimum of two years from date the equipment is placed in operation; however, the batteries of the UPS shall be warranted for full replacement for a minimum of five years.

**Record Drawings.** Alterations and additions to the electrical installation made during the execution of the work shall be neatly and plainly marked in red by the Contractor on the full-size set of record drawings kept at the Engineer's field office for the project.

These drawings shall be updated on a daily basis and shall be available for inspection by the Engineer during the course of the work. The record drawings shall include the following:

- Cover Sheet
- Summary of Quantities, electrical items only
- Legends, Schedules and Notes
- Plan Sheet
- Pertinent Details
- Single Line Diagram
- Other useful information useful to locate and maintain the systems.

Any modifications to the details shall be indicated. Final quantities used shall be indicated on the Summary of Quantities. Foundation depths used shall also be listed.

As part of the record drawings, the Contractor shall inventory all materials, new or existing, on the project and record information on inventory sheets provided by the Engineer.

The inventory shall include:

- Location of Equipment, including rack, chassis, slot as applicable.
- Designation of Equipment
- Equipment manufacturer
- Equipment model number
- Equipment Version Number
- Equipment Configuration
  - Addressing, IP or other
  - Settings, hardware or programmed
- Equipment Serial Number

The following electronic inventory forms are available from the Engineer:

- Lighting Controller Inventory
- Lighting Inventory
- Light Tower Inspection Checklist
- ITS Location Inventory

The information shall be entered in the forms; handwritten entries will not be acceptable; except for signatures. Electronic file shall also be included in the documentation.

When the work is complete, and seven days before the request for a final inspection, the set of 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 on CDROM as well as hardcopy's for review and approval.

In addition to the record drawings, PDF copies of the final catalog cuts which have been Approved and Approved as Noted with applicable follow-up shall be submitted along with the record drawings. The PDF files shall clearly indicate either by filename or PDF table of contents the respective pay item number. Specific part or model numbers of items which have been selected shall be clearly visible. Hard copies of the catalog are not required with this submittal.

The Contractor shall provide two sets of electronically produced drawings in a moisture proof pouch to be kept on the inside door of the controller cabinet or other location approved by the Engineer. These drawings shall show the final as-built circuit orientation(s) of the project in the form of a single line diagram with all luminaires numbered and clearly identified for each circuit.

Final documentation shall be submitted as a complete submittal package, i.e. record drawings, test results, inventory, etc. shall be submitted at the same time. Partial piecemeal submittals will be rejected without review. A total of five hardcopies and CDROMs of the final documentation shall be submitted.

GPS Documentation. In addition to the specified record drawings, the Contactor shall record GPS coordinates of the following electrical components being installed, modified or being affected in other ways by this contract:

- All light poles and light towers.
- Handholes and vaults.
- Junction Boxes
- Conduit roadway crossings.
- Controllers.
- Control Buildings.
- Structures with electrical connections, i.e. DMS, lighted signs.
- Electric Service locations.
- CCTV Camera installations.
- Roadway Surveillance installations.
- Fiber Optic Splice Locations.
- Fiber Optic Cables. Coordinates shall be recorded along each fiber optic cable route every 200 feet.
- All fiber optic slack locations shall be identified with quantity of slack cable included. When sequential cable markings are available, those markings shall be documented as cable marking into enclosure and marking out of enclosure.

Datum to be used shall be North American 1983.

Data shall be provided electronically and in print form. The electronic format shall be compatible with MS Excel. Latitude and Longitude shall be in decimal degrees with a minimum of 6 decimal places. Each coordinate shall have the following information:

1. District
2. Description of item
3. Designation
4. Use
5. Approximate station
6. Contract Number
7. Date
8. Owner
9. Latitude
10. Longitude
11. Comments

A spreadsheet template will be available from the Engineer for use by the Contractor.

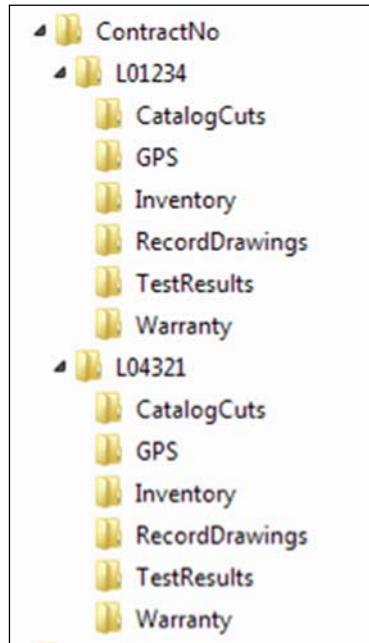
**Prior to the collection of data, the contractor shall provide a sample data collection of at least six data points of known locations to be reviewed and verified by the Engineer to be accurate within 20 feet.** Upon verification, data collection can begin. Data collection can be made as construction 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 submit the data for review and approval as specified. **Data collection prior to the submittal and review of the sample data of existing data points will be unacceptable and rejected.**

Accuracy. Data collected is to be mapping grade. A handheld mapping grade GPS device shall be used for the data collection. The receiver shall support differential correction and data shall have minimum 5 meter accuracy after post processing.

GPS receivers integrated into cellular communication devices, recreational and automotive GPS devices are not acceptable.

The GPS shall be the product of an established major GPS manufacturer having been in the business for a minimum of 6 years.”

The documents on the CD shall be organized by the Electrical Maintenance Contract Management System (EMCMS) location designation. If multiple EMCMS locations are within the contract, separate folders shall be utilized for each location as follows:



Extraneous information not pertaining to the specific EMCMS location shall not be included in that particular folder and sub-folder.

The inspection will not be made until after the delivery of acceptable record drawings, specified certifications, and the required guarantees.

The Final Acceptance Documentation Checklist shall be completed and is contained elsewhere herein.

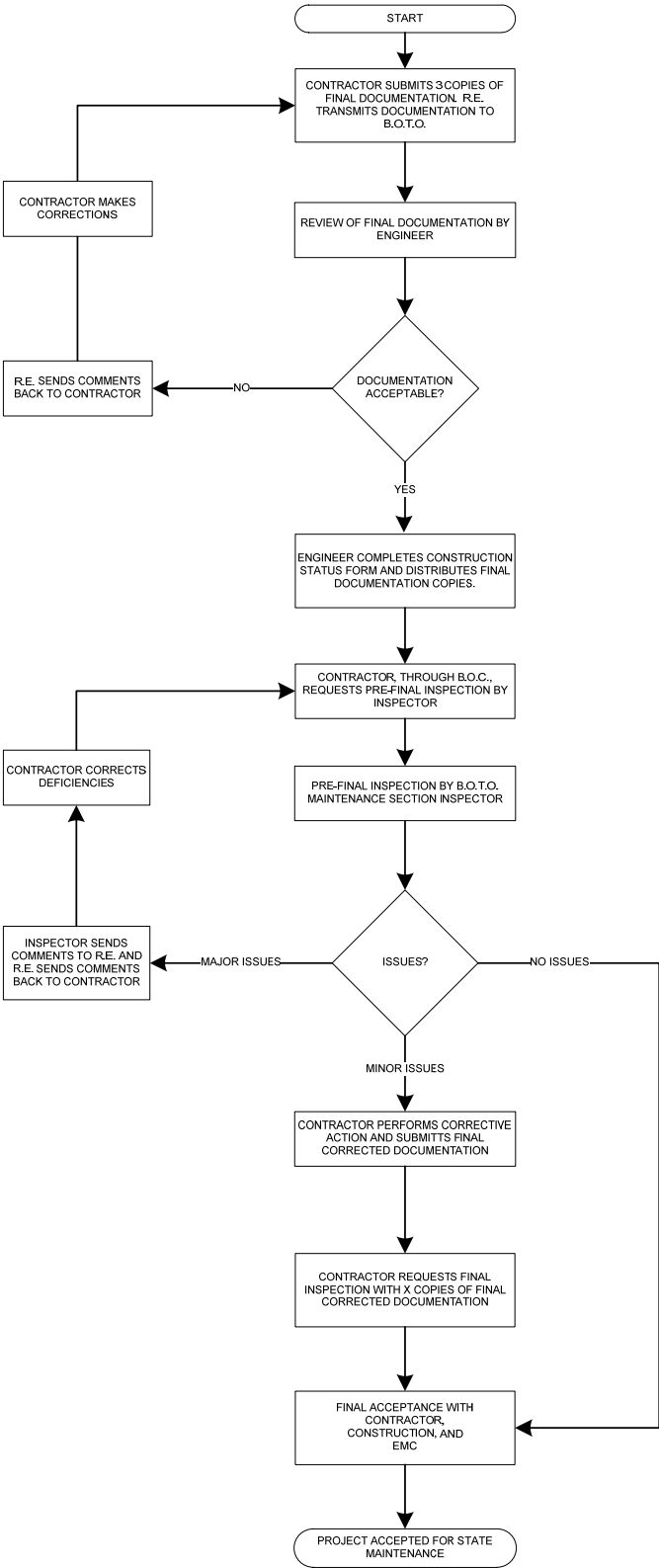
All CD's shall be labeled as illustrated in the CD Label Template contained herein.

**Acceptance.** Acceptance of electrical work will be given at the time when the Department assumes the responsibility to protect and maintain the work according to Article 107.30 or at the time of final inspection.

When the electrical work is complete, tested, and fully operational, the Contractor shall schedule an inspection for acceptance with the Engineer no less than seven working days prior to the desired inspection date. The Contractor shall furnish the necessary labor and equipment to make the inspection.

A written record of the test readings taken by the Contractor according to Article 801.13 shall be furnished to the Engineer seven working days before the date the inspection is scheduled. Inspection will not be made until after the delivery of acceptable record drawings, specified certifications, and the required guarantees.





**Final Acceptance Documentation Checklist**

LOCATION	
Route	Common Name
Limits	Section
Contract #	County
Controller Designation(s)	EMC Database Location Number(s)

ITEM	Contractor (Verify)	Resident Engineer (Verify)
<b>Record Drawings</b> -Four hardcopies (11" x 17") -Scanned to two CD-ROMs	<input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/>
<b>Field Inspection Tests</b> -Voltage -Amperage -Cable Insulation Resistance -Continuity -Controller Ground Rod Resistance (Four Hardcopies & scanned to two CD's)	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
<b>GPS Coordinates</b> -Excel file (Check Special Provisions, Excel file scanned to two CD's)	<input type="checkbox"/>	<input type="checkbox"/>
<b>Job Warranty Letter</b> (Four Hardcopies & scanned to two CD's)	<input type="checkbox"/>	<input type="checkbox"/>
<b>Catalog Cut Submittals</b> -Approved & Approved as Noted (Scanned to two CD's)	<input type="checkbox"/>	<input type="checkbox"/>
<b>Lighting Inventory Form</b> (Four Hardcopies & scanned to two CD's)	<input type="checkbox"/>	<input type="checkbox"/>
<b>Lighting Controller Inventory Form</b> (Four Hardcopies & scanned to two CD's)	<input type="checkbox"/>	<input type="checkbox"/>
<b>Light Tower Inspection Form</b> (If applicable, Four Hardcopies & scanned to two CD's)	<input type="checkbox"/>	<input type="checkbox"/>

Four Hardcopies & scanned to two CD's shall be submitted for all items above. The CD ROM shall be labeled as shown in the example contained herein.

**General Notes:**

Record Drawings – The record drawings should contain contract cover sheet, summary of quantities showing all lighting pay item sheets, proposed lighting plans and lighting detail sheets. Submit hardcopies 11 x 17 size. Include the original “red-ink” copy. The red-ink markup should be neatly drawn. Record drawings copies should be legible. Blurred copies will not be acceptable. Temporary lighting plans and removal lighting plans should not be part of the set.

Field Inspection Tests – Testing should be done for proposed cables. Testing shall be per standard specifications. Forms shall be neatly filled out.

GPS Coordinates – Check special provisions “General Electrical Requirements”. Submit electronic “EXCEL” file.

Job Warranty Letter – See standard specifications.

Cutsheet Submittal – See special provisions “General Electrical Requirements”. Scan Approved and Approved as Noted cutsheets.

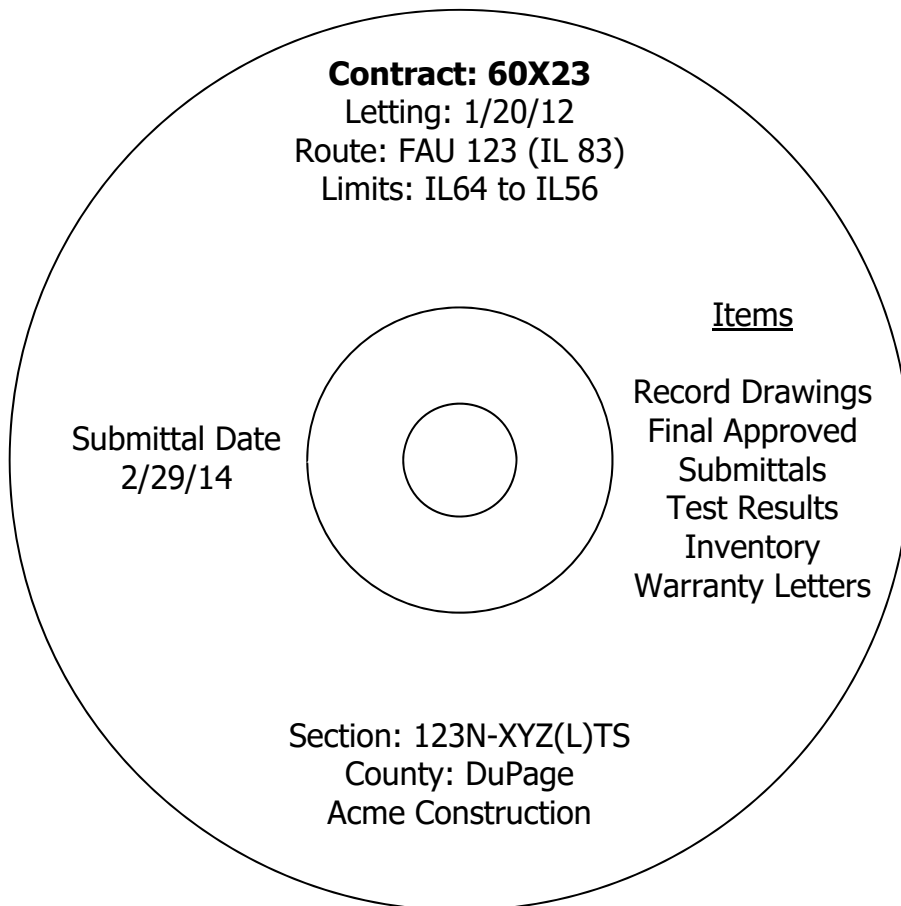
Lighting Inventory Form – Inventory form should include only proposed light poles, proposed light towers, proposed combination (traffic/light pole) lighting and proposed underpass luminaires.

Lighting Controller Inventory Form – Form should be filled out for only proposed lighting controllers.

Light Tower Safety Inspection Form – Form should be filled out for each proposed light tower.

CD LABEL FORMAT TEMPLATE.

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



**SPECIFICATION 1351  
BUREAU OF ELECTRICITY  
DEPARTMENT OF STREETS & SANITATION  
CITY OF CHICAGO  
DECEMBER 20, 1971**

**WIRE: SINGLE CONDUCTOR NO. 12 STRANDED COPPER WITH MINERAL-  
FILLED CROSS-LINKED POLYETHYLENE INSULATION**

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**SUBJECT**

1. This specification states the requirements for insulated wire intended for use as a conductor to connect street light luminaires to aerial wires or underground cables.

**GENERAL**

2. (a) Specifications. The cable shall conform in detail to the requirements herein stated and to the Specifications and methods of Test of the American Society for Testing and Materials, cited by ASTM Designation Number, in which the most recently published revision shall govern.
- (b) Acceptance. Cable not conforming to this specification will not be accepted.
- (c) Packaging. The wire shall be delivered in coils containing five hundred (500) feet each. A tolerance limit of plus or minus five percent ( $\pm 5\%$ ) shall be adhered to and the coils shall be packaged in individual dispenser cartons.
- (d) Warranty. The manufacturer shall warrant the cable to be first class material throughout. In Lieu of other claims against them, if the cable be installed within six months of date of shipment, the manufacturer shall replace any cable failing during normal and proper use within two years of date of installation. All replacements under this warranty shall be made free of charge F.O.B. delivery point of the original contract. Lengths of cable having been replaced shall become the property of and shall be returned to the manufacturer F.O.B. City of Chicago.

**CABLE**

3. (a) Construction. The cable shall consist of a coated conductor concentrically encased in mineral-filled cross-linked polyethylene insulation-jacket.
- (b) Sealing. Both ends of each length of cable shall be thoroughly sealed to prevent the entrance of moisture and other foreign matter.

- (c) Color. All cables shall use a carbon black pigmented cross-linked polyethylene compound. Any other Color required shall be an approved, permanent type coating applied to the carbon black insulation-jacket.

**CONDUCTOR**

- 4. (a) Material. Shall be No. 12 AWG conductor consisting of seven (7) strands of coated, annealed, copper wires (0.0305 in diameter).
- (b) Resistivity. Conform to ASTM B-189.
- (c) Coating. Shall be either tin coated in accordance with ASTM B-33 or have a lead or lead alloy coating in accordance with ASTM B-189.
- (d) Stranding. Shall conform to the requirements of ASTM B-8, Class B.

**INSULATION**

- 5. (a) Type. The insulation shall be a mineral-filled cross-linked polyethylene compound meeting the physical and electrical requirements herein specified.
- (b) Thickness. The insulation shall be circular in cross section and have an average thickness of  $\frac{4}{64}$  inches. The thickness shall not vary by more than plus or minus five percent ( $\pm 5\%$ ).
- (c) Physical Properties

Initial Values:

Tensile strength, min., psi. 2,000  
Elongation at rupture, min. % 250

After Aging:

- (1) After 168 hours in oxygen bomb at a pressure of 80 psi and a temperature of 127<sup>0</sup> C.:

Tensile strength, min. % of initial value 75  
Elongation at rupture, min., % of initial value 75

- (2) After 168 hours in an air oven at 121<sup>0</sup> ± 1<sup>0</sup> C:

Tensile strength, min., % of initial value 80  
Elongation at rupture, in., % of initial value 80

(d) Modulus Test.

- (1) After initial conditioning period of 4 minutes at a temperature of 150<sup>0</sup> C. And at 100% elongation, the modulus shall not be less than 110 pounds per square inch.

(e) Accelerated Water Absorption Characteristics

Test shall be made in accordance with methods discussed in ASTM D470.

- (1) Electrical Method. After 24 hours immersion in tap water at 75<sup>0</sup> C ± 1<sup>0</sup> C, the specific inductive capacity of the insulation shall be not more than 7.0. After a continued 14 day immersion, the specific inductive capacity shall be not more than three percent (3%) higher than the value determined at the end of the first day, nor more than two percent (2%) higher than the value determined at the end of the seventh day. Accelerated Water Absorption Characteristics.
- (2) Gravimetric Method. The insulation shall not absorb more than five (5) milligrams of water per square inch of exposed surface area after immersion in distilled water at 70<sup>0</sup> C for a period of seven (7) days.

(f) Electrical Characteristics

- (1) Dielectric Strength. Each completed length of insulated conductor shall withstand a test voltage of 3,000 volts A.C. for a period of 5 minutes after immersion in water for not less than 6 hours and while still immersed.
- (2) Insulation Resistance. After withstanding the dielectric test, the cable shall have an insulation resistance constant of not less than 25,000.

**TEST**

6. (a) General. The tests required to determine compliance with this specification shall be made at the works of the manufacturer of the cable. At or before the time of shipment, certified copies of the test reports of each shipment shall be forwarded to the City for approval. The City reserves the right to make check tests of the cables, and to reject cables failing to meet these tests.
- (b) Apparatus and Method. The apparatus and method of testing shall conform to ASTM D470, except as otherwise herein specified.

- (c) Test Report Required.
  - (1) Physical Properties (initial and after aging).
  - (2) Accelerated Water Absorption Characteristics.
  - (3) Electrical Characteristics.

THIS SPECIFICATION SHALL NOT BE ALTERED



**ELECTRICAL SPECIFICATION 1375  
DIVISION OF ELECTRICAL OPERATIONS  
DEPARTMENT OF TRANSPORTATION  
CITY OF CHICAGO  
MARCH 31, 1977**

**BASE: BALLAST HOUSING, NO. 7 U.S. STANDARD GAUGE STEEL**

**SUBJECT**

1. This specification states the requirements for ballast housing base assemblies to be installed on concrete foundations and to serve as bases for anchor base type steel poles with mast arm attached street light luminaires.

**GENERAL REQUIREMENTS**

2.
  - (a) Specifications. The base assemblies shall conform in detail to the requirements herein stated and to the specifications of the American Society for Testing and Materials, of which the latest published revisions will govern.
  - (b) Acceptance. Base assemblies not conforming to this specification will not be accepted.
  - (c) Drawings. The drawing mentioned herein is a drawing of the Department of Transportation. It is an integral part of this specification cooperating to state necessary requirements.
  - (d) Shop Drawing. One complete set of shop drawings of the base assembly intended to be furnished must be submitted within fifteen (15) days upon request of the Chief Procurement Officer.
  - (e) Sample. One completely assembled base of the manufacture intended to be furnished must be submitted upon request of the Chief Procurement Officer within fifteen (15) days after receipt of the request.

**DETAIL REQUIREMENTS**

3.
  - (a) Drawing. The base assembly must conform in detail to the design and dimensions shown on Drawing No. 785, dated March 25, 1977.
  - (b) Material. The steel used in the fabrication of the base assemblies must conform to ASTM A-606 Type 4 for the sides and door and to ASTM A-36 for the top, bottom and anchor plates.
  - (c) Thickness. The sides and door must be No. 7 U.S. Standard Gauge; the top,

bottom and Anchor Plates must be 3/4 inch plate.

- (d) Door. The door must be drilled top and bottom for, and furnished with, four (4) 1/4-20NCX3/4" button head stainless steel tamper resistant bolts for fastening top and bottom of door to base as shown on drawing No. 785. Ten (10) wrenches or drivers to fit the door bolts must be furnished with each fifty (50) base housings.
- (e) Hardware. The bolts, nuts, lock washers and anchor plates must conform to the drawing. Four (4) galvanized hex head machine bolts, four (4) galvanized hex nuts, four (4) galvanized lock washers, and two (2) 3/4" thick steel anchor plates must be furnished with each base assembly. The anchor plates must be shipped bolted to the top of the ballast housing assembly using the hardware enumerated above.
- (f) Welding. Every welded joint shall be made in conformity with the proper interpretation of the standard welding symbols of the American Welding Society as indicated on the drawings. Each bidder must submit with his proposal a drawing showing the sizes and types of welds, the type of electrode and the welding methods he proposes to use in fabricating the base assembly.
- (g) Sandblasting. The door and ballast housing shall be thoroughly sand blasted to remove all scale, oil or slag prior to painting.
- (h) Dating. The top of the ballast housing base must be stamped or engraved with the year of manufacture in numerals not less than 1/2" in height.
- (i) Painting. A coat of Penetrol shall be applied on the inside weld of the base. The complete base assembly, inside and outside, is to be given a coat of iron oxide zinc chromate primer meeting the requirements of Federal Specification TT-P-636B.

**TESTING**

- 4. (a) Chemical Composition. Certified reports from the steel manufacturer must be furnished to the City upon request of the Chief Procurement Officer.
- (b) Test Specimens. Shall conform to the requirements of ASTM Specifications A-36 and A-606 Type 4.
- (c) Strength Tests. One test specimen of the metal in each order of 50 base assemblies or less shall be tested for tensile strength and elongation, in accordance with ASTM Standards.
- (d) Welding Tests. One percent (1%) of the longitudinal and circumferential welds of the base assembly shall be inspected for penetration and soundness of the welds by the magnetic particle inspection method or by radiography. If the

## SPECIFICATION 1375

magnetic inspection process is used, the dry method with direct current shall be employed. All transverse welds must be magnetized by the "prod" (circular magnetization) method. Longitudinal welds may be magnetized by either circular or longitudinal magnetization.

- (e) Certificate. One certified copy of the test data sheet must be furnished to the City before delivery of the bases.

### PACKING

- 5. When packed for transportation and delivery as per paragraph 3(e), the base assemblies must be thoroughly blocked or otherwise protected to prevent damage to painted surfaces.

THIS SPECIFICATION SHALL NOT BE ALTERED

**ELECTRICAL SPECIFICATION 1385  
DIVISION OF ENGINEERING  
DEPARTMENT OF TRANSPORTATION  
CITY OF CHICAGO  
REVISED AUGUST 12, 2013**

**PEDESTAL WITH BASE: ALUMINUM,  
FOR TRAFFIC SIGNALS**

---

**SUBJECT**

1. The specification states the requirements of an aluminum pedestal and base with handhole and door for supporting a traffic signal.

**GENERAL**

2. (a) Specifications. The pedestal base shall conform to the requirements herein stated, to the specifications and methods of test of the American Society for Testing and Materials (ASTM), to the requirements of the Society of Protective Coatings (SSPC), and to the requirements of the American Welding Society (AWS), of which the most recently published revisions will govern.
- (b) Acceptance. Pedestal bases not conforming to this specification will not be accepted.
- (c) Drawing. The drawing mentioned herein is a drawing of the Department of Transportation. It is an integral part of this specification cooperating to state the necessary requirements.
- (d) Workmanship. All pedestal bases must be free of casting flaws and must have neat, smooth exterior surfaces. All holes must be accurately located and drilled. The bottom surface of the base must be ground smooth.
- (e) Sample. One complete pedestal of the manufacture intended to be furnished must be submitted within fifteen (15) business days upon receipt of a request from the Chief Procurement Officer.
- (f) Warranty. The manufacturer shall warrant the performance and construction of the traffic pedestal to meet the requirements of this specification and shall warrant all parts, components, and appurtenances against defects due to design, workmanship, or material developing within a period of five years after the traffic pedestals have been delivered. This will be interpreted particularly to mean structural or mechanical failure of any element or weld, or failure of any portion of the painting system. The warranty must be furnished in writing guaranteeing

material replacement including shipment, free of charge to the City. The Commissioner will be the sole judge in determining which replacements are to be made and the Commissioner's decision will be final.

### **DETAIL REQUIREMENTS**

3. (a) Design. The pedestal base must conform to the design shown on Drawing Number 526. All bases must be of the same dimensions, and all doors must be interchangeable.
- (b) Base. The base must be cast of aluminum alloy 319 meeting the requirements of ASTM B26 with a minimum wall thickness of 9/32". The handhole opening must have a recessed lip along the entire length of both sides and the bottom such that with the door in place the exterior surface of the door is flush with the exterior surface of the base. The door must have the same curvature as the base. The door must be locked in place by means of two fingers located on its top edge which bear against the inside surface of the base, and a stainless steel Allen head locking screw which fastens to the base. The locking screw must be protected by a C-shaped drip edge protruding approximately 5/8" and concentrically encircling the screw head. The clearance between the inner surface of the drip edge and the outer surface of the screw head must be no greater than 1/8". The drip edge must encircle the screw head by a minimum of 300° with the opening in the drip edge centered at the bottom of the screw head. A continuous pipe stop must be integrally cast along the inside of the base 2.5" below the top edge.
- (c) Pedestal. The pedestal must be aluminum-alloy extruded round tube conforming to the requirements of ASTM B221, alloy 6063-T6. Its outside diameter must be 5.563"; its wall thickness must be not less than 0.187", and its length must be as required to furnish the overall height specified in the order. The round tube must be inserted not less than two and one-half inches (2.5") into the base and welded with four (4) butt welds each not less than one (1) inch long on the inside and a continuous seam weld around the outside. Aluminum alloy pipe in lieu of aluminum alloy tube is acceptable.
- (d) The pedestal cap must be of the same cast aluminum as the base. The pedestal cap shall be essentially conical with a globe-shaped upper-end and having a minimum wall thickness throughout of not less than 1/4 inch. The cone portion must meet the skirted portion of the top in a smooth filet. The skirt must enclose the top 7/8" inches of the pedestal. Three stainless steel, or other similar approved material, set screws not less than 3/4 inches long must be equally spaced in tapped holes around the skirt and must hold the cap securely in place atop the pedestal. The set screw size must be 5/16 – 18 hex head.
- (e) Welding. The welds shall be made by the inert gas metal welding process. Filler wire shall conform to chemical composition requirements of AWS Alloy Number A5.10-69.

**PAINING**

4. (a) Oil and Grease Removal. All metal surfaces shall be washed with an alkaline detergent to remove any oils or grease.
- (b) Chemical Pretreatment. The cleaned metal surfaces must then be treated with a hot, pressurized phosphate wash and must be dried by convection heat.
- (c) Coat. A thermosetting, weathering, polyester powder coat shall be applied electrostatically to all cleaned and treated exterior surfaces to a uniform four mil (4) thickness in a one coat application. This powder coat must be cured in a convection oven at a minimum temperature of 400° Fahrenheit to form a high molecular weight fusion bonded finish.
- (d) Alternate Methods. Alternate powder coat methods may be reviewed and tested on a case-by-case basis. However, no coating method will be accepted unless the Commissioner judges such alternate to be equal to the coating herein specified.
- (e) Durability. The coating shall be capable of passing 1,000 hours of salt spray exposure as per ASTM B117 in a 5% NaCl (by weight) solution at 95° Fahrenheit and 95% relative humidity without blistering. Before testing, the test panel must be scribed with an “X” down to bare metal.
- (f) Coating Measurement. Measurement of coating thickness shall be done in accordance with SSPC-PA 2-73T, “Measurement of Dry Paint Thickness with Magnetic Gauges”, except that the lowest single spot measurement in an area of two (2) square inches must not be less than 3 mils.
- (g) Color. Color shall be gloss black unless identified otherwise in the order. A color sample must be submitted for approval prior to fabrication. This color sample must include the manufacturer’s name and the manufacturer’s color name.

**PACKING**

5. Each pedestal shall be individually wrapped to prevent damage to the surface. Each pedestal shall be suitably packed or blocked to prevent damage during shipment and handling.

THIS SPECIFICATION SHALL NOT BE ALTERED

**ELECTRICAL SPECIFICATION 1407  
DIVISION OF ENGINEERING  
DEPARTMENT OF TRANSPORTATION  
CITY OF CHICAGO  
REVISED APRIL 2, 2009**

**POLE MOUNTED CAST ALUMINUM JUNCTION BOX FOR TRAFFIC  
SIGNALS**

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**SCOPE**

1. This specification states the requirements for pole mounted, cast aluminum junction boxes, with terminal strips, to be used for traffic signal multiple cable terminations.

**GENERAL**

2. (a) Specifications. The junction boxes shall conform in detail to the requirements herein stated, and to the specifications and methods of test of the American Society for Testing and Materials cited by ASTM Designation Number, of which the most recently published revisions will govern. The terminal strip shall meet the applicable sections of NEMA ICS 4-2005, as well as the requirements herein stated.
- (b) Drawing. The drawing mentioned herein is a drawing of the Department of Transportation, and will be interpreted as part of these specifications.
- (c) Acceptance. Junction boxes not conforming to this specification will not be accepted.
- (d) Sample. One complete junction box with terminal strip of the manufacture intended to be furnished shall be submitted within fifteen (15) business days after receipt of a request from the Chief Procurement Officer. The box must be delivered to the Division of Electrical Operations at 2451 South Ashland.
- (e) Workmanship. All junction boxes shall be free of casting flaws and must have neat, smooth exterior surfaces. All holes must be accurately located and drilled to ensure interchangeability of all components.

**DESIGN**

3. (a) Drawing. The junction box must conform in detail to the dimensions and requirements shown on Drawing Number 954.

- (b) Material. The body door and plate must be castings of non-heat treated aluminum silicon alloy conforming to ANSI alloy 443.0 of ASTM B26.

#### **DETAIL REQUIREMENTS**

4. (a) Assembly. Each junction box shall consist of the body, door with its gasket, two cast elbows with gaskets at either end of the box, terminal block mounting bracket, and terminal strip on channel mounted to bracket. All must be completely assembled, painted and ready for installation. A flat plate with gasket shall also be provided so that the City can use the junction box with only one elbow if desired.
- (b) Body. The body shall be cast as shown in Drawing Number 954. The top and bottom sides of the box where flat plates, or other fittings, will be attached, must be identically cast, machined flat, and drilled and tapped in accordance with dimensions shown. All fittings which fit on the top side must fit on the bottom side.
- (c) Door. The door shall be cast as shown in Drawing Number 954. The door must be hinged at the left with stainless steel hinge pins and must open not less than 180° to permit complete access to the interior of the junction box. Two stainless steel Allen head machine screws, undercut and held captive, shall hold the door closed and maintain positive pressure against a sponge neoprene gasket cemented in place completely around the door jamb. The door shall be finished and painted prior to cementing the gasket into its groove in the door.
- (d) Elbow sweep. Two elbows must be provided for cable entry and exit into the box. The elbows shall be cast of the same alloy as the box. The dimensions will be as indicated on Standard Drawing 954.
- (e) End Plate. A flat end plate shall be furnished with each body casting. The plate must be drilled to align with tapped holes in the body casting and have a flush match with the periphery of the top and bottom body casting pads. The plate must have a properly fitted gasket.
- (f) Gaskets. The gasketing between the body and the door shall be of sponge neoprene and must be cemented in place after painting of the door. A cork gasket, 1/8 inch thick, shall be used between the elbow or end plate and the body of the junction box on the top end and bottom end and held in place by four (4) stainless steel screws.
- (g) Mounting Bracket. A terminal block mounting bracket, as shown on Drawing Number 954, shall be furnished and installed in each junction box. The bracket must be cast from ANSI alloy 443.0 per ASTM B26.



- (h) Terminal Strip. The terminal strip will consist of modular blocks. Each block will consist of two terminals to handle one circuit. The strip will consist of twenty blocks to handle twenty circuits. The terminal strip will be mounted to an aluminum channel. The channel will have pre-punched holes for mounting to the junction box. The channel will be mounted to the box with two #10 screws.

Each block housing shall be constructed of nylon, polypropylene, or another approved material of equal properties. The bottom of the block housing will be dovetailed to fit into the aluminum channel. Overall dimensions of each block will be approximately 1.2 inches wide by 1.5 inches high. Center-to-center spacing between contacts (blocks) must be at least .375 inches.

The terminals shall accommodate AWG wire sizes 8 to 22. The contact type will be tubular clamp, with electroplated tubular copper contact. The screw type will be a steel electroplated number 10-32, slotted pan head. The terminals will be rated at 30 amps and 600 volts.

Maximum service temperature for the terminal strip will be 150° Celsius. The flammability rating must meet UL 94V-0.

- (i) Hardware. The hinge pins and all screws required for assembly of this junction box must be of stainless steel.
- (j) Painting. The exterior surfaces of the junction box shall be properly cleaned and given one (1) coat of zinc chromate primer containing ten percent (10%) iron oxide and one (1) coat of enamel. The color of the enamel must be gloss black or as ordered. A color sample must be submitted and approved before manufacturing commences. The primer and enamel shall be of an approved grade and quality.
- (k) Packing. After the paint is completely dry, and the junction boxes have been assembled, they shall be suitably packed to prevent damage to painted surfaces during shipping and handling. All shipments must be fastened to, and shipped on, 48" x 48" hardwood, 4 way, non-returnable pallets. Total height must not exceed 64" and total weight must not exceed 2,000 pounds.

THIS SPECIFICATION SHALL NOT BE ALTERED

**SPECIFICATION 1428  
BUREAU OF ELECTRICITY  
DEPARTMENT OF STREETS AND SANITATION  
CITY OF CHICAGO  
SEPTEMBER 11, 1989**

**THERMAL MAGNETIC CIRCUIT BREAKER**

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**SUBJECT**

1. This specification covers the requirements for thermal-magnetic circuit breakers capable of providing complete over-current protection for street lighting branch-load and service circuits.

**GENERAL REQUIREMENTS**

2.
  - (a) Sample. One complete circuit breaker of each type and size, and of the manufacture intended to be furnished shall be submitted upon request of the Commissioner within forty-eight (48) hours after the bid opening date. If the contractor supplying the sample(s) delivered is awarded the contract, the sample(s) shall be credited as part of the order. The sample(s) shall be delivered to the Engineer of Electricity, Bureau of Electricity, 2451 South Ashland Avenue, Chicago, Illinois 60608.
  - (b) U.L. Approval. Circuit breakers furnished under this specification shall be listed and approved by Underwriter's Laboratories, Inc.
  - (c) Applicable Specifications. Where reference is made to applicable requirements of Underwriter's Laboratories, Inc., Bulletin #489, entitled "Standard for Branch Circuit and Service Circuit Breakers," hereinafter cited as the U.L. Standards, the most recently published revision shall govern.
  - (d) Assembly. Each circuit breaker shall have the thermal-magnetic trip installed, calibrated and sealed within its insulated housing.
  - (e) Instructions. Complete installation instructions, details on wiring, and information on operation shall be furnished with each circuit breaker, except as otherwise indicated.
  - (f) Packing. Each circuit breaker shall be packed in a suitable manner so that it will not be damaged in shipping or handling.

**TYPES AND SIZES**

3. Circuit breakers furnished under this specification shall consist of the following types and sizes:
- (a) EHD Frame Circuit Breakers. For use on A-C Systems with a 100-ampere frame; minimum interrupting rating of 18,000 R.M.S. symmetrical amperes at 240 volts A.C.
    - 1. Single pole, 240 or 480 volts A.C., ampere rating from 15 to 100.
    - 2. Double pole, 240 or 480 volts A.C., ampere rating from 15 to 100.
  - (b) FDB Frame Circuit Breakers. For use on A-C Systems with a 150 ampere frame; minimum interrupting capacity of 18,000 R.M.S. symmetrical amperes at 240 volts A-C.
    - 1. Double pole, 240, 480 or 600 volts A-C, ampere rating from 15 to 150.
    - 2. Triple pole, 240, 480 or 600 volts A-C, ampere rating from 15 to 150.
  - (c) JDB Frame Circuit Breakers. For use on A-C Systems with a 250 ampere frame; minimum interrupting current of 65,000 R.M.S. symmetrical amperes at 240 volts A-C.
    - 1. Double pole, 240, 480 or 600 volts A-C, ampere ratings from 70 to 250.
    - 2. Triple pole, 240, 480 or 600 volts A-C, ampere ratings from 70 to 250.

**DESIGN AND CONSTRUCTION**

4. Circuit breakers furnished under this specification shall include the following design and construction features: (1) molded insulating housing, (2) thermal-magnetic trip mechanism, (3) silver alloy contacts, (4) corrosion-resistant internal parts, (5) trip-free, indicating handle, and (6) pressure-type terminals.

**DETAIL REQUIREMENTS**

5. (a) Thermal-Magnetic Trip Mechanism. The breaker shall be activated on current overload by means of a thermal-magnetic trip mechanism. This mechanism shall be non-adjustable, non-interchangeable, and factory calibrated and sealed. Instantaneous tripping as controlled by the magnetic trip setting, and time delay tripping accomplished by thermal action shall be in accordance with the manufacturer's published characteristic curves for these breakers or with calibration requirements of the U. L. Standards, as applicable.

- (b) Contact Mechanism. The contacts shall be spring loaded and provide a quick-make, quick-break non-teasing action. The contact mechanism shall be such that the breaker will trip open even if the handle is held or locked in the ON position.
- (c) Calibration. Rating and performance of these breakers shall be based on calibration at an ambient temperature of 40° C. (104°F.).
- (d) Rated Current. Each breaker shall be capable of carrying 100% rated current continuously in its calibrated ambient temperature without tripping and without exceeding the temperature limits specified in the U. L. Standards.
- (e) Contacts. The contacts shall be made of a non-welding silver alloy or equivalent, subject to approval.
- (f) Internal Parts. All internal parts of these circuit breakers shall be corrosion resistant material.
- (g) Terminals. Solderless, pressure type terminals of copper construction shall be provided for both line and load connections.
- (h) Handle Indication. The handle shall indicate clearly whether the circuit breaker is on the ON, OFF, or TRIPPED position.
- (i) Mounting. Breakers furnished under this specification shall have drilled and counterbored holes for front mounting which shall conform to spacings shown on Department of Streets and Sanitation Drawings numbered 677, 678 and 865.
- (j) Test Requirements. These breakers shall be capable of meeting the following sequence of test requirements as specified in the U. L. Standards.
  - (1) Endurance test.
  - (2) Calibration test at 200% and 125% of rated current.
  - (3) Short circuit tests
  - (4) Calibration test at 500% rated current.
  - (5) Dielectric strength test.

**GUARANTEE**

6. Circuit breakers furnished under this specification shall be guaranteed against defects in materials or workmanship for a period of one year after installation. During this period, should a failure occur, repair or replacement shall be made without cost to the City.

**THIS SPECIFICATION SHALL NOT BE ALTERED**

**ELECTRICAL SPECIFICATION 1447  
DIVISION OF ENGINEERING  
DEPARTMENT OF TRANSPORTATION  
CITY OF CHICAGO  
REVISED MARCH 20, 2007**

**POLE: ANCHOR BASE, 3 AND 7 GAUGE, TAPERED TUBULAR STEEL, WITH  
HANDHOLE ENTRY**

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**SUBJECT**

1. This specification states the requirements for tapered, tubular, 3 gauge and 7 gauge steel anchor base poles with mast arm supports. They will support street light luminaires and/or traffic signal mast arms and will be served by underground cables.

**GENERAL**

2. (a) Specifications. The poles shall conform in detail to the requirements herein stated, and to the requirements of the following organizations cited herein, of which the most recent revisions shall govern:  
  
American Association of State Highway and Transportation Officials (AASHTO)  
American National Standards Institute (ANSI)  
American Society for Testing and Materials (ASTM)  
American Welding Society (AWS)  
Society for Protective Coatings (SSPC)
- (b) Acceptance. Poles not conforming to this specification will not be accepted.
- (c) Bidders Drawings. Bidders shall submit with their bids detailed scale drawings of the mast showing actual dimensions, details, and welds. Shop drawings must be original engineering drawings created by the manufacturer. The drawings must show every dimension necessary to show how all parts will fit each other and be properly held in assembly. These drawings must also be submitted in electronic format, preferably Microstation 95, if so requested by the City.
- (d) Drawings. The drawings mentioned herein are drawings of the Department of Transportation being an integral part of this specification cooperating to state necessary requirements.
- (e) Sample. If requested by the Chief Procurement Officer, one completely assembled anchor-base pole of the manufacture intended to be furnished, must be submitted for review within fifteen (15) business days of receiving the request.

- (g) Warranty. The manufacturer shall warrant the performance and construction of the light poles to meet the requirements of this Specification and must warrant all parts, components, and appurtenances against defects due to design, workmanship, or material developing within a period of five years after the light poles have been delivered. This will be interpreted particularly to mean structural or mechanical failure of any element or weld, or failure of any portion of the painting system. The warranty must be furnished in writing guaranteeing material replacement including shipment, free of charge to the City. The Commissioner will be the sole judge in determining which replacements are to be made and the Commissioner's decision will be final.

**STANDARDS**

- 3. (a) Assembly. Each anchor base pole shall consist of a steel mast with handhole entry, entry door with machine screws, grounding nut, mast base plate, top cap for mast, two (2) mast arm supports, bolt covers, and all necessary hardware required for complete assembly of these parts, ready for assembly, without special tools.
- (b) Interchangeability. Members of each pole type shall be mutually interchangeable for assembly, so that no reworking will be required to make any member fit properly in the place of any other similar member of any other similar pole.
- (c) Design. Each pole type shall conform in design and dimensions to the pertinent drawing(s) listed in Table "A".

**MASTS**

- 4. (a) Mast Size. The outside diameters of the mast of each pole type shall be as listed in Table A. The mast must be tapered at 0.14 inches per foot.
- (b) Material. The mast must be fabricated from one length of No. 3, No. 7, or No. 11 Standard gauge steel meeting the material requirements of ASTM A606 for low alloy high strength coil steel, which, after fabrication, must possess an ultimate tensile strength of not less than 70,000 psi and a yield strength of not less than 60,000 psi, in accordance with ASTM A595, Grade C. Chemistry of the steel must be such as to insure resistance to atmospheric corrosion superior to that of ordinary copper bearing steel. Material certification is required. Manufacturer's steel meeting the specified physical and chemical requirements, and approved by the Commissioner, will be accepted.
- (c) Fabrication. The mast must be fabricated with not more than one (1) longitudinal weld. The weld shall be ground smooth so that it is virtually invisible. There shall be no lateral welds in the masts other than where the masts are welded to the steel bases. Each mast must be straight and centered on its longitudinal axis. Each mast must be formed on a mandrel and worked to form a round cross-section. The completed, unpainted masts shall have smooth external surfaces free from

protuberances, dents, cracks or other imperfections marring their appearance.

- (d) Base. The mast base shall be a steel plate, of low alloy, high strength steel as noted in Par. 4 (b).

Plate Base. The base plate for each pole type shall be as listed in Table "A". It must be fabricated from the same ASTM A606 low alloy, high strength steel as is used for the mast. After fabrication the steel must meet the requirements of ASTM A588. The mast must be inserted into the base to a maximum depth which will still allow for an adequate weld to be made between the bottom of the mast and the plate. A circumferential weld must be made between the mast and the base at both the top and underside of the plate. Non-metallic removable bolt covers which completely cover the anchor bolts and nuts shall be provided. The covers must be attached with stainless steel screws coated with a non-seizing compound, or another type of non-seizing fastener, as approved by the Commissioner. The covers shall enclose the anchor bolts and be secured in an approved manner. The base shall be attached to the mast so that the bearing surface of the base is at right angles to the longitudinal axis of the mast. The vertical center line of the seam must be positioned so that no welds for the simplex attachments or the handhole opening will go through the seam.

Anchor Rod Openings. All anchor rod openings for each pole type shall have a width as listed in Table "A". Each opening must be sized to have a circumferential slot length equal to  $15^\circ$  of the circumference.

- (e) Mast Arm Support Plates. The mast arm support plates will be made of cast steel conforming to the requirements for Grade 65-35 cast steel of ASTM A27, or subject to approval. They shall neatly fit the external surface of the mast. The upper mast arm support plate must have a hollow protuberance, the hole of which must be approximately equivalent to two (2) inches in diameter, extending into the interior of the pole providing a smooth surface for the lamp cables to rest upon. The mast arm support plates shall be designed so that they will carry the mast arm and hold it in the proper position for fastening the mast arm to the mast. The design of the mast arm support plates must be a two (2) bolt type as shown on Drawing No. 659.
- (f) Provision for Ground. A 1/2-13 UNC (unified thread – course ANSI B1.1) square nut must be welded to the inside of the mast on the handhole entry frame for a ground connection.
- (g) Entry. A vertical doorframe carrying a removable door providing access to the interior of the mast must be welded into a close fitting opening centered approximately 15 inches above the bottom of the base. The doorframe must be formed and welded of steel with a cross section of two and one-quarter (2-1/4) inches wide by one-quarter (1/4) inch thick so as to adequately reinforce the opening of the mast. The internal horizontal clearance of the doorframe must be



four and three-quarter (4-3/4) inches; its internal vertical clearance must be seven (7) inches. Its upper and lower ends must be semi-circular meeting its straight sides tangentially. The radius of this opening must be two and three-eighths (2-3/8) inches. The vertical center line of the entry must be at a right angle clockwise from the vertical center line of the mast arm supports. The frame must have two welded tabs; one at the top and one at the bottom of the door frame. These tabs must be drilled and tapped to accept a 1/4-20 UNC screw. The top hole must be located 13/16 of an inch from the top of the opening. The bottom hole must be located 13/16 of an inch from the bottom of the opening. The 1/4-20 UNC machine screws must be stainless steel with hex heads, meeting the requirements of ASTM A193. The screws shall be treated with a compound to prevent seizing. Other non-seizing types of screws and fasteners may be considered. An alternate method of attachment consisting of a removable hinge on the bottom with a screw connection at the top may be considered. (The above requirements apply to all pole masts except those with a 10 inch bolt circle. Poles with 10 inch bolt circles must have handhole openings of 3" by 5". All other requirements apply.)

- (h) Door. The removable door must be formed of sheet steel approximately one-eighth (1/8) inch thick. It shall be flat or dished depending upon the pole type, and fit the doorframe closely so that it will stay in proper position even if its locking screws are slightly loosened. The door must be drilled top and bottom to accept the 1/4-20 UNC hex head machine screws which will fasten the door to the doorframe. A half-circle piece of steel must be welded by the screw opening, to allow only a socket wrench to be used. All doors shall be interchangeable. An alternate method of attachment using an internal hinge at the bottom of the door with a screw at the top of the door will be considered. Any alternate method will be subject to approval by the Commissioner or his duly authorized representative.
- (i) Locking Device. Any other door locking device, other than the one outlined above in (g) and (h), must be approved by the Commissioner or his duly authorized representative.
- (j) Tag. To each pole must be attached immediately below the handhole, by mechanical means and not by adhesive, a stainless steel tag with a stamped or embossed legend which must include the pole outside diameter at the base, the overall length, and the gauge; i.e., 12.5" X 34'-6" X 3 gauge.
- (k) Structural Requirements. The mast shall be manufactured in accordance with AASTHO's 1994 version of the "Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals". The shaft and base assembly must be designed to meet AASTHO's 1994 criteria for 80 MPH wind loading with a 30% gust factor. The poles shall be designed appropriately for Chicago applications for both street lighting and traffic signal applications, including signal mast arms.

**TOP**

5. (a) Design. The mast top shall be essentially conical with a globe-shaped upper-end and having a minimum wall thickness throughout of not less than 1/4 inch. The cone portion must meet the skirted portion of the top in a smooth filet, the skirt must enclose the top 7/8" inches of the mast. Three stainless steel, or other similar approved material, set screws not less than 3/4 inches long must be equally spaced in tapped holes around the skirt and must hold the top securely in place atop the mast. The design of the top shall be similar to one shown on Drawing #11420A.
- (b) Material. The top must be aluminum alloy 356-F per ASTM B108. It shall have smooth surfaces, neat edges and corners and be free from fins, holes or other casting flaws. Non-metallic tops may be substituted if approved by the Commissioner.
- (c) Finish. Tops shall be painted as herein specified.

**HARDWARE**

6. All the hardware necessary to complete the assembly of the pole shall be furnished. All hardware will be as specified elsewhere in these specifications. Hardware not specified elsewhere must be stainless steel meeting the requirements of ASTM A193, corrosion-resistant non-seizing metal, or a non-metallic material subject to approval by the Commissioner.

**WELDING**

7. (a) General. Every welded joint shall be made in conformity with the proper interpretation of the standard welding symbols of the American Welding Society as indicated on the drawings; however, each bidder must submit with his proposal a drawing showing the sizes and types of welds, must state the type of electrode, and must describe the welding methods, he proposes to use in fabricating the pole.
- (b) Testing. Welds shall be inspected for penetration and soundness of the welds by the magnetic particle inspection method or by radiography. Acceptance or rejection will be governed by the same conditions as in Section 9. If the magnetic inspection process is to be used, the dry method with the direct current must be employed. All transverse welds must be magnetized by the "prod" (Circular magnetization) method. Longitudinal welds may be magnetized by either circular or longitudinal magnetization.

**PAINTING**

8. (a) Oil and Grease Removal. All metal surfaces shall be washed with an alkaline detergent to remove any oils or grease.

- (b) Metal Cleaning. All exterior metal surfaces shall be cleaned by blasting with a combination of shot and grit to remove all dirt, mill scale, rust, corrosion, oxides and foreign matter and provide a "near white" surface in accordance with SSPC-SP10. Included in this process will be the interior base section of the mast to a minimum height of twelve (12) inches.
- (c) Chemical Pretreatment. The cleaned metal surfaces shall then be treated with a hot, pressurized iron phosphate wash and shall be dried by convection heat.
- (d) Primer Coat. All exterior surfaces are to be coated with Tnemec 90-97 corrosion-inhibiting zinc-rich aromatic urethane to a minimum dry film thickness of 2.5 mils (.0025"). The aromatic urethane is to consist of a zinc dust content not less than 83% by weight in dried film. The coating shall be airless-spray applied and moisture cured.
- (e) Finish Coat. All exterior surfaces are to be subsequently coated with Tnemec Endura-Shield II 1074 aliphatic acrylic polyurethane to a minimum dry film thickness of 3.0 mils (.003"). The coating shall be airless-spray applied and cured in a gas-fired convection oven by heating the steel substrate to between 150° Fahrenheit and 220° Fahrenheit.
- (f) Interior Coat. Interior surfaces are to be coated with red oxide rust inhibitive alkyd primer to a dry film thickness of 1.5 mils.
- (g) Durability. Both the exterior and interior coats must be capable of passing 1,000 hours of salt spray exposure as per ASTM B117 in a 5% NaCl (by weight) solution at 95°F and 95% relative humidity without blistering. Before test, the panel must be scribed with an "X" down to bare metal.
- (h) Coating Measurement. Measurement of coating thickness must be done in accordance with SSPC-Pa 2-73T, "Measurement of Dry Paint Thickness with Magnetic Gauges," except that the lowest "single spot measurement" in an area of two square inches must be not less than 5.5 mils.
- (i) Color. Color must be gloss black unless otherwise noted in the order. A color sample must be submitted for approval prior to fabrication.
- (j) Alternate Methods. Alternate painting methods may be reviewed and tested on a case by case basis. However, no coating method will be accepted unless the Commissioner judges such alternate to be equal to the coating herein specified.

**MAST TEST**

- 9. (a) General. All completed masts shall be available for testing for maximum deflection and set. The masts shall meet the structural requirements of Section 4(k). Unless specifically authorized in writing, all tests shall be made at the

works of the manufacturer. A record of every test must be made and a certified copy of the test record must be submitted to the Commissioner before the masts are shipped.

- (b) Lot. Tests for welds, deflection and set of the mast and of the mast arm supports shall be made upon three (3) masts of the first fifty (50) in every order. An additional one (1) mast shall be tested for each additional fifty (50) masts in the order. The selection of masts for testing shall be random from the entire completed lot. If any of the masts in any lot fail to meet the test, an additional three (3) masts of the same lot must be tested. If any of these masts fail to meet the test requirements, the entire lot will be subject to rejection, except that the manufacturer may subject each mast in the lot to the test, and those which fulfill the requirement will be accepted. After testing, each base weld must be inspected by the magnetic particle method to determine that the welds have not been affected.
- (c) Mast Requirements. With base rigidly anchored, a test load as indicated in Table A must be applied at a point approximately two feet (2'0") from the free end. The load must be applied at right angles to the center line of the mast and in the same vertical plane. The deflection must not be greater than that indicated in Table A. Within one (1) minute after the test load is released, measurement must be made of the set taken by the mast. This set must not be greater than that indicated in Table A. The deflection measurement device must be reset to zero and the test load must be reapplied. The deflection must not change from the deflection noted in the first test by more than  $\pm 5\%$ . No measurable set must be noted within one (1) minute after test load is released.
- (d) Mast Arm Support (simplex) Requirements. With an appropriate mast arm firmly attached to the mast, a test load of 300 pounds must be applied to the mast arm as a side pull at a point seven (7) feet from the mast. After the test, the mast arm support welds on the mast must be tested by the magnetic particle method to determine that they have not been affected.

**PACKAGING**

- 10. (a) General. The poles must be shipped in twelve (12) pole bundles. Each pole must be individually wrapped so that the pole can be bundled for shipping and unbundled for delivery to the City without damaging the pole or its finish.
- (b) Bundles. The bundles shall consist of twelve (12) poles laid base to top to form an approximately rectangular cylinder. Materials such as lumber (2" x 4" min.), non-marring banding, and other appropriate bundling materials must be used to make a rigid, long lasting, bundle capable of being handled, shipped and stored without shifting of contents or breaking, subject to approval. Any bundles, in which either poles or packaging is received broken, damaged or with contents shifted, will not be accepted and it will be the responsibility of the supplier to

return the bundle to its original destination at no cost to the City of Chicago. The bundles should be capable of being stacked two (2) high without breaking, or shifting of the contents. Each bundle must be capable of being lifted by a fork lift truck or crane and the bundles must be shipped on a flat bed truck to facilitate unloading. Each pole wrapping must be clearly labeled indicating the pole size, i.e. 34'6", 7 GAUGE, STEEL POLE, 15" B.C.

- (c) Hardware. The bolt covers and their attachment devices must be shipped with each bundle and packaged in twelve (12) sets of four (4) each. The package must be labeled and placed in a prominent position to facilitate accessibility, and must be attached to, or within, the bundle in such a manner as to assure safe delivery. Payment will be withheld for any bundle delivered without the accompanying hardware. Pole caps must be attached at the manufacturer's facilities, or be packed separately in a manner similar to the bolt covers, and the same payment conditions will prevail. Cracked, broken or chipped parts will be considered as an incomplete delivery as regards payment.

**TABLE A**

POLE	GAUGE	BOLT CIRCLE	ANCHOR ROD	BASE PLATE	TEST LOAD	MAX. DEF	MAX. SET	DRAWING
7.67"x12.5"x34'6"	3	16.5"	1.5"	1.75"	3200#	22"	2.5"	827
6.17"x11"x34'6"	3	17.25"	1.25"	1.5"	2500#	26"	2.5"	824
5.17"x10.0"x34'6"	3	15.0"	1.25"	1.5"	2000#	30"	2.5"	808
5.17"x10.0"x34'6"	7	15.0"	1.25"	1.5"	1500#	30"	2.5"	808
3.95"x8.5"x32'6"	3	11.5"	1.25"	1.5"	1500#	33"	2.5"	763
3.95"x8.5"x32'6"	7	11.5"	1.0"	1.25"	1200#	33"	2.5"	762
3.87"x8.0"x29'6"	3	10.0"	1.0"	1.5"	1500#	28"	1.0"	657
3.87"x8.0"x29'6"	7	10.0"	1.0"	1.25"	1200#	28"	1.0"	656
4.15"x8.0"x27'6"	3	10.0"	1.0"	1.5"	1500#	23"	1.0"	655
4.15"x8.0"x27'6"	7	10.0"	1.0"	1.25"	1200#	23"	1.0"	654
4.20"x7.0"x20'0"	3	10.0"	1.0"	1.0"	1500#	13"	1.0"	653
3.70"x6.5"x20'0"	11	10.0"	1.0"	1.0"	800#	14"	1.0"	652

**ELECTRICAL SPECIFICATION 1454  
DIVISION OF ENGINEERING  
DEPARTMENT OF TRANSPORTATION  
CITY OF CHICAGO  
REVISED APRIL 20, 2007**

**MAST ARM: TRAFFIC SIGNAL MONO-TUBE**

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**SUBJECT**

1. This specification states the requirements for a tapered, tubular, 7 gauge steel mono-tube arm with mounting brackets. The arm will support traffic signals and signs.

**GENERAL**

2. (a) Specifications. The arms shall conform in detail to the requirements herein stated, and to the requirements of the following organizations cited herein:  
  
American Association of State Highway and Transportation Officials (AASHTO)  
American National Standards Institute (ANSI)  
American Society for Testing and Materials (ASTM)  
American Welding Society (AWS)  
Society for Protective Coatings (SSPC)
- (b) Acceptance. Arms not conforming to this specification will not be accepted.
- (c) Bidders Drawings. Bidders must submit with their bids detailed scale drawings of the mast arm showing actual dimensions, details, and welds. Shop drawings must be original engineering drawings created by the manufacturer. The drawings must show every dimension necessary to show how all parts will fit each other and be properly held in assembly. These drawings shall also be submitted in electronic format, preferably Microstation 95, if so requested by the City.
- (d) Drawings. The drawings mentioned herein are drawings of the Department of Transportation being an integral part of this specification cooperating to state necessary requirements.
- (e) Sample. If requested by the Chief Procurement Officer, one complete mast arm of the manufacture intended to be furnished must be submitted for review by the Commissioner within fifteen (15) business days of receiving such request.

- (f) Warranty. The manufacturer shall warrant the performance and construction of the mast arms to meet the requirements of this specification and shall warrant all parts, components, and appurtenances against defects due to design, workmanship, or material developing within a period of five years after the mast arms have been delivered. This will be interpreted particularly to mean structural or mechanical failure of any element or weld, or failure of any portion of the painting system. The warranty must be furnished in writing guaranteeing material replacement including shipment, free of charge to the City. The Commissioner will be the sole judge in determining which replacements are to be made and the Commissioner's decision will be final.

**STANDARDS**

- 3. (a) Assembly. Each arm shall consist of a tubular tapered steel shaft, mounting brackets, an aluminum cap, and all mounting hardware.
- (b) Interchangeability. Members of each arm type must be mutually interchangeable for assembly, so that no reworking will be required to make any member fit properly in the place of any other similar member of any other similar arm.
- (c) Design. Each arm must meet the requirements as shown on Standard Drawing 870.

**ARMS**

- 4. (a) Arm Size. The outside diameters of the arm of each size shall be as listed in Standard Drawing 870.
- (b) Material. The arm must be fabricated from one length of No. 7 Standard gauge steel meeting the requirements of ASTM A606 for low alloy high strength coil steel, which, after fabrication, must possess an ultimate tensile strength of not less than 70,000 psi and a yield strength of not less than 60,000 psi, in accordance with ASTM A595, Grade C. Chemistry of the steel shall be such as to insure resistance to atmospheric corrosion superior to that of ordinary copper bearing steel. Material certification is required. Manufacturer's steel meeting the specified physical and chemical requirements, and approved by the Commissioner, will be accepted.
- (c) Fabrication. The arm must be fabricated with not more than one (1) longitudinal weld. The weld must be ground smooth so that it is virtually invisible. There must be no lateral welds in the arms other than where the arms are welded to the steel clamp. Each arm must be straight and centered on its longitudinal axis. Each arm must be formed on a mandrel and worked to form a round cross-section. The completed, unpainted arms shall have smooth external surfaces free from protuberances, dents, cracks or other imperfections marring their appearance.

- (d) Clamp. The arm clamp must be of low alloy, high strength steel as noted in Section 4 (b). The clamp must be constructed as shown on Standard Drawing 870.
- (e) Structural Requirements. The mast arm must be manufactured in accordance with AASTHO's 1994 version of the Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals. The arm assembly must be designed to meet AASTHO's 1994 criteria for 80 MPH wind loading with a 30% gust factor. The arms shall be designed appropriately for traffic signal applications within the City of Chicago.

**CAP**

- 5. (a) Design. The arm cap shall be essentially conical with a globe-shaped upper-end and having a minimum wall thickness throughout of not less than 5/32 inches. The cone portion must meet the skirted portion of the arm in a smooth filet, the skirt must enclose the top 7/8" inches of the arm. Three stainless steel, or other similar approved material, set screws not less than 3/4 inches long must be equally spaced in tapped holes around the skirt and must hold the cap securely in place on the arm.
- (b) Material. The cap must be of aluminum alloy 356-F per ASTM B108. It shall have smooth surfaces, neat edges and corners and be free from fins, holes or other casting flaws.
- (c) Finish. Tops shall be painted as herein specified.

**HARDWARE**

- 6. All the hardware necessary to complete the assembly of the arm must be furnished. All hardware shall be stainless steel, corrosion-resistant non-seizing metal, subject to approval.

**WELDING**

- 7. (a) General. Every welded joint shall be made in conformity with the proper interpretation of the standard welding symbols of the American Welding Society as indicated on the drawings; however, each bidder must submit with his proposal a drawing showing the sizes and types of welds, must state the type of electrode, and must describe the welding methods, he proposes to use in fabricating the arm.
- (b) Testing. All welds of the first three (3) arms of the first fifty (50) arms in every lot must be inspected for penetration and soundness of the welds by the magnetic particle inspection method or by radiography. Acceptance or rejection must be governed by the same conditions as in Section 9. If the magnetic inspection process is used, the dry method with the direct current shall be employed. All transverse welds must be magnetized by the "prod" (circular magnetization)



method. Longitudinal welds may be magnetized by either circular or longitudinal magnetization.

## PAINING

8. (a) Oil and Grease Removal. All metal surfaces must be washed with an alkaline detergent to remove any oils or grease.
- (b) Metal Cleaning. All exterior metal surfaces must be cleaned by blasting with a combination of shot and grit to remove all dirt, mill scale, rust, corrosion, oxides and foreign matter and provide a "near white" surface in accordance with SSPC-SP 10.
- (c) Chemical Pretreatment. The cleaned metal surfaces must then be treated with a hot, pressurized iron phosphate wash and must be dried by convection heat.
- (d) Primer Coat. All exterior surfaces are to be coated with Tnemec 90-97 corrosion-inhibiting zinc-rich aromatic urethane to a minimum dry film thickness of 2.5 mils (.0025"). The aromatic urethane is to consist of a zinc dust content not less than 83% by weight in dried film. The coating must be airless-spray applied and moisture cured.
- (e) Finish Coat. All exterior surfaces are to be subsequently coated with Tnemec Endura-Shield II 1074 aliphatic acrylic polyurethane to a minimum dry film thickness of 3.0 mils (.003"). The coating must be airless-spray applied and cured in an oven by heating the steel substrate to between 150° Fahrenheit and 220° Fahrenheit.
- (f) Interior Coat. Interior surfaces are to be coated with red oxide rust inhibitive alkyd primer to a dry film thickness of 1.5 mils.
- (g) Durability. Both the exterior and interior coats must be capable of passing 1,000 hours of salt spray exposure as per ASTM B117 in a 5% Na Cl (by weight) solution at 95°F and 95% relative humidity without blistering. Before test, the panel must be scribed with an "X" down to bare metal.
- (h) Coating Measurement. Measurement of coating thickness must be done in accordance with SSPC-Pa 2-73T, "Measurement of Dry Paint Thickness with Magnetic Gauges," except that the lowest "single spot measurement" in an area of two square inches must not be less than 5.5 mils.
- (i) Color. Color must be gloss black unless noted otherwise in the order. A paint chip must be submitted for approval prior to fabrication.
- (j) Alternate Methods. Alternate coating methods may be reviewed and tested on a case by case basis. However, no coating method will be accepted unless the

Commissioner judges such alternate to be equal to the coating herein specified.

### **ARM TEST**

9. (a) General. All completed arms shall be available for testing for maximum deflection and set. Unless specifically authorized in writing, all tests must be made at the works of the manufacturer. A record of every test must be made and a certified copy of the test record must be submitted to the Engineer of Electricity before the arms are shipped.
- (b) Lot. Tests for deflection and set must be made upon the first three (3) arms in the first fifty (50) arms in the lot. An additional one (1) arm must be tested for each additional fifty (50) arms. If any of the arms in any lot fail to meet the test, an additional three (3) arms of the same lot must be tested. If any of these arms fail to meet the test requirements, the entire lot will be subject to rejection, except that the manufacturer may subject each arm in the lot to the test, and those which fulfill the requirement will be accepted. After testing, each weld must be inspected by the magnetic particle method to determine that the welds have not been affected.
- (c) Requirements. With arm rigidly anchored, a test load as indicated in the table in Standard Drawing 870 must be applied at a point approximately two feet (2'0") from the free end. The load must be applied at right angles to the center line of the arm and in the same vertical plane. The deflection must not be greater than that indicated. Within one (1) minute after the test load is released, measurement must be made of the set taken by the arm. The deflection measurement device must be reset to zero and the test load must be reapplied. The deflection must not change from the deflection noted in the first test by more than  $\pm 5\%$ . No measurable set must be noted within one (1) minute after test load is released.

### **PACKAGING**

10. (a) General. The arms shall be shipped in twelve (12) arm bundles. Each arm must be individually wrapped so that the arm can be bundled for shipping and unbundled for delivery to the job site without damaging the arm or its finish.
- (b) Bundles. The bundles shall consist of twelve (12) arms laid base to top to form an approximately rectangular cylinder. Materials such as lumber (2" x 4" min.), non-marring banding, and other appropriate bundling materials must be used to make a rigid, long lasting, bundle capable of being handled, shipped and stored without shifting of contents or breaking, subject to approval. Any bundles, in which either arms or packaging is received broken, damaged or with contents shifted, will not be accepted and it will be the responsibility of the supplier to return the bundle to its original destination at no cost to the City of Chicago. The bundles should be capable of being stacked two (2) high without breaking, or shifting of the contents. Each bundle must be capable of being lifted by a fork lift

## SPECIFICATION 1454

truck or crane and the bundles must be shipped on a flat bed truck to facilitate unloading. Each arm wrapping must be clearly labeled indicating the mast size, i.e. "30' SIGNAL MAST ARM".

- (c) Hardware. The hardware must be shipped with each bundle and packaged in twelve (12) sets of four (4) each. The package shall be placed in a prominent position to facilitate accessibility, and must be attached to, or within, the bundle in such a manner as to assure safe delivery. Payment will be withheld for any bundle delivered without the accompanying hardware. Arm caps must be attached at the manufacturer's facilities, or be packed separately in a manner similar to the other hardware, and the same payment conditions will prevail. Cracked, broken or chipped parts will be considered as an incomplete delivery as regards payment.

THIS SPECIFICATION SHALL NOT BE ALTERED

**ELECTRICAL SPECIFICATION 1457  
DIVISION OF ELECTRICAL OPERATIONS  
DEPARTMENT OF TRANSPORTATION  
CITY OF CHICAGO  
REVISED AUGUST 3, 2006**

**CABLE: SERVICE ENTRANCE,  
THREE INSULATED CONDUCTORS IN ONE OVERALL JACKET,  
600 VOLT**

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**SUBJECT**

1. This specification states the requirements for a three conductor (two power conductors and one neutral conductor) Ethylene Propylene Rubber (EPR) insulated, chlorosulfonated polyethylene (CSPE) or polyvinyl chloride (PVC) jacketed cable for installation on Commonwealth Edison service poles for the purpose of providing secondary power feeds from Commonwealth Edison to a City disconnect mounted on the pole for street lighting or traffic signal circuits.

**GENERAL**

2. (a) Specifications. The cable shall conform in detail to the requirements herein stated, and to the applicable portions of the specifications and methods of test of the following agencies:
  - (1) ICEA Specification S-95-658
  - (2) IEEE Standard 383
  - (3) ASTM Standard E-662-79
  - (4) ASTM Standard D-470-81
  - (5) U.L. 44
  - (6) U.L. 854
- (b) Acceptance. Cable not conforming to this specification will not be accepted.
- (c) Sample. A three (3) foot sample of the cable intended to be provided under this contract must be submitted to the Engineer of Electricity within fifteen (15) business days after receipt of such a request from the Chief Procurement Officer.
- (d) Warranty. The manufacturer shall warranty the cable to be first class material throughout. If the cable is installed within one year of the date of shipment, the manufacturer must replace any cable failing during normal and proper use within two years of installation. The cable length to be replaced will be the entire unspliced length where the fault has been located. The Commissioner will be the sole judge in determining if a cable has failed and should be replaced. All replacements under this warranty must be made free of charge F.O.B. delivery

point of the original contract

**CABLE**

- 3. (a) Construction. The cable must consist of three (3) conductors separately insulated and color coded. Suitable fillers must be used to produce essentially a round cross section in the completed cable. The insulated conductors must be cabled with a suitable left hand lay in conformance with the latest revision of ICEA S-95-658. A binder tape must be used over the cabled conductor assembly and a jacket applied overall.
- (b) Sealing. The ends of each length of cable shall be sealed against the entrance of moisture.
- (c) Marking. The color of the neutral conductor must be white; that of the phase conductors must be black and red, respectively. The jacket must be black.
- (d) Each conductor shall consist of a round copper wire with a tight fitting, free stripping, concentric layer of Ethylene Propylene insulation. The cable must be rated for continuous duty at 90°C operating temperature, wet or dry, 130°C emergency overload temperature and 250°C short circuit temperature.

**CONDUCTOR**

- 4. (a) Material. The conductor shall either be soft or annealed round copper wire, tin coated.
- (b) Specifications. The conductor must meet the requirements of ASTM B3, and B8 for stranded Class B copper.
- (c) Size. The conductor size shall be as stated in the proposal or on the plans.

**INSULATION**

- 5. (a) Type. The insulation must be Ethylene Propylene compound meeting the physical and electrical requirements specified herein.
- (b) Thickness. The insulation must be circular in cross-section, concentric to the conductor, and must have an average thickness not less than 30 mils (.030”) for #14 AWG, 55 mils (.055”) for #4 AWG, 65 mils (.065”) for #2 AWG, 80 mils (.080”) for #1/0 AWG, 80 mils (.080”) for #2/0 AWG, and a spot thickness not less than ninety percent (90%) of the average thickness.
- (c) Initial Physical Requirements:
  - (1) Tensile Strength, min., psi. 1200

- (2) Elongation at Rupture, min. % 250
- (d) Air Oven Exposure Test. After conditioning in an air oven at  $121 \pm 1^\circ\text{C}$  for 168 hours using methods of test described in ASTM-D 573:
  - (1) Tensile strength, min% of unaged value 75
  - (2) Elongation, min % of unaged value at rupture 75
- (e) Mechanical Water Absorption:
  - (1) Gravimetric Method: After 168 hours in water at  $70 \pm 1^\circ\text{C}$ :
 

Water absorption, maximum (Mg. per sq. in)	5.0
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- (f) Cold Bend Test Requirements. The completed cable must pass the "Cold-Bend, Long-Time Voltage Test on Short Specimens" of ASTM D-470 except that the test temperature must be minus (-)  $25^\circ\text{C}$ .
- (g) Electrical Requirements.
  - (1) Voltage Test. The completed cable must meet an A.C. and D.C. voltage test in accordance with ASTM- D-470 and D-2655.
  - (2) Insulation Resistance. The completed cable must have an insulation resistance constant of not less than 20,000 when tested in accordance with methods shown in ASTM D-470.

**JACKET**

- 6. (a) Type. The jacket shall be either a chlorosulfonated polyethylene (CSPE) or a polyvinylchloride (PVC) compound meeting the physical and electrical requirements specified herein. CSPE must meet the environmental requirements of CFR Title 40, Part 261 for leachable lead content.
- (b) Thickness. The jacket must be circular in cross-section, concentric with the insulation, must have an average thickness not less than 45 mils (.045") for #14 AWG, 80 mils (.080") for #2 and #4 AWG, and not less than 95 mils (.095") for #1/0 and #2/0 AWG, and a spot thickness not less than ninety percent (90%) of the average thickness.
- (c) Initial Physical Requirements:
  - (1) Tensile strength minimum PSI 1800

- (2) Elongation at rupture, minimum percent 300
- (d) Air Oven Exposure Test. After conditioning in an air oven at  $121 \pm 1^\circ\text{C}$  for 168 hours:
  - (1) Tensile strength, minimum percent of unaged value 75
  - (2) Elongation at rupture, minimum percent of unaged value 60
- (e) Mechanical Water Absorbtion. After 168 hours at  $70 \pm 1^\circ\text{C}$ :
  - (1) Milligrams per square inch, maximum 20

**TESTING**

- 7. (a) General. Tests shall be performed on insulation, jacket and completed cables in accordance with the applicable standards as listed in these specifications. Included in these tests will be a 70,000 BTU per hour flame test in accordance with IEEE 383. Where standards are at variance with each other or with other portions of this specification, the most stringent requirements, as determined by an engineer from the Division of Engineering, will apply. All tests shall be conducted on cable produced for this order.
- (b) Number of Tests. Insulation and jacket tests shall be conducted on samples taken every 5,000 feet or fraction thereof of each conductor size. In no case must less than two (2) samples be taken. Approximately five percent (5%) of the cable must be tested. Where the cable fails to conform to any of the tests specified herein, samples must be taken from each reel and must successfully conform to all tests specified herein. Reels from which samples fail to conform, will be rejected.
- (c) Test Reports. No cable may be shipped until certified copies of all factory tests have been reviewed and approved by the engineer.

**PACKAGING**

- 8. (a) Cable Marking. The cable must be identified by a permanently inscribed legend in white lettering as follows:  
  
 3/C - No. (conductor size) AWG-600V-90°C-EPR/CSPE or EPR/PVC-  
 manufacturer's name- month/year of manufacture  
  
 The legend must be repeated at approximately eighteen (18) inch intervals on the outside surface of the cable parallel to the longitudinal axis of the conductor.
- (b) Reels. The completed cable shall be delivered on sound substantial, non-returnable reels. Both ends of each length of cable must be properly sealed against the entrance of moisture and other foreign matter by the use of clamp-on

## SPECIFICATION 1457

cable caps. The ends must be securely fastened so as not to become loose in transit. Before shipment, all reels must be wrapped with cardboard or other approved wrapping.

- (c) Footage. Each reel must contain 1,000 foot of cable for either #4 AWG or #2 AWG and 500 feet of cable for #1/0 AWG or #2/0 AWG. A tolerance limit of plus or minus ten percent ( $\pm 10\%$ ) shall be adhered to.
- (d) Reel Marking. A metal tag must be securely attached to each reel indicating the reel number, contract number, date of shipment, gross and tare weights, description of the cable and the total footage. Directions for unrolling the cable must be placed on the reel with an approved permanent marking material such as oil-based paint or a securely attached metal tag.

TABLE 1 - THREE CONDUCTOR SERVICE ENTRANCE CABLE

Size (AWG)	Overall Diameter (mils)	No. Of Strands	Test Volts (KV)	Footage per Reel	Insulation (mils)	Jacket (mils)
4	950	7	4.5	1000	55	80
2	1100	7	4.5	1000	65	80
1/0	1400	19	5.5	500	80	95
2/0	1800	19	5.5	500	80	95

THIS SPECIFICATION MUST NOT BE ALTERED



**SPECIFICATION 1458  
BUREAU OF ELECTRICITY  
DEPARTMENT OF STREETS AND SANITATION  
CITY OF CHICAGO  
APRIL 28, 1992**

**ROUND MANHOLE FRAMES AND COVERS  
24 INCH AND 30 INCH DIAMETER**

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**SCOPE**

The Contractor must furnish and deliver F.O.B., City of Chicago, 24" and 30" Circular MANHOLE FRAMES AND COVERS all in accordance with the Standard Specifications, Drawings 872, 874 and 10927 and Detailed Specifications.

**GENERAL REQUIREMENTS**

- Conformance: The manhole frames and covers must conform with every detail of the requirements herein stated and to the Specifications and Methods of Test of the American Society for Testing Materials cited by ASTM Designation Number in which the most recently published revision will govern.
- Acceptance: Frames and covers not conforming to this specification will not be accepted.
- Drawings: The drawings mentioned herein are drawings of the Department of Streets and Sanitation, Bureau of Electricity, and must be interpreted as part of these specifications. The FRAMES AND COVERS must each conform in detail to the design shown on Drawings 872, 874 and 10927.
- Weight: Each frame and cover must weigh approximately as shown on the drawings.
- Machining: The bearing surfaces of both the COVER and the FRAME must be machine finished as indicated on the drawings.
- Workmanship: The frames and covers must be mutually interchangeable size for size, so that each lid will fit every frame neatly without jamming and with only such clearance as the drawings indicate. In addition, 24" & 30" covers must fit existing 24" & 30" frames, as shown on drawings 872, 874 and 10927. The castings must be neat, true to pattern and free from cracks and casting flaws. No welding of defective castings will be permitted nor must the castings be painted.

**SAMPLE**

Upon request, one complete manhole frame and cover of the manufacture intended to be furnished must be submitted within fourteen (14) business days after the bid opening date. If the Bidder supplying the samples is awarded a contract, the samples delivered will be credited as part of the order. The samples must be delivered to the Bureau of Electricity Storeroom, 4101 South Cicero Avenue, Chicago, Illinois.

**MATERIAL**

The frames and covers must be made of Class 30 Cast Iron described in the specifications for Gray Iron Castings of ASTM A48. No plugging of defective castings will be permitted.

**TESTS**

Test bars of the metal used for the castings must be made and tested for tensile and transverse strength in accordance with ASTM A48. The Metal must be tested at the works of the manufacturer. The manufacturer must furnish a certified copy of all test data sheets to the City prior to delivery of the castings. Where the number of castings on a single order exceeds four hundred (400), a representative from the Bureau of Electricity must witness these tests. Frames and covers must each be considered a separate casting for determining the requirement of witness testing.

The manufacturer must include in his bid the cost of travel, food and lodging for one (1) representative. Travel for 150 miles or greater must utilize a major airline. Lodging arrangements must be equal to those provided at a Holiday Inn. The engineer must be given ten (10) working days' notice of all travel arrangements.

**THIS SPECIFICATION MUST NOT BE ALTERED**

**SPECIFICATION 1462  
BUREAU OF ELECTRICITY  
DEPARTMENT OF STREETS AND SANITATION  
CITY OF CHICAGO  
AUGUST 7, 1992**

**RIGID STEEL CONDUIT  
(HOT DIPPED GALVANIZED)**

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**SCOPE**

This specification describes Rigid Steel Conduit, Zinc Coated.

**GENERAL REQUIREMENTS**

Rigid steel conduit shall be of one grade, zinc coated by the hot-dip process. Conduit shall be furnished in 10 foot lengths, threaded on each end and with one coupling attached to one end and a protective cap at the other end.

**STANDARDS**

The conduit shall be listed by Underwriters Laboratories in accordance with standard U.L. - 6 and shall conform to ANSI C 80.1. In addition, conduit shall be recognized as an equipment grounding conductor as per N.E.C. article 250-91 b.

**STEEL**

Conduit shall be formed from steel suitable for use as an electrical raceway. It shall be structurally sound so that it will hang straight and true when supported by hangers in accordance with Chicago electrical code requirements and shall be capable of being field bent without deformation of the walls.

Conduit shall have a circular cross section sufficiently accurate to permit the cutting of threads in accordance with Table 2 and shall provide a uniform wall thickness throughout. All surfaces shall be smooth and free of injurious defects. The dimensions and weights of rigid steel conduit shall be in accordance with Table 1.

**THREADING AND CHAMFERING**

Each length of conduit, and each nipple, elbow and bend shall be threaded on both ends, and each end shall be chamfered to remove burrs and sharp edges.

The number of threads per inch, and the length of the threaded portion at each end of each length of conduit, nipple and elbow shall be as indicated in Table 2. The perfect thread shall be tapered for its entire length, and the taper shall be 3/4 inch per foot.

**ZINC COATING**

After all cutting threading and chamfering all conduit surfaces shall be thoroughly cleaned before application of zinc. The cleaning process shall leave the interior and exterior surfaces of the conduit in such a condition that the zinc will be firmly adherent and smooth.

The conduit shall be hot dipped galvanized both inside and out to provide approximately two (2) ounces of zinc per square foot. This is equivalent to 3.4 mils of zinc coating. An additional interior coating to aid in the installation of wires is desirable.

**COUPLINGS**

Couplings shall comply with the following requirements:

- (a) The outside surface of couplings shall be protected by means of a zinc coating. The zinc content of the coating on the outside surface shall be equivalent to a minimum thickness of 0.0008 inch.
- (b) Couplings shall be so made that all threads will be covered when the coupling is pulled tight on standard conduit threads.
- (c) Both ends of the coupling shall be chamfered to prevent damage to the starting threads.
- (d) The outside diameter, length and weight of coupling shall be as indicated in Table 3.
- (e) Couplings shall be straight tapped, except that the 2 ½ inch and larger sizes may be taper-tapped.

**PACKING AND IDENTIFICATION**

The pipe shall be delivered in bundles. Each length of conduit shall be marked with the manufacturer's name or trademark. Securely attached to each bundle at two (2) locations on the bundle shall be a weather resistant tag containing the following information:

- 1) conduit size
- 2) footage of bundle
- 3) gross weight of bundle
- 4) commodity code # as per table 4

Precaution shall be taken by the contractor in handling during shipment or delivery of conduit, and any conduit found to be damaged will not be accepted.

**TEST AND INSPECTION**

Conduit shall be capable of being bent cold into a quarter of a circle around a mandrel, the radius of which is four times the nominal size of the conduit, without developing cracks at any portion and without opening the weld.

The protective coatings used on the outside and inside surfaces of rigid steel conduit shall be sufficiently elastic to prevent their cracking or flaking off when a finished sample of ½ inch conduit is tested within one year after the time of manufacture, by bending it into a half of a circle around a mandrel, the radius of which is 3 ½ inches.

Tests on sizes other than ½ inch may be conducted within one year after the time of manufacture. If such tests are conducted, the conduit shall be bent into a quarter of a circle around a mandrel, the radius of which is six times the nominal size of the conduit.

One of the following three test methods shall be employed for measuring the thickness or extent of the external zinc coating on conduit:

- (a) Magnetic test.
- (b) Dropping test.
- (c) Preece test (Material which will withstand four 1-minute immersions shall be considered as meeting requirements as follows; the zinc content of the coating on the outside surface shall be equivalent to a minimum thickness of 0.0008 inch).

All tests and inspections shall be made at the place of manufacture prior to shipment unless otherwise specified, and shall be so conducted as not to interfere with normal manufacturing processes.

Each length of conduit shall be examined visually both on the outside and inside to determine if the product is free from slivers, burrs, scale or other similar injurious defects (or a combination thereof), and if coverage of the coating is complete.

If any samples of rigid steel conduit tested as prescribed in this specification should fail, two additional samples shall be tested, both of which shall comply with the requirements of the specification.

All pipe which may develop any defect under tests, or which may before testing or on delivery be found defective, or not in accordance with these specifications, shall be removed by the Contractor at his own expense; and such pipe so removed by the Contractor shall be replaced by him within ten (10) days of such rejection with other pipe which shall conform to these specifications.

TABLE 1

**Design Dimension and Weights of Rigid Steel Conduit**

Nominal or Trade Size of Conduit (Inches)	Inside Diameter (Inches)	Outside Diameter (Inches)	Wall Thickness (Inches)	Length Without Coupling (Feet & Inches)	Minimum Weight of Ten Unit Lengths with Couplings Att. (Pounds)
½	0.622	0.840	0.109	9-11 ¼	79.00
¾	0.824	1.050	0.113	9-11 ¼	105.0
1	1.049	1.315	0.133	9-11	153.0
1 ¼	1.380	1.660	0.140	9-11	201.0
1 ½	1.610	1.900	0.145	9-11	249.0
2	2.067	2.375	0.154	9-11	334.0
2 ½	2.469	2.875	0.203	9-10 ½"	527.0
3	3.068	3.500	0.216	9-10 ½"	690.0
3 ½	3.548	4.000	0.226	9-10 ¼"	831.0
4	4.026	4.500	0.237	9-10 ¼"	982.0

NOTE: The applicable tolerances are:

Length: + ¼ inch (without coupling)

Outside diameter + 1/64 inch or -1/32 inch for the 1 ½ inch and smaller sizes,  
± 1 percent for the 2-inch and larger sizes.

Wall thickness: - 12 ½ percent

TABLE 2

**Dimensions of Threads**

Nominal or Trade Size of Conduit (Inches)	Threads per Inch	Pitch Diameter at end of Thread (Inches) Tapered 3/4 Inch per foot	Length of Thread (Inches)	
			Effective L2	Overall L4
1/2	14	0.7584	0.53	0.78
3/4	14	0.9677	0.55	0.79
1	11 1/2	1.2136	0.68	0.98
1 1/4	11 1/2	1.5571	0.71	1.01
1 1/2	11 1/2	1.7961	0.72	1.03
2	11 1/2	2.2690	0.76	1.06
2 1/2	8	2.7195	1.14	1.57
3	8	3.3406	1.20	1.63
3 1/2	8	3.8375	1.25	1.68
4	8	4.3344	1.30	1.73

NOTE: The applicable tolerances are:

Threaded Length (L4 Col 5): Plus or minus one thread

Pitch Diameter (Col 3): Plus or minus one turn is the maximum variation permitted from the gaging face of the working thread gages. This is equivalent to plus or minus one and one half turns from basic dimensions, since a variation of plus or minus one half turn from basic dimensions is permitted in working gages.

**TABLE 3**

**Designed Dimensions and Weights of Couplings**

Nominal or Trade Size of Conduit <u>(INCHES)</u>	Outside Diameter  <u>(INCHES)</u>	Minimum Length  <u>(INCHES)</u>	Minimum Weight  <u>(POUNDS)</u>
1/2	1.010	1-9/16	0.115
3/4	1.250	1-5/8	0.170
1	1.525	2	0.300
1 1/4	1.869	2-1/16	0.370
1 1/2	2.155	2-1/16	0.515
2	2.650	2 1/8	0.671
2 1/2	3.250	3-1/8	1.675
3	3.870	3-1/4	2.085
3 1/2	4.500	3-3/8	2.400
4	4.875	3-1/2	2.839

**TABLE 4**

**COMMODITY CODE NUMBERS**

1/2"	285-26-14-035
3/4"	285-26-14-027
1"	285-26-14-019
1 1/4"	285-26-14-044
1 1/2"	285-26-14-053
2"	285-26-14-068
2 1/2"	285-26-14-085
3"	285-26-14-100
3 1/2"	285-26-14-117
4"	285-26-14-132

**THIS SPECIFICATION SHALL NOT BE ALTERED**



**ELECTRICAL SPECIFICATION 1463  
DIVISION OF ENGINEERING  
DEPARTMENT OF TRANSPORTATION  
CITY OF CHICAGO  
REVISED FEBRUARY 7, 2014**

**TRAFFIC SIGNAL MOUNTING BRACKETS FOR  
MONOTUBE ARMS**

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**SUBJECT**

1. This specification states the requirements for mounting brackets which will be used to secure traffic signals and illuminated signs to steel monotube mast arms.

**GENERAL**

2. (a) Specifications. The mounting brackets shall conform in detail to the requirements herein stated and to the specifications and methods of test of the American Society for Testing and Materials cited by ASTM Designation number of which the most recently published revision will govern.
- (b) Acceptance. Mounting brackets not conforming to these specifications will not be accepted.
- (c) Sample. If requested by the Chief Procurement Officer, one complete mounting bracket must be submitted within 15 business days upon receipt of such a request. It must be delivered to the Division of Electrical Operations, 2451 South Ashland Avenue, Chicago, Illinois 60608.
- (d) Warranty. Bracket must have a minimum 3 year warranty. The warranty must cover the material and workmanship. Any structural flaws or inability to maintain alignment will be deemed a failure and result in the warranty being invoked. The manufacturer will supply a new bracket for each failed bracket, at no cost to the City. The warranty will start from the date of delivery [date of acceptance for contract construction].

**DESIGN**

3. (a) General. The mounting bracket shall be designed such that no portion of the bracket is put into tension when it is attached to the mast arm with banding. The signal support tube will be attached to the bracket using compression type attachments. All materials must be corrosion resistant and designed to be structurally sound. The signal support tube will be a slotted aluminum pipe of sufficient length to hold either 3, 4, or 5 section signal heads, or an illuminated

sign. The slot must have a neoprene gasket to protect the cable. There must also be top and bottom brackets that hold the signal head assembly at each end to the tube. The bottom bracket will also be used as a cable runway.

- (b) Hardware. All components of the mounting brackets must be held firmly in place with stainless steel hardware.
- (c) Adjustments. Bracket shall allow for mounting and adjustment of signal faces in any direction desired on a fixed mast arm. Adjustments shall be made using standard hand tools. Neither mounting nor adjusting the bracket should require the use of a torque wrench.
- (d) Signal Mounting. Mounting hardware shall be available for use with standard 2, 3, and 5 signal head configurations; for use with optically programmed signal heads; and for use with illuminated signs.
- (e) Wiring. Bracket design shall allow for ease of installation of components and wiring. All wiring troughs and nipples must provide smooth, burr-free surfaces and adequate space for facile movement of nominal .5 inch diameter cable between the mast arm and the signal face.
- (f) Banding. Where banding is used to attach the mounting bracket to the mast arm, the banding must be .75 inch wide stainless steel.
- (g) Castings. Where castings are used for the brackets, they shall be smooth and free of defects.

**TESTING**

- 4. (a) General. At least 1% of the traffic signal mounting brackets in each order or contract shall be tested for rigidity and structural integrity.
- (b) Re-testing. If any mounting bracket fails any portion of the test, an additional 3% of the brackets must be tested. If an additional bracket fails, the entire lot will be rejected.
- (c) Tests.
  - 1. With five 12" signal head sections attached to the bracket, the assembly shall be mounted to a suitable and proper supporting structure.
  - 2. Using a calibrated dynamometer, a 100 pound force must be applied for 60 seconds at the center of the bracket in the horizontal plane. At the completion of the test, there must be no movement of the assembly or deterioration of the bracket or appurtenant hardware.

## SPECIFICATION 1463

3. Using a calibrated dynamometer, a 100 pound force must be applied to the top signal head section for 60 seconds in a direction which will pull the head away from the mounting post in the mounting post plane. During this time period, the mounting bracket castings must be struck 10 times with an 8 ounce flat head hammer at the point(s) which appear to be most vulnerable to stress. At the completion of the test, no movement of the assembly must have been observed and there must be no cracking of the castings or deterioration of the appurtenant hardware.
4. The above test must be repeated except that the force must be applied in a plane which is perpendicular to the mounting post plane.

### **PACKAGING**

5. (a) Packing. Each bracket shall be packed in a suitable carton so secured that the bracket and parts will not be damaged during shipment, handling or storage.
- (b) Marking. Each carton containing the bracket and parts shall be clearly marked on the outside in letters not less than 3/8 inches tall with the legend: "TRAFFIC SIGNAL MONOTUBE BRACKET", the name of the manufacturer, the date of manufacture, the contract number, and the City commodity code.

**THIS SPECIFICATION SHALL NOT BE ALTERED**

**ELECTRICAL SPECIFICATION 1464  
DIVISION OF ELECTRICAL OPERATIONS  
DEPARTMENT OF TRANSPORTATION  
CITY OF CHICAGO  
NOVEMBER 24, 1992**

**FUSES FOR STREET LIGHTING**

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**SUBJECT**

1. This specification covers the requirements for fuses to be used to protect street lighting circuits and luminaires. The fuses will be installed in the fixture on fuse blocks, or in-line fuse holders.

**DESIGN**

2.
  - (a) Fuses shall be rated for H.I.D. ballast and street lighting protection.
  - (b) Fuses shall be fast acting, high interrupting capacity and current limiting.
  - (c) Fuses must be rated for 10A, 600 VAC and 100,000 AMPS symmetrical interrupting.
  - (d) Fuse dimensions must be 13/32" x 1-1/2".
  - (e) Fuses must be U.L. listed.
  - (f) Fuses shall be Buss fuse type KTK; Littlefuse type KLK; Gould (Chase-Shawmut) type CTK.

**THIS SPECIFICATION SHALL NOT BE ALTERED**

**SPECIFICATION 1465  
BUREAU OF ELECTRICITY  
DEPARTMENT OF STREETS AND SANITATION  
CITY OF CHICAGO  
REVISED AUGUST 28, 1995**

**GROUND RODS**

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**SUBJECT**

1. This specification states requirements for ground rods to be used for ground connections in street lighting, traffic signal, fire alarm, and miscellaneous electrical circuits.

**GENERAL**

2. (a) Ground Rods shall be copper clad, steel rods suitable for driving into the ground without deformation of the rod or scoring, separation or other deterioration of the copper cladding.
- (b) Acceptable ground rod manufacturers shall have been successfully producing copper-clad ground rods for the electrical industry for a minimum of five (5) years.

**DESIGN**

3. (a) Ground rods shall be made of mild steel core suitable for driving into the earth without deformation.
- (b) A heavy, uniform covering of electrolytic copper shall be metallurgically bonded to the steel core to provide a corrosion resistant, inseparable bond between the steel core and the copper overlay.
- (c) The rod shall be processed to work harden the copper providing a scar resistant surface.
- (d) The finished rod shall be of uniform cross-section; straight, and free of nicks, cuts or protuberances.
- (e) The rod shall be pointed at one end and chamfered at the other end.
- (f) All ground rods shall be three-quarter inches (3/4") in diameter. The length shall be as specified elsewhere. The length of the rod shall be clearly and permanently marked near the top of the rod (chamfered end).

- (g) All ground rods shall conform to U.L. 467 and shall be listed as such.

**ACCEPTANCE**

- 4. (a) The contractor shall furnish one sample of the ground rod proposed to be furnished. The approved sample shall be the standard, in all respects, to which all ground rods furnished shall conform. The accepted ground rod will be credited as part of the order.
- (b) The sample ground rod shall be delivered to the Engineer of Electricity, 2451 S. Ashland Avenue, Chicago, Illinois 60608.
- (c) Ground rods not accepted shall be removed at the sole expense of the contractor.

**THIS SPECIFICATION SHALL NOT BE ALTERED**

**SPECIFICATION 1467  
BUREAU OF ELECTRICITY  
DEPARTMENT OF STREETS AND SANITATION  
CITY OF CHICAGO  
MAY 12, 1993**

**ROD: ANCHOR, STEEL, WITH HARDWARE**

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**SUBJECT**

1. This Specification states the requirements for steel anchor rods with hardware for the street light pole foundations.

**GENERAL**

2. (a) Specifications. The anchor rods shall conform in detail to the requirements herein stated, and to the specifications of the American Society for Testing and Materials cited by ASTM Designation Number, of which the most recently published revision shall govern.
- (b) Drawing. The drawings mentioned herein are issued by the Department of Streets and Sanitation, and are an integral part of this specification.

**ANCHOR ROD**

3. (a) Fabrication. Each anchor rod shall be fabricated in conformity with City of Chicago drawings numbered 806, 811, 830 and 844.
- (b) Material. The rods shall be fabricated from cold rolled carbon steel bar meeting the requirements of ASTM Specification A-36, except that the Specification shall be modified to provide a minimum yield point of 55,000 psi (379 MPa).
- (c) Thread. The straight end of each rod shall be threaded as shown on City of Chicago drawing for that size rod, and shall be American Standard, National Coarse.

**HARDWARE**

4. Hardware furnished with the anchor rod shall be as shown on the applicable drawing. It shall include two (2) hexagonal nuts, American Standard Regular, two (2) flat washers, type B, series W, and one (1) lock washer, steel, helical spring. The nuts shall have a Class 2 or 3 fit.

**FINISH**

5. (a) Galvanizing. The threaded end of each rod shall be hot dipped galvanized for the distance shown on the applicable drawing. The thickness of the galvanized coating shall not be less than 0.0021 inches. Each hexagonal nut and washer shall be galvanized to the minimum thickness required by ASTM A-153, Class C, or ASTM B-454, Class 50. After galvanization, each anchor rod and nut shall have a mating fit equivalent to the American Standard Class 2 or 3 fit for nuts and bolts.
- (b) Rust Inhibitor. With the hardware in place on the end of the bolt, the galvanized portion of the bolt shall be coated with heavy No-Ox-Id rust inhibiting greasy compound.

**TESTS**

6. At the discretion of the Commissioner, anchor rods and hardware furnished under this specification shall be subject to testing to determine compliance with the materials physical requirements.

**INSPECTION**

7. Final inspection shall be made at point of delivery. Any anchor rods and hardware rejected shall be removed by the Contractor at his sole expense.

THIS SPECIFICATION SHALL NOT BE ALTERED



**ELECTRICAL SPECIFICATION 1473  
DIVISION OF ELECTRICAL OPERATIONS  
DEPARTMENT OF TRANSPORTATION  
CITY OF CHICAGO  
REVISED FEBRUARY 12, 2010**

**POLE MOUNTED CAST ALUMINUM BOX FOR MAIN  
SERVICE DISCONNECT**

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**SCOPE**

1. This specification states the requirements for a pole mounted, cast aluminum box intended for outdoor use on the City's Street Light and/or Traffic Control Systems as a main service disconnect. The box will be mounted on a Commonwealth Edison pole and will feed a separately mounted street light controller or traffic signal controller.

**GENERAL**

2. (a) Specification. The junction box shall conform in detail to the requirements stated herein, and to the specifications and methods of test of the American Society for Testing and Materials cited by ASTM Designation Number, of which the most recently published revisions will govern.
- (b) Drawing. The drawing mentioned herein is a drawing of the Department of Transportation, Division of Engineering, and must be interpreted as part of these specifications.
- (c) Acceptance. Junction boxes not conforming to this specification will not be accepted.
- (d) Sample. One complete junction box of the manufacture intended to be furnished, must be submitted within fifteen (15) business days after receipt of a request from the Chief Procurement Officer.

**DESIGN**

3. (a) Drawing. The junction box must conform in detail to the dimensions and requirements shown on Standard Drawing Number 893.
- (b) Material. The body and door must be castings of non-heat treated aluminum silicon alloy conforming to ANSI alloy 443.0 of ASTM B26.
- (c) Assembly. Each junction box must consist of the body, door, gaskets, bronze

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eye-head bolts, bronze wing nuts and stainless steel knurled pins furnished as described below, all completely assembled, painted and ready for installation.

- (d) Body. The body must be cast as shown in Drawing Number 893. The body must be complete with all drilled and tapped holes required for the mounting of any hardware required to make the box fully functional for a service disconnect.
- (e) Door. The door must be cast as in Drawing Number 893. The door must be furnished with a 1/2" x 3/16" sponge neoprene gasket cemented in place completely around the door jam. The door must be painted prior to cementing the gasket into its groove on the door.
- (f) Hardware. The hinge pins must be stainless steel. The eye-head bolts and wing nuts must be bronze.
- (g) Painting. The exterior surfaces of the junction box must be properly cleaned and given one (1) coat of an approved zinc chromate primer containing a minimum of ten percent (10%) iron oxide, and one (1) coat of black enamel. The paint must be approved prior to production.
- (h) Packing. Assembled junction boxes shall be suitably packed to prevent damage to painted surfaces during shipping and handling. All shipments must be fastened to and shipped on 48" x 48" hardwood, 4 way, non-returnable pallets. Total height must not exceed 64" and total weight must not exceed 2,000 pounds.

THIS SPECIFICATION SHALL NOT BE ALTERED

**ELECTRICAL SPECIFICATION 1475  
DIVISION OF ENGINEERING  
DEPARTMENT OF TRANSPORTATION  
CITY OF CHICAGO  
REVISED SEPTEMBER 26, 2006**

**CORD: TRAFFIC SIGNAL, EIGHT CONDUCTOR NO. 16 AWG, 600 VOLT**

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**SUBJECT**

1. This specification states the requirements for an eight (8) conductor number 16 AWG, electrical cable, to be installed in poles and conduit and used to electrically energize traffic signal faces at street intersections within the City of Chicago. The cable shall be flame retardant, have low acid gas content, good resistance to oil, moisture and mechanical abuse, and exhibit excellent heat aging and electrical characteristics.

**GENERAL**

2. (a) Specifications. The cable shall conform in detail to the requirements herein stated, and to the specifications and methods of test of the American Society for Testing and Materials cited by ASTM Designation Number, the Underwriters Laboratories, Inc. Standard or Style number and any other recognized standardization group's specifications referred to by the appropriate designation, of which the most recently published revision will govern.
- (b) Acceptance. Cable not conforming to this specification will not be accepted.
- (c) Warranty. The manufacturer shall warrant the cable to be first class material throughout. In addition to any other claims against them, if the cable is installed within six months of date of shipment, the manufacturer must replace any cable failing during normal and proper use within two years of date of installation. All replacements under this warranty must be made free of charge F.O.B. delivery point of the original contract.
- (d) Sample. If requested by the Chief Procurement Officer, a three (3) foot sample of the cable intended to be provided under this specification must be submitted to the attention of the Engineer of Electricity within fifteen (15) business days after receipt of such request.

**CABLE**

3. (a) Construction. This cable shall consist of stranded, coated, conductors each

concentrically encased with a "free stripping," ethylene propylene rubber insulation. Suitable fillers shall be used to produce an essentially round cross-section. The insulated conductors and the fillers must be cabled with a suitable left-hand lay as close together as is consistent with forming a core of minimum diameter. A Mylar tape must be wrapped over the conductor assembly, and a jacket applied overall.

- (b) Outer Diameter. The maximum allowable outer diameter must be one-half (0.50) inch.
- (c) Sealing. Both ends of each length of cable must be thoroughly sealed to prevent the entrance of moisture or other foreign matter.

**MARKING**

- 4. (a) Conductors. Identification must be provided by colors in accordance with I.M.S.A. Standards.
- (b) Jacket. The outer jacket must be marked as follows: "8/C 16 AWG 600V 90°C LSZH, name of manufacturer and date of manufacture. The height of letters must not be less than 1/8 inch in height and the message must repeat at approximately two (2) foot intervals. A sequential footage marking must be located on the opposite side of the jacket. All marking must be perfectly legible with permanent white ink.

**CONDUCTOR**

- 5. (a) Material. Round, Soft or annealed, stranded copper wire in accordance with ASTM B-3 and B-8, and coated in accordance with ASTM B33 (tin coated) , must be furnished.
- (b) Size. The stranded conductor must consist of stranded wires twisted with an appropriate lay to form a No. 16 AWG conductor with an approximate diameter of 0.048 inches.

**INSULATION**

- 6. (a) Type. The insulation must be an easily strippable low smoke zero halogen (LSZH) thermosetting polyolefin compound or ethylene propylene rubber (EPR), meeting or exceeding the requirements of ICEA S-95-658 and the additional requirements of this specification.
- (b) Rating. The insulation must be rated for continuous duty at 90°C in accordance with U.L. AWM Style 3400.

- (c) Thickness. The insulated conductor must be circular in cross-section, concentric to the conductor, with a nominal insulation thickness of 0.031 inches (2/64") and a minimum spot thickness of 90% of the nominal thickness.
- (d) Initial Physical Requirements:
  - 1. Tensile strength, min., PSI 1,600
  - 2. Elongation at rupture, min. % 250
- (e) Air Oven Exposure Test. After conditioning in an air oven at  $158 \pm 1^\circ\text{C}$  for 168 hours using methods of test described in ASTM-D 573:
  - Tensile strength, minimum percent of unaged value . . . . . .85
  - Elongation at rupture, minimum percent of unaged value . . . . .65
- (f) Mechanical Water Absorption:
  - 1. Gravimetric Method. After 168 hours in water at  $70 \pm 1^\circ\text{C}$ :
    - Water absorption, maximum, milligrams per square inch . . .5.0
- (g) Cold Bend Test Requirements. The completed cable must pass the "Cold-Bend," Long-Time Voltage Test on Short Specimens of ASTM D-470 except that the test temperature must be minus (-)  $25^\circ\text{C}$ .
- (h) Electrical Requirements:
  - 1. Voltage Test. The completed cable must meet an A.C. and D.C. voltage test in accordance with ASTM D-470 and D-2655.
  - 2. Insulation Resistance. The completed cable must have an insulation resistance constant of not less than 20,000 when tested in accordance with methods shown in ASTM D-470.
- (i) Flexibility Tests. A sample length of insulated conductor must be formed in a loose coil, placed in a circulating air oven, and aged for 168 hours at  $158^\circ\text{C} \pm 1^\circ\text{C}$ . The sample must then be allowed to cool to room temperature for one (1) hour and tightly wrapped around a 3X metal mandrel. The sample must show no cracks and must pass the same voltage test specified for the "Cold-Bend Test."

**JACKET**

- 7. (a) Type. The jacket must be a thermosetting low smoke zero halogen (LSZH) polyolefin compound or chlorinated polyethylene (CPE), meeting the physical

and electrical requirements specified herein.

- (b) Rating. The jacket must be rated for continuous duty at 90° C.
- (c) Thickness. The jacket must be circular in cross-section, concentric with the insulation, must have an average thickness not less than 45 mils and a spot thickness not less than ninety percent (90%) of the average thickness.
- (d) Initial Physical Requirements:
  - 1. Tensile strength minimum PSI 1800
  - 2. Elongation at rupture, minimum percent 300
- (e) Air Oven Exposure Test. After conditioning in an air oven at  $121 \pm 1^{\circ}\text{C}$  for 168 hours for LSZH or  $136 \pm 1^{\circ}\text{C}$  for CPE:
  - 1. Tensile strength, minimum percent of unused value 75
  - 2. Elongation at rupture, minimum percent of unaged valued 55
- (f) Mechanical Water Absorption. After 168 hours at  $70 \pm 1^{\circ}\text{C}$ :
  - 1. Milligrams per square inch, maximum 20

**TESTING**

- 8. (a) General. Tests shall be performed on insulation, jacket and completed cables in accordance with applicable standards as listed in this specification. Where standards are at variance with each other or with other portions of this specification, the most stringent requirements, as determined by the Engineer of Electricity will apply.

All tests must be conducted on cable produced for this order. Where cable insulation and/or jacket thickness preclude obtaining samples of sufficient size for testing, special arrangements must be made with the engineer to obtain samples of unprocessed materials directly from the extrusion feed bins which will be separately processed and prepared for tests.

- (b) Number of Tests. Insulation and jacket tests must be conducted on samples taken every 25,000 feet or fraction thereof of each conductor size. In no case must samples be taken closer than 15,000 feet apart.

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- (c) Test Reports. No cable shall be shipped until certified copies of all factory tests have been reviewed and approved by the engineer.
- (d) Acceptance. Samples shall be taken from each reel and must successfully conform to all tests specified herein. Reels from which samples fail to conform, will be rejected.

### PACKAGING

- 9. (a) Reels. The completed cord shall be delivered on sound, substantial reels. The ends of the cable must be securely fastened so that they will not become loose during shipment and handling.
- (b) Footage. The number of feet per reel must be five hundred (500) feet plus or minus ten percent ( $\pm 10\%$ ).
- (c) Marking. A metal tag or indelible marking material such as alkyd enamel paint, must be used to mark the reel. The marking information must include, but not be limited to, the following: reel number, contract number, a description of the cord, and the footage of that particular reel.

THIS SPECIFICATION SHALL NOT BE ALTERED

**ELECTRICAL SPECIFICATION 1493  
DIVISION OF ENGINEERING  
DEPARTMENT OF TRANSPORTATION  
CITY OF CHICAGO  
REVISED FEBRUARY 6, 2014**

**TRAFFIC SIGNAL: VEHICULAR, TWELVE-INCH  
SINGLE FACE, SINGLE OR MULTIPLE-SECTION,  
POLYCARBONATE, LED OR INCANDESCENT**

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**1. GENERAL REQUIREMENTS**

- 1.1 This specification states the requirements for twelve-inch, single face, single and multiple-section, traffic signals with polycarbonate housings, using LED or incandescent light source, for use in the traffic control system of the City of Chicago. Units include red ball, yellow ball, green ball, red arrow, yellow arrow, green arrow, red bicycle, yellow bicycle, green bicycle, white vertical bar, and white horizontal bar.
- 1.2 Sample and Certified Test Reports. One complete signal, fully assembled and wired, of the manufacture proposed to be furnished, must be submitted along with the required certified test reports, within 15 business days upon request of the Chief Procurement Officer. The sample must be delivered to the Division of Electrical Operations, 2451 South Ashland Avenue, Chicago, Illinois 60608.
- 1.3 Standards. Equipment furnished under this specification shall meet the appropriate requirements of the following standards, as required within the body of this specification:
- American Association of State Highway and Transportation Officials (AASHTO)
  - American Iron and Steel Institute (AISI)
  - American Society for Testing and Materials (ASTM)
  - Institute of Transportation Engineers (ITE)
  - National Electrical Manufacturers Association (NEMA)
  - Underwriters Laboratories (UL)
- 1.4 Approval. Approval will mean approval in writing by the Commissioner or his duly authorized representative.
- 1.5 Warranty. The manufacturer shall warrant the signals to meet the requirements of this specification, and shall warrant all equipment, components, parts and appurtenances against defective design, material and workmanship for a period of 3 years from date of delivery [date of acceptance for contract construction]. In addition, LED optical modules must carry a 7 year warranty against failure or loss of color (chromaticity) and signal brightness (luminance) below minimum acceptable ITE standard levels from date of



delivery [date of acceptance for contract construction]. In the event defects or failures occur in the units during the warranty period, the manufacturer must replace all defective units, at no expense to the City. This warranty shall be evidenced by a letter or certificate of warranty submitted to the City at the time delivery is made. The warranty must cover all units delivered in an order or installed by contract, and must include unit serial numbers. The warranty must be signed and dated by an official of the manufacturer who is empowered by the manufacturer to enter into such a warranty.

**2. MATERIALS AND EQUIPMENT REQUIREMENTS**

2.1 The traffic signal heads shall conform to ITE Standard "Vehicle Traffic Control Signal Heads" (VTC SH), in which the most recently published revision will govern.

2.2 Housing. The housing of each section must be one piece, ultraviolet stabilized polycarbonate resin of the specified color, injection molded complete with integral top, bottom, and sides, having a minimum thickness of 0.1 inch.

(a) The polycarbonate shall meet or exceed the following tests:

<b>TEST</b>	<b>REQUIRED</b>	<b>METHOD</b>
Specific gravity	1.17 minimum	ASTM D 792
Vicat Softening temp	310-320° F	ASTM D 1525
Brittleness temp.	-200° F	ASTM D 746
Flammability	Self-extinguishing	ASTM D 635
Tensile strength, yield	8,500 PSI	ASTM D 638
Elongation at yield	5.5-8.5%	ASTM D 638
Shear strength, yield	5,500 PSI min.	ASTM D 732
Izod impact strength (notched, .125" thick)	12-16 ft-lbs/in.	ASTM D 256
Fatigue strength (at 2.5 mm cycles)	950 PSI min.	ASTM D 671

(b) Assembly. A traffic signal section shall be comprised of, but not limited to, the housing, hinged door, visor, optical unit and all necessary gaskets and hardware. The multi-section, single face, traffic signal shall be comprised of single face single sections assembled together, containing an internally mounted terminal block. Arrow indications must be shipped as single sections. The traffic signals shall be designed and constructed to permit sections to be assembled together, one above the other, forming a weatherproof and dust-tight unit.

(c) Individual sections shall be fastened together with a coupling washer assembly composed of 2 washers, 3 zinc plated bolts, nuts, and lock washers which lock the individual sections together. As an alternative, individual sections may be fastened together with 4 cadmium plated bolts, lock washers, and nuts.

- (d) Height. The overall height of an assembled traffic signal must be 14 inches  $\pm$ 1 inch for a single-section signal, 42 inches  $\pm$ 3 inches for a three-section signal, and 70 inches  $\pm$ 5 inches for a five-section signal.
- (e) Mounting. The traffic signal shall be designed for mounting with standard traffic signal brackets using 1.5 inch pipe size fittings.
- (f) Positioning Device. The top and bottom opening of each housing must have integral serrated bosses that will provide positive positioning of the signal head in 5° increments. A total of 72 teeth must be provided in the serrated bosses to allow the signal face to be rotated 360° about its axis. The teeth shall be clean and well defined to provide positive positioning.
- (g) Hinges. The signal housing shall be sectional; one section for each optical unit. Each housing must have 4 integral hinge lugs, with stainless steel hinge pins (AISI 304), located on the left side for mounting the door. The hinge pins shall be straight and not protrude past the outside of the housing lugs. The housing must have 2 integral latching bolt lugs on the right side each with a stainless steel hinge pin to which a latching bolt (AISI 304), washer, and wing nut will be attached. The wing nuts must be captive. Each housing must be equipped with holes to be used for mounting backplates.
- (h) Door. The door shall be a one piece ultraviolet stabilized polycarbonate resin of the specified color, injection molded complete with a minimum thickness of 0.1 inch. Two hinge lugs on the left side and 2 sets of latch screw jaws centered on the right side, as viewed from the front of the signal, must be integrally cast with the housing door. The door must be hinged to the housing with 2 stainless steel hinge pins, drive fitted. Two stainless steel latch screws and wing nut and washer assemblies on the latch side of the housing body shall provide for opening and closing the door without the use of tools. The door must have holes with threaded metal inserts for stainless steel machine screws to secure the visor and the lens. The inside of the door must be grooved to accommodate a one piece, air-cored ethylene propylene diene monomer (EPDM) gasket to provide a weatherproof and dust proof seal when the door is closed. The inside of the door must have 4 equally spaced threaded metal inserts for the lens attachment. The outside of the door must have an integral rim completely encircling the lens opening to prevent leakage between the door and the lens. The rim must have 4 equally spaced tabs around the circumference with threaded metal inserts for the visor.
- (i) Visor. Each traffic signal shall have a visor for each signal indication (section). The visor shall be the tunnel type, 9.25 inches long, fabricated of ultraviolet stabilized polycarbonate resin of the specified color, injection molded. The visor shall fit tightly against the door and not permit any light leakage between the door and visor. All hardware necessary for, but not limited to, attachment of the visor must be of stainless steel. The visor must have 4 mounting lugs for attaching the visor to the door. Screws must go through the visor lugs into the metal inserts in

the door to secure the visor.

- 2.3 The traffic signal heads shall be provided with incandescent or LED optical modules as specified in the line item [or Contract Plans].

### 2.3.1 INCANDESCENT OPTICAL UNITS

- (a) Incandescent Optical Unit. The incandescent optical unit consists of the lens, reflector and lamp holder. The optical unit and visor shall be designed as a whole so as to eliminate the return of outside rays entering the unit from above the horizontal (known as sun phantom). The optical unit shall be designed and assembled so that no light can escape from one indication to another.
- (b) Lenses. The red, green, and yellow polycarbonate lenses must be round with a nominal 12 inch diameter and shall conform to all requirements set forth under the heading "Traffic Signal Lenses" in the ITE standard. The red, green, and yellow arrow lenses must be round with a nominal 12 inch diameter and the outside surface must be covered, except for the arrow, with a dull or dark grey opaque material of a thickness sufficient to totally hide the light from a 2000-lumen lamp placed behind it operating at rated voltage. The opaque material shall be hard and durable and shall be bonded such that it will not peel or flake when subject to the heat of a signal lamp or when the lens is washed. The shape and size of the arrow shall meet ITE standards. The arrow shall appear uniformly illuminated when viewed from angles usually encountered in service, whatever may be the angular position of the lens in the signal section. The lens must be enclosed by an air-cored EPDM gasket providing a weather proof and dust proof seal between the lens, door, and reflector assembly. The gasketed lens must be secured to the housing door by 4 stainless steel screws (AISI 304) and clamps equally spaced around the lens opening. The door must have threaded metal inserts to receive the screws.
- (c) Reflector. The reflector shall be fabricated of high-purity, clad-type aluminum sheet formed to a parabolic shape and cut to fit in a circular polycarbonate, hinged frame for rigid mounting within the housing. The circular rim of the reflector shall be mounted in such a way as to seal the internal optical system by being compressed against the lens gasket when the signal door is closed. The reflecting surface must be an "ALZAK" class SI specular finish having a minimum reflectivity of 82% and a protective oxide coating. The reflector must have an opening in the back to accommodate the lamp holder.
- (d) Lamp Holder. The lamp holder must have a heat, moisture, and weatherproof molded phenolic housing designed to accommodate a standard 133 watt, 3 inch light center length, incandescent lamp. The lamp holder shall be so designed that it can be readily rotated and positively positioned to provide proper lamp filament orientation and focus. The inner brass shell, or ferrule, of the lamp holder must have a grip to prevent the lamp from working loose due to vibration. A gasket

must be furnished at the junction of the lamp holder and the reflector.

### 2.3.2 LIGHT EMITTING DIODE (LED) OPTICAL MODULES

- (a) Light emitting diode (LED) optical modules shall consist of an integral unit containing the following components: power leads, housing, matrix of light emitting diodes (LEDs) emitting monochromatic light of desired signal color, and electronic and electrical components necessary to permit operation at nominal 120 volt, 60 hertz power.
- (b) The LED module shall be of such dimensions as to permit mounting in any standard traffic signal housing, be interchangeable with incandescent optical units, and must include appropriate gasket for this purpose. Gasketing provided must provide a watertight seal meeting existing ITE standard for signal heads, and exclude the infiltration of moisture into either the signal housing or into the LED optical unit case.
- (c) The LED module shall meet the applicable requirements of the ITE standards for Vehicle Traffic Control Signal Heads (VTCSH) Part 2: LED Vehicle Signal Modules, for color (chromaticity), signal brightness (luminance), and beam spread (luminance at various vertical and horizontal angles).
- (d) Minimum brightness of LED signal units shall be in accordance with the luminous requirements in a standard testing procedure as defined by Section 4 of the VTCSH Part 2: LED Vehicle Signal Modules. During the required operating life of LED signal units, the luminance output of the units must not be less than 60% of the values specified in the standard.
- (e) The module indicator surface shall be constructed of ultraviolet (UV) stabilized, impact resistant polycarbonate, acrylic, or other approved material. The surface must be anti-glare, smooth texture, and clear.
- (f) Modules shall consist of LEDs uniformly distributed to present a homogeneous appearance on the indicator face from a wide viewing angle.
- (g) LEDs shall be wired so that the loss of a single LED or a string of LEDs will not reduce the luminescence below the minimum requirement.
- (h) For purposes of this specification, failure of a single unit is defined as an occurrence where the luminescence of the signal measured in candela in standard test procedures is less than the required initial luminance or luminance at time points and conditions specified; or where minimum required brightness is achieved, but 2 or more series strings of LEDs or in excess of 20% of LEDs are not operable.

- (i) Module power supply shall be constant current regulated and filtered to provide instant on indications, and to prevent momentary signal outages or flicker. Units must be fully operable over a range of 90 volts to 130 volts at 60 hertz  $\pm$  3 hertz.
- (j) Surge protection: Each module must be provided with integral surge protection to withstand transient of 600 volt, 100 microsecond rise and 1 millisecond pulse width. The surge protector shall provide full electrical and physical protection to all unit components.
- (k) Maximum permissible power consumption at ambient conditions (nominal 120 volts, 60 hertz, 70°F.) must be 30 watts at a minimum 90% power factor. Power consumed must not vary by more than 10% from nominal power consumption over a voltage range of 105 volts to 125 volts, and over permissible environmental ranges.
- (l) Modules must be fully operable at temperature ranges of -40°F. (-40°C.) to +165° F. (+74°C.) at up to 100% relative humidity.
- (m) Modules shall be clearly marked on the back surface of the unit in a permanent manner showing information required for warranty and long term performance. Information to be shown must include manufacturer name, date of manufacture, electric power requirements, signal model type including color and indication type, and signal serial number.
- (n) The LED module shall be compatible with the traffic signal controller equipment currently in use by the City of Chicago, and meeting the City=s latest specifications for traffic signal control equipment. In particular the LED unit shall be compatible with the NEMA TS-1 and later traffic signal load switches and conflict monitors.
- (o) Modules shall meet applicable sections of Title 47, Sub-Part B, Section 15 of the Federal Communications Commission (FCC) rules as applies to electronic noise limitation and electromagnetic interference.
- (p) Total harmonic distortion (THD) induced into the voltage and current AC power line sine waves must not exceed 20%.
- (q) LED modules must meet the requirements of VTCSH Part 2: LED Vehicle Signal Modules Section 6.3.1 for signal burn-in.

2.4 Wiring. Each lamp holder must be furnished with two (2) leads color coded as follows:

First Lead Wire:

White

Common

Second Lead Wire:

Red	Red Section
Yellow	Yellow Section
Green	Green Section
Green with Black Tracer	Green Arrow Section
Yellow with Black Tracer	Yellow Arrow Section
Red with Black Tracer	Red Arrow Section
Green with White Tracer	Green Bicycle Section
Yellow with White Tracer	Yellow Bicycle Section
Red with White Tracer	Red Bicycle Section
Any Other Colors	Bus Sections

The leads must be No. 18 AWG stranded copper wire rated at 600 volt, 105° C., with thermo-plastic insulation. The leads must connect to the terminal strip without being spliced. The ends of the leads must be stripped of 0.5 inches of insulation and tinned.

- 2.5 Terminal Strip. A dual-point, barrier type terminal strip with a solid base and pressure plate type connectors shall be securely attached at both ends to the housing body inside the "Green" section of the signal head, or other approved section within a multiple section head.
- 2.6 Cable. One 11 foot length of flexible electric cord, medium duty, type SO, No. 16 AWG stranded copper conductor, color coded, rubber insulated, neoprene jacketed, must be furnished with each signal head. The number of conductors must include a neutral and one leg for each section. Both ends of each cable length must be carefully stripped of 6 inches of jacket and 1 inch of insulation, and each conductor properly tinned.
- 2.7 Gaskets. Wherever necessary to make a completely dustproof, moistureproof and weatherproof assembly of the housing and optical system, approved type gaskets of neoprene or silicone rubber shall be provided.

**3. TESTING AND DOCUMENTATION REQUIREMENTS**

- 3.1 Documentation. The contractor shall provide certified manufacturing and testing documentation to demonstrate that the traffic signals being supplied meet or exceed the specification requirements. All LED modules shall be tested by a nationally recognized testing laboratory (NRTL), such as Intertek (ETL division), to demonstrate compliance with the latest ITE VTCSH specification. All LED units shall have the testing laboratory's label attached.
- 3.2 Inspection. The signals shall be subject to inspection at the request of the Commissioner. Final inspection shall be made at point of delivery. Any signal rejected shall be removed, disposed of, and replaced by the contractor at his sole cost.

**4. PACKAGING**

- 4.1 Packing. Each traffic signal assembly shall be packed in a suitable carton so secured that the signal will not be damaged during shipment, handling or storage.
- 4.2 Marking. Each carton containing a traffic signal shall be clearly marked on the outside in letters not less than 3/8 inch tall with the legend: "TRAFFIC SIGNAL, TWELVE-INCH, POLYCARBONATE" or "TRAFFIC SIGNAL, TWELVE INCH, POLYCARBONATE, LED OPTICS" and the number of Sections as required, the color and indication types, the name of the manufacturer, the date of manufacture, the pertinent Contract Number and the appropriate City Commodity Code Number.

THIS SPECIFICATION SHALL NOT BE ALTERED

**ELECTRICAL SPECIFICATION 1494  
DIVISION OF ENGINEERING  
DEPARTMENT OF TRANSPORTATION  
CITY OF CHICAGO  
REVISED FEBRUARY 6, 2014**

**PEDESTRIAN TRAFFIC SIGNAL, 16 INCH LED  
WITH SYMBOLIC WALK/DON'T WALK,  
POLYCARBONATE HOUSING**

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**SCOPE**

1. This specification states the requirements for a single section pedestrian signal with light emitting diode (LED) symbolic messages on a nominal sixteen inch by eighteen inch message surface and enclosed in a polycarbonate housing.

**GENERAL REQUIREMENTS**

2. (a) Sample and Certified Test Reports. One complete pedestrian signal, fully assembled and wired, of the manufacture proposed to be furnished, must be submitted along with the required certified test reports, within 15 business days upon request of the Chief Procurement Officer. The sample must be delivered to the Division of Electrical Operations, 2451 South Ashland Avenue, Chicago, Illinois 60608.
- (b) Standards. Equipment furnished under this specification shall meet the appropriate requirements of the following standards, as required within the body of this specification:  
  
American Association of State Highway and Transportation Officials (AASHTO)  
American Iron and Steel Institute (AISI)  
American Society for Testing and Materials (ASTM)  
Institute of Transportation Engineers (ITE)  
National Electrical Manufacturers Association (NEMA)  
Underwriters Laboratories (UL)
- (c) Approval. Approval will mean approval in writing by the Commissioner or his duly authorized representative.
- (d) Warranty. The manufacturer shall warrant the signals to meet the requirements of this specification, and shall warrant all equipment, components, parts and appurtenances against defective design, material and workmanship for a period of 3 years from date of delivery [date of acceptance for contract construction]. In addition, LED modules must carry an additional warranty against failure or loss



of color (chromaticity) and signal brightness (luminance) below minimum acceptable ITE standard levels for a period of 7 years from date of delivery [date of acceptance for contract construction]. In the event defects or failures in the LED units occur during the warranty period, the manufacturer must replace all defective units at no expense to the City. This warranty shall be evidenced by a letter or certificate of warranty submitted to the City at the time final delivery is made. The warranty must cover all units delivered in an order or installed by contract, and must include module serial numbers for all LED modules. The warranty must be signed by an official of the manufacturer who is empowered by the manufacturer to enter into such an agreement.

**MATERIAL**

- 3. (a) The pedestrian signal heads shall conform to ITE Standard "Pedestrian Traffic Control Signal Indications" (PTCSI), in which the most recently published revisions will govern.
- (b) Housing Design. The housing must be one piece, ultra violet stabilized polycarbonate resin of the specified color, injection molded complete with integral top, bottom, and sides, having a minimum thickness of 0.1 inches.
- (c) The polycarbonate formulation used must provide these physical properties in the housing (Tests may be performed on separately molded specimens).

<b><u>TEST</u></b>	<b><u>REQUIRED</u></b>	<b><u>METHOD</u></b>
Specific gravity	1.17 minimum	ASTM D 792
Vicat Softening temp	310-320° F	ASTM D 1525
Brittleness temp.	-200° F	ASTM D 746
Flammability	Self-extinguishing	ASTM D 635
Tensile strength, yield	8,500 PSI	ASTM D 638
Elongation at yield	5.5-8.5%	ASTM D 638
Shear strength, yield	5,500 PSI min.	ASTM D 732
Izod impact strength (notched, .125" thick)	12-16 ft-lbs/in.	ASTM D 256
Fatigue strength ( at 2.5 mm cycles)	950 PSI min.	ASTM D 671

**EQUIPMENT REQUIREMENTS**

- 4. (a) Positioning Device. The top and bottom opening of each housing must have integral serrated bosses that will provide positive positioning of the signal head in 5° increments to eliminate undesirable rotation or misalignment of the signal head between sections. A total of 72 teeth must be provided in the serrated bosses to allow the signal face to be rotated 360° about its axis. The teeth shall be clean and sharp to provide positive positioning with the grooves of the mating section or framework. Each opening shall accommodate standard 1.5 inch pipe fittings and

brackets.

- (b) Hinges. The housing must have four integral hinge lugs, with stainless steel hinge pins (AISI 304), located on the left side for mounting the door. The hinge pins must be straight and not protrude past the outside of the housing lugs. The housing must have two integral latching bolt lugs on the right side each with a stainless steel hinge pin to which a latching bolt (AISI 304), washer, and wing nut will be attached. The wing nuts must be captive.
- (c) Door. The door must be a one piece ultraviolet stabilized polycarbonate resin of the specified color, injection molded complete with a minimum thickness of 0.1 inch. Two hinge lugs on the left side and 2 sets of latch screw jaws centered on the right side, as viewed from the front of the signal, must be integrally cast with the housing door. The door must be hinged to the housing with 2 stainless steel hinge pins, drive fitted. Two stainless steel latch screws and wing nuts and washer assemblies on the latch side of the housing body shall provide for opening and closing the door without the use of tools.

The inside of the door must be grooved to accommodate a one piece, air-cored ethylene propylene diene monomer (EPDM) gasket to provide a weatherproof and dust proof seal when the door is closed. The outside of the door must have an integral rim completely encircling the opening to prevent leakage between the door and the LED module. The rim must have equally spaced tabs around the circumference with threaded metal inserts for the visor attachment.

### **LED OPTICAL MODULE**

- 5. (a) LED Optical Module. Light emitting diode (LED) optical modules shall consist of an integral unit containing the following components: power leads, housing, matrix of light emitting diodes (LEDs) emitting monochromatic light of desired colors, and electronic and electrical components necessary to permit operation at nominal 120 volt, 60 hertz power. All units must form a neat compact unit within the housing body with no light leakage between the door and the housing body, and the signal indication and the visor.
- (b) The LED module shall meet the applicable requirements of ITE's LED Pedestrian Traffic Signal Modules. During the required operating life of LED signal units, the luminance output of the units must not be less than 60% of the values specified in the standard.
- (c) Module power supply must be constant current regulated and filtered to provide instant on indications, and to prevent momentary signal outages or flicker.
- (d) Modules must consist of LEDs uniformly distributed to present a homogeneous appearance on the face of the lens from a wide viewing angle.

## SPECIFICATION 1494

- (e) LEDs shall be wired so that the loss of a single LED or a string of LEDs will not reduce the luminescence below the minimum requirement.
- (f) For purposes of this specification, failure of a single module is defined as an occurrence where the luminescence of the signal measured in candela in standard test procedures is less than the required initial luminance or luminance at time points and conditions specified; or where minimum required brightness is achieved, but 2 or more series strings of LEDs or in excess of 20% of LEDs are not operable.
- (g) Modules must be fully operable over a range of 90 volts to 130 volts at 60 hertz  $\pm$  3 hertz.
- (h) Surge protection. Each module must be provided with integral surge protection to withstand transient of 600 volt, 100 microsecond rise and 1 millisecond pulse width. The surge protector shall provide full electrical and physical protection to all module components.
- (i) Maximum permissible power consumption at ambient conditions (nominal 120 volts, 60 hertz, 70° F.) must be 18 watts at a minimum 90% power factor. Power consumed must not vary by more than 10% from nominal power consumption over voltage range of 105 volts to 125 volts, and over permissible environmental ranges.
- (j) Modules must be fully operable at temperature ranges of -40° F. (-40° C) to +165° F. (+74° C) at up to 100% relative humidity
- (k) Modules shall be clearly marked on the back surface of the unit in a permanent manner showing information required for warranty and long term performance. Information to be shown must include manufacturer name, date of manufacture, electric power requirements, signal model type, and signal serial number.
- (l) The LED module shall be compatible with the traffic signal controller equipment currently in use by the City of Chicago, and meeting the City's latest specifications for traffic signal control equipment. In particular the LED module must be compatible with the NEMA TS-1 and later traffic signal load switches and conflict monitors.
- (m) Modules must meet applicable sections of Title 47, Sub-Part B, Section 15 of the Federal Communications Commission (FCC) rules as applies to electronic noise limitation and electromagnetic interference.
- (n) Total harmonic distortion (THD) induced into the voltage and current AC power line sine waves must not exceed 20%.

- (o) Burn-in. LED Optical units must be energized for a minimum 24 hour burn-in at 100% on-time duty cycle.

**SYMBOLIC MESSAGE**

- 6. (a) Symbols for "Walk" (Man) and "Don't Walk" (Hand) shall conform in style and color to those of the "Institute of Transportation Engineers" (I.T.E.). The messages shall be approximately 16 inches square and display the "Don't Walk" and "Walk" symbols. The symbols shall be applied in such a manner as to provide an opaque polycarbonate background and illuminated legends. The symbols must be not less 9.5 inches tall with proportional width. The "Don't Walk" symbol must be Portland orange, and the "Walk" symbol must be lunar white, conforming to the specifications of the PTCSI.
- (b) The module message surface shall be constructed of ultraviolet (UV) stabilized, impact resistant polycarbonate or acrylic. The surface must be anti-glare, smooth texture, and clear.

**WIRING**

- 7. (a) Each lamp holder must have 3 wire leads color coded as follows:

White - Common  
 Red - "Don't Walk" Indication  
 Green - "Walk" Indication

The leads must be No. 18 AWG stranded copper wire rated at 600 volt, 105° C., with thermo-plastic insulation. The ends of the lamp leads must be stripped of 0.5 inches of insulation and tinned. The leads must be splice-free and connected to one side of the terminal strip.

- (b) Terminal Strip. A four terminal, eight point, barrier type terminal strip with solid base and pressure plate type connectors shall be securely attached at each end to the housing body inside the walk section.
- (c) Cable. One 11foot length of flexible electric cord, medium duty, type SO, 3-conductor No. 16 AWG stranded copper, color coded, rubber insulated, neoprene jacketed, must be furnished with each signal housing. Both ends of each cable length must be carefully stripped of 6 inches of jacket and 1 inch of insulation, and each conductor properly tinned.

**TESTING AND DOCUMENTATION REQUIREMENTS**

- 8. (a) Documentation. The contractor shall provide certified manufacturing and testing documentation to demonstrate that the pedestrian signals being supplied meet or exceed the specification requirements. All LED modules shall be tested by a

nationally recognized testing laboratory (NRTL), such as Intertek (ETL division), to demonstrate compliance with the latest ITE VTCSH specification. All LED modules shall have the testing laboratory's label attached.

- (b) Inspection. The signals shall be subject to inspection at the request of the Commissioner. Final inspection shall be made at point of delivery. Any signal rejected must be removed, disposed of, and replaced by the contractor at his sole cost.

**PACKAGING**

- 9. (a) Each pedestrian signal assembly shall be packed in a suitable carton so secured that the signal will not be damaged during shipment, handling, or storage.
- (b) Marking. Each carton containing a pedestrian signal shall be clearly marked on the outside in letters not less than 3/8 inch tall with the legend: "PEDESTRIAN SIGNAL, SIXTEEN-INCH, SYMBOLIC LED WALK-DONT WALK," the appropriate City Commodity Code Number, the name of the manufacturer, the date of manufacture, and the pertinent contract number.

**THIS SPECIFICATION SHALL NOT BE ALTERED**

**ELECTRICAL SPECIFICATION 1495  
DIVISION OF ENGINEERING  
DEPARTMENT OF TRANSPORTATION  
CITY OF CHICAGO  
REVISED FEBRUARY 7, 2014**

**TRAFFIC SIGNAL MOUNTING BRACKET  
POLYCARBONATE, SIDE OF POLE**

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**SCOPE**

1. This specification states the requirements for polycarbonate brackets designed for mounting traffic and pedestrian signal heads from the side of poles.

**GENERAL REQUIREMENTS**

2. (a) Sample and Certified Test Reports. One complete signal bracket of the manufacture proposed to be furnished, must be submitted along with the required certified test reports, within 15 business days upon request of the Chief Procurement Officer. The sample must be delivered to the Division of Electrical Operations, 2451 South Ashland Avenue, Chicago, Illinois 60608.
- (b) Standards. Equipment furnished under this specification must meet the appropriate requirements of the following standards, as required within the body of this specification:  
  
American Association of State Highway and Transportation Officials (AASHTO)  
American Society for Testing and Materials (ASTM)  
Institute of Transportation Engineers (ITE)  
National Electrical Manufacturers Association (NEMA)
- (c) Approval. Approval will mean approval in writing by the Commissioner or his/her duly authorized representative.
- (d) Warranty. The manufacturer shall warrant the signal bracket to meet the requirements of this specification, and shall warrant all equipment, components, parts and appurtenances against defective design, material and workmanship for a period of 3 years from date of delivery [date of acceptance for contract construction]. In the event defects and failures become apparent during this period, the manufacturer must replace the defective brackets at no expense to the City. This warranty must be evidenced by a letter or certificate of warranty submitted to the City at the time final delivery is made.

**MATERIAL**

- 3. (a) The bracket must be one piece, ultra violet stabilized polycarbonate resin of the specified color, injection molded complete with integral top, bottom, and sides.
- (b) The polycarbonate formulation used must provide these physical properties (Tests may be performed on separately molded specimens).

<b><u>TEST</u></b>	<b><u>REQUIRED</u></b>	<b><u>METHOD</u></b>
Specific gravity	1.17 minimum	ASTM D 792
Vicat Softening temp	310-320° F	ASTM D 1525
Brittleness temp.	-200° F	ASTM D 746
Flammability	Self-extinguishing	ASTM D 635
Tensile strength, yield	8,500 PSI	ASTM D 638
Elongation at yield	5.5-8.5%	ASTM D 638
Shear strength, yield	5,500 PSI min.	ASTM D 732
Izod impact strength (notched, 1/8" thick)	12-16 ft-lb/in.	ASTM D 256
Fatigue strength (at 2.5 mm cycles)	950 PSI min.	ASTM D 671

- (c) Glass. The polycarbonate may be glass impregnated to increase strength.

**POSITIONING DEVICE**

- 4. The top and bottom opening of the bracket must have integral serrated bosses that will provide positive positioning of the signal head in 5° increments to eliminate undesirable rotation or misalignment of the signal head between sections. A total of 72 teeth must be provided in the serrated bosses to allow the signal head to be rotated 360° about its axis. The teeth must be clean and sharp to provide positive positioning with the grooves of the signal head.

**HARDWARE**

- 5. The mounting brackets must be provided complete with 1 polycarbonate shim(.25 inches thick), one 1.5 inch chase nipple with rubber gasket, and 1 pinnacle cap with rubber gasket.

**DIMENSIONS**

- 6. The bracket must have nominal dimensions of 12 inches long, by 6 inches high, by 3 inches wide.

**WIRING SPACE**

- 7. The bracket must have an integral molded wireway with a minimum 1.5 inch diameter

opening.

**DESIGN STRENGTH**

8. The bracket must be designed to support a 12 inch, single face, five-section, polycarbonate signal head.

**TESTING AND DOCUMENTATION REQUIREMENTS**

9. (a) Documentation. The contractor must provide certified manufacturing and testing documentation to demonstrate that the brackets being supplied meet or exceed the specification requirements.
- (b) Inspection. The brackets will be subject to inspection at the request of the Commissioner. Final inspection must be made at point of delivery. Any bracket rejected must be removed, disposed of, and replaced by the contractor at his sole cost.

**PACKAGING**

10. (a) Each bracket must be packed in a suitable carton so secured that the bracket will not be damaged during shipment, handling, or storage.
- (b) Marking. Each carton containing brackets must be clearly marked on the outside in letters not less than 3/8 inch tall with the legend: "POLYCARBONATE SIGNAL BRACKET, SIDE OF POLE" the appropriate City Commodity Code Number, the name of the manufacturer, the date of manufacture, and the pertinent contract number.

**THIS SPECIFICATION SHALL NOT BE ALTERED**



**ELECTRICAL SPECIFICATION 1504  
DIVISION OF ENGINEERING  
DEPARTMENT OF TRANSPORTATION  
CITY OF CHICAGO  
REVISED MARCH 6, 2014**

**CHICAGO 2000 PEDESTRIAN POLE: 12'-0", 11 GAUGE FLUTED, TAPERED STEEL  
FOR 15" BOLT CIRCLE**

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**SUBJECT**

1. This specification states the requirements for an Anchor Base Chicago 2000 Pedestrian Pole. This pole will support a tenon mounted luminaire. A split pedestal base described under a different material specification, will be provided to cover the bottom nominal 31" of the pole. This pole will be served by underground cables.

**SUBMITTAL INFORMATION REQUIRED**

2. (a) Manufacturer's Shop Drawings. Scaled manufacturer's shop drawings showing actual light pole dimensions, details, and welds. Shop drawings must be original engineering drawings created by the manufacturer; photocopied or scanned copies of the Standard Drawings will not be accepted, and will be rejected as an incomplete submittal. These drawings must also be submitted in electronic format in Microstation 95, if requested; failure to provide drawings in this format will be cause for rejecting the submittal.

Dimensions must include but will not be limited to: mast height, width, taper, and fluting; base plate length, width, thickness, and bolt circle; handhold length, width, plan location, and height above base plate; component attachment plan locations and heights above baseplate including luminaire tenon.

Details must include scaled and dimensioned plan views, front elevations, side elevations, and section views as required for components including but not limited to: handhole and luminaire tenon.

Welds must include but will not be limited to: locations, sizes, and types of welds in accordance with the WELDING Section of this Specification.

- (b) Manufacturer's catalog cut sheets showing light pole designation(s), characteristics, and catalog number(s).
- (c) Manufacturer's specifications including fabricating materials and processes.

- (d) Manufacturer's written installation instructions and maintenance manuals including recommendations and/or procedures for storage, assembly, orientation, installation, component access and wiring, and numeric tolerances for torquing the foundation anchor bolts to the light pole base plate.
- (e) Sample. If requested by the Chief Procurement Officer, one completely assembled anchor-base pole with integral components, of the manufacture intended to be furnished, will be submitted within fifteen (15) business days from receipt of notice.
- (f) Warranty. The manufacturer must warrant the performance and construction of these light poles to meet the requirements of this specification and must warrant all parts, components, and appurtenances against defects due to design, workmanship, or material developing within a period of five years after the light poles have been delivered. This will be interpreted particularly to mean structural or mechanical failure of any component, failure of any weld, or failure of any portion of the painting system. The warranty must be furnished in writing guaranteeing replacement, including shipment, free of charge to this Contract and to the City, of any light pole assembly, or any component parts thereof, which, as determined by the Commissioner, would develop aforesaid failures. The warranty must accompany submittal information. Any light pole or part thereof not performing as required or developing defects within this period, must be replaced by the manufacturer at no cost to the City. The Commissioner will be the sole judge in determining which replacements are to be made and the Commissioner's decision will be final. Any cost for the warranty as specified will be incidental to this contract.

**GENERAL**

- 3. (a) Products. Light poles and component equipment must be the products of established manufacturers, and must be suitable for the service required. Light pole or component equipment items which are proposed as similar or identical must be the products of a single manufacturer. Masts will be manufactured by Union Metal Corporation or Valmont Industries Incorporated.
- (b) Specifications. The poles must conform in detail to the requirements herein stated, and to the requirements of the following organizations as cited herein:  
  
American Association of State Highway and Transportation Officials (AASHTO)  
American Society for Testing and Materials (ASTM)  
American Welding Society (AWS)  
Society for Protective Coatings (SSPC)
- (c) Drawings. The drawings mentioned herein are drawings of the Department of Transportation being an integral part of this specification cooperating to state the necessary requirements.

- (d) Design. The pole must conform in design and dimensions to Standard Drawing 928.
- (e) Approval. Whenever “approval” and “approved” are used in this specification they will mean a written approval by the Commissioner to be secured prior to proceeding with manufacture of these light poles.
- (f) Commissioner’s Review. The Commissioner will be the sole judge in determining if the submitted light poles are in compliance with this specification. The Commissioner’s decision will be final

**MAST**

- 4. (a) Mast Size. The mast size will be nominally 12'-0" as shown on Standard Drawing 928. The mast diameter at the bottom must be 6.61".
- (b) Mast Design. The mast must be tapered at 0.14" per foot. The 12'-0" long mast must be of monotube construction and must be rolled on a mandrel to provide a 16-flute pattern. The flutes must be neat, true to pattern, and free from cracks and flaws. Each mast must be straight and centered on its’ longitudinal axis. The mast must utilize a single longitudinal weld, 70% minimum penetration, in accordance with the WELDING Section of this Specification. There must be no lateral welds in the mast other than at the base plate and at the luminaire tenon, unless noted otherwise on the Contract Drawings.
- (c) Material. The mast must be 11 gauge carbon steel in accordance with ASTM A595, Grade A.
- (d) Mast Base. The mast base must be a 1" thick steel plate of low alloy, high strength steel conforming to ASTM A 595, grade C, ASTM A 588 or ASTM A 606.
  - 1. The base must be attached to the mast so that the bearing surface of the base is at right angles to the longitudinal axis of the mast. The vertical center line of the seam must be positioned 135° counter-clockwise from the vertical center line of the handhold door frame.
  - 2. The mast must be inserted into the base to a maximum depth which will still allow for an adequate weld to be made between the bottom of the mast and the plate. A circumferential weld must be made between the mast and the base at both the top and underside of the plate.
  - 3. The base plate must have four (4) 1 1/2" wide slots to accommodate 1 1/4" diameter anchor bolts. The slots must be 3 inches long along the circumference. The mast must provide for mounting on a 15" bolt circle using 1 1/4" anchor bolts, nuts and washers provided by others. Any

special hardware required to facilitate installation must be provided under this contract.

- (e) Provision for Ground. A 1/2" - 13 square nut must be welded to the inside of the mast on the handhole entry frame for a ground connection.
- (f) Entry. A vertical doorframe carrying a removable door providing access to the interior of the mast must be welded into a close fitting opening centered approximately 16" above the bottom of the base. The doorframe must be formed and welded of steel with cross section not less than 1-1/2" wide by 1/4" inch thick so as to adequately reinforce the opening of the mast. The internal horizontal clearance of the doorframe must be 4"; its internal vertical height must be 8". Its upper and lower ends must be semi-circular meeting its straight sides tangentially. The frame must have two welded tabs; one at the top and one at the bottom of the door frame. The top hole must be located 13/16 of an inch from the top of the opening. The bottom hole must be located 13/16 of an inch from the bottom of the opening. These tabs must be drilled to accept a 1/4 inch screw. Stainless steel spring clips must be mounted to the tabs. These clips must be made to accept 1/4" -20 machine screws. The entry must in all respects be identical to handhole openings on poles that have already been installed and accepted by the City.
- (g) Door. The removable door must be formed of sheet steel approximately 1/8" thick. It must fit the doorframe closely and be dished so that it will stay in proper position even if its locking screws may be slightly loosened. The door must be drilled top and bottom to accept the 1/4" - 20 hex head stainless steel screws which will fasten the door to the doorframe. All doors must be interchangeable. Doors must fit pole handholes of like poles that have already been installed and accepted by the City. Alternate methods may be subject to approval by the Commissioner or his fully authorized representative.
- (h) Tag. A stainless steel tag must be attached to each pole immediately below the handhole by mechanical means and not by adhesive. The stainless steel tag must have an embossed legend which must include the pole outside diameter at the base, the overall length, and the gauge; i.e. 6.375" x 12'-0" - 11 gauge.
- (i) Interchangeability. Each member including the handhole doors in the pole and all component equipment must be mutually interchangeable for assembly, so that no work will be required to make any member fit properly in the place of any other similar member of any other similar pole.
- (j) Tenon. A tenon must be provided at the top of the pole for attachment of a luminaire. The tenon diameter must be a 3" O.D. I.P.S. pipe equivalent and must be sufficiently long to ensure positive, structurally sound mating between the mast and the attached device. In no case will the tenon be more than 3" long. The tenon must be factory assembled to the mast. The finished mast must give the appearance of a single, homogeneous mast and the entire assembly must be

structurally sound so that with the weight of a luminaire, the mast will not twist, rack, vibrate or otherwise deform when subjected to the severe vibrations of wind loading, passing elevated trains or heavily loaded vehicles.

- (k) Luminaire Mounting Height. The luminaire mounting height indicates the height necessary to provide a distance of 14.0 feet from the top of the light pole foundation to the light source center of the luminaire.
- (l) Structural Requirements. The mast shall be manufactured in accordance with AASTHO's 1994 version of the "Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals". The shaft must be designed for 80 MPH wind loading with a 30% gust factor.

**HARDWARE**

- 5. All the hardware necessary to complete the assembly of the pole must be furnished. All hardware will be stainless steel corrosion-resistant metal, or as noted in these specifications, subject to approval.

**WELDING**

- 6. (a) General. Where welds are required and approved, each welded joint must be thoroughly cleaned of flux and spatter, and must be made in conformity with the standards of the American Welding Society. Each bidder must submit with his proposal a drawing showing the sizes and types of welds, in conformity with the proper interpretation of the standard welding symbols of the American Welding Society. The bidder's proposal must state the type of electrode and must describe the welding methods proposed for use in fabricating the pole.
- (b) Certifications. Welders must have proper certification for the welding operations required. Welding by non-certified personnel will not be allowed. Certifications for welding personnel must be included with the submittal information package for review.
- (c) Testing. All welds of 5% of the poles in every lot must be inspected for penetration and soundness of the welds by the magnetic particle inspection method or by radiography. Acceptance or rejection will be governed by the same conditions as in the TESTING Section. If the magnetic inspection process is used, the dry method with direct current must be employed. All transverse welds must be magnetized by the "prod" (Circular Magnetization) method. Longitudinal welds may be magnetized by either circular or longitudinal magnetization. Proposed weld inspection method must be included with the submittal information package for review.

**PAINING**

7. (a) Oil and Grease Removal. All metal surfaces must be washed with an alkaline detergent to remove oils and grease.
- (b) Metal Cleaning. All exterior metal surfaces must be cleaned by blasting with a combination of shot and grit to remove all dirt, mill scale, rust, corrosion, oxides and foreign matter and provide a “near white” surface in accordance with SSPC-SP10. Included in this process, the pretreatment process and the painting process will be the interior base section of the mast to a minimum height of 12”.
- (c) Chemical Pretreatment. The cleaned metal surfaces must then be treated with a hot, pressurized iron phosphate wash and must be dried by convection heat.
- (d) Exterior Coat. A thermosetting, weathering, Polyester powder coat must be applied electrostatically to all cleaned and treated surfaces to a uniform 8 mil thickness in a one coat application. This powder coat must be cured in a convection oven at a minimum temperature of 400°F to form a high molecular weight fusion bonded finish.
- (e) Alternate Methods. Alternate powder coat methods may be reviewed and tested on a case by case basis. However, no coating method will be accepted unless the Commissioner judges such alternate to be equal to the coating herein specified.
- (f) Interior Coat. The interior metal surfaces must be powder coated with a thermoplastic hydrocarbon resin containing corrosion inhibitors. The resin must be formulated for full application over untreated metal surfaces. The resin must be applied at a temperature of approximately 200°F to a minimum thickness of 3 mils. The interior thermoplastic coat must overlap the interior, thermosetting base coat by approximately 6”. Alternate interior coatings may be used subject to prior approval of the Commissioner.
- (g) Durability. Both the exterior and interior coats must be capable of passing 1,000 hours of salt spray exposure per ASTM B117 in a 5% Na Cl (by weight) solution at 95°F and 95% relative humidity without blistering. Before test, the panel must be scribed with an “X” down to bare metal.
- (h) Coating Measurement. Measurement of coating thickness must be done in accordance with SSPC-Pa 2-73T, “Measurement of Dry Paint Thickness with Magnetic Gauges,” except that the lowest “single spot measurement” in an area of two square inches must be not less than 7.0 mils.
- (i) Color. Color must be gloss black unless noted otherwise on the order. A 4” square color chip sample must be submitted for approval prior to fabrication. The chip sample must be of the same material as the pole mast, and must include the manufacturer’s name and the manufacturer’s color name as well. The sample

must also include any other information required to purchase the same color for the split pedestal base.

### **TESTING**

8. (a) Testing. Structural testing must be conducted on 5% of the manufacturer's production masts for each order in which the quantity of masts is 20 or more. The testing must include coupon tests, load tests, and weld tests. All testing must be certified by the manufacturer, or an independent lab.
- (b) The selection of pole masts must be a random selection from the entire completed lot of pole masts on the order.
- (c) Material Test. Coupon tests as outlined in ASTM A53 and A 595, A588, or A606.
- (d) Load tests for masts as described herein. With base rigidly anchored, a test load of 1000 pounds must be applied at a point approximately two feet (2' - 0") from the free end. The load must be applied at right angles to the center line of the mast and in the same vertical plane. The deflection must not be greater than 13". Within one (1) minute after the test load is released, measurement will be made of the set taken by the mast. This set must not be greater than 1.0". The deflection measurement device must be reset to zero and the test load must be reapplied. The deflection must not change from the deflection noted in the first test by more than  $\pm 5\%$ . No measurable set must be noted within one (1) minute after test load is released. The mast must then be checked to insure that it is still securely fastened, that it is plumb, and that no cracks have developed in either the mast or base plate.
- (e) Weld tests as described in the WELDING Section of this Specification.

### **SHIPMENT AND DELIVERY**

9. (a) General. The poles must be carefully inspected at the factory prior to shipment to assure that the poles are complete and free of defects. When poles are stacked together, they must be supported with suitable spacers or must otherwise be protected from dents and other potential shipping damage. The spacing and protective materials must be suitable for and usable in the storage of the poles. All hardware must be packaged in a clear container and labeled.
- (b) Packaging. The poles must be shipped in bundles weighing a maximum of 5,000 pounds. Each pole must be individually wrapped so that it can be bundled and unbundled without damage to the pole or its finish. Each pole wrapping must be clearly labeled, using 2 inch letters identifying the pole type, manufacturer, and date of manufacture. Specific instructions must be securely attached to each bundle indicating the proper methods of storage. In addition, each bundle must contain specific instructions on unbundling and erection of poles. Instructions

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must be printed on a fiber based paper with a permanent ink so that instructions will be completely legible after weathering outdoors for a minimum of 5 years.

- (c) Bundles. The bundles will consist of poles laid base to top to form an approximately rectangular cylinder. Materials such as lumber (2" x 4" min.) non-marring banding, and other appropriate bundling materials will be used to make a rigid, long lasting bundle capable of being handled, shipped and stored without shifting of contents or breaking. Bundling procedure will be subject to approval. Any bundles, in which either poles or packaging is received broken, damaged or with contents shifted, will not be accepted and it will be the responsibility of the supplier to return the bundle to its original destination at no cost to the City of Chicago. The bundles should be capable of being stacked two high without breaking, or shifting of the contents. Each bundle must be capable of being lifted by a fork lift truck or crane and the bundles must be shipped on a flat bed truck to facilitate unloading.
  
- (d) Appurtenant Devices and Hardware. Any appurtenant devices and hardware not attached to the pole must be carefully wrapped and securely attached to each bundle. Payment will be withheld for any units provided without the appropriate appurtenant devices and hardware. Cracked, broken, chipped or damaged units will also be considered as incomplete quantities as regards payment.

THIS SPECIFICATION SHALL NOT BE ALTERED



**ELECTRICAL SPECIFICATION 1512  
DIVISION OF ENGINEERING  
DEPARTMENT OF TRANSPORTATION  
CITY OF CHICAGO  
REVISED MARCH 6, 2014**

**SPLIT PEDESTAL BASE: FOR CHICAGO 20000 PEDESTRIAN POLE**

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**SUBJECT**

1. This specification states the requirements for a split pedestal base (Clamshell) for installation on a 12'-0" fluted, tapered steel pedestrian light pole. This specification will address the requirements for a split fiberglass base without doors.

**SUBMITTAL INFORMATION REQUIRED**

2. (a) Manufacturer's Shop Drawings. Scaled manufacturer's shop drawings showing actual split pedestal base dimensions and details. Shop drawings must be original engineering drawings created by the manufacturer; photocopied or scanned copies of the Standard Drawings will not be accepted, and will be rejected as an incomplete submittal. If requested by the City, these drawings must also be submitted in electronic format in Microstation 95; failure to provide drawings in this format will be cause for rejecting the submittal.

Dimensions must include but will not be limited to: base height, width, pattern, and fluting. Details must include scaled and dimensioned plan views, front elevations, side elevations, and section views as required.

- (b) Manufacturer's catalog cut sheets showing split pedestal base designation, and catalog number.
- (c) Manufacturer's specifications including fabricating materials and processes.
- (d) Manufacturer's written installation instructions and maintenance manuals including recommendations and/or procedures for storage, assembly, orientation, and installation.
- (e) Sample. If requested by the Chief Procurement Officer, one completely assembled split pedestal base with hardware and all components, of the manufacture intended to be furnished, shall be submitted for review within fifteen (15) business days from receipt of notice. The sample base must be coordinated with an existing pedestrian light pole for accuracy of fit.

- (f) Warranty. The manufacturer must warrant the performance and construction of these split pedestal bases to meet the requirements of this specification and must warrant all parts, components, and appurtenances against defects due to design, workmanship, or material developing within a period of five years after the bases have been delivered. This will be interpreted particularly to mean structural or mechanical failure of any component, or failure or fading of the surface color. The warranty must be furnished in writing guaranteeing replacement, including shipment, free of charge to the City, of any split pedestal base, which, as determined by the Commissioner, would develop aforesaid failures. Any split pedestal base, or part thereof not performing as required or developing defects within this period, must be replaced by the manufacturer at no cost to the City. The Commissioner will be the sole judge in determining which replacements are to be made and the Commissioner's decision will be final. Any cost for the warranty as specified must be incidental to this contract.

**GENERAL**

- 3. (a) Products. Split pedestal bases must be the products of established manufacturers and must be suitable for the service required. Split pedestal bases which are proposed must be the products of a single manufacturer. Fiberglass bases must be manufactured by Shakespeare Company or W.J. Whatley, Incorporated.
- (b) Specifications. The split pedestal bases must conform in detail to the requirements herein stated, and to the Specifications and Methods of Test of the American Society for Testing and Materials cited by ASTM Designation Number, of which the most recently published revision will govern.
- (c) Drawings. The drawings mentioned herein are drawings of the Department of Transportation being an integral part of this specification cooperating to state the necessary requirements.
- (d) Design. The base must conform in design and dimensions to Standard Drawing 928.
- (e) Approval. Whenever "approval" and "approved" are used in this specification they will mean a written approval by the Commissioner to be secured prior to proceeding with manufacture of the split pedestal bases.
- (f) Commissioner's Review. The Commissioner will be the sole judge in determining the submitted split pedestal bases compliance with this specification. The Commissioner's decision will be final.

**CONSTRUCTION OF FIBERGLASS BASE**

- 4. (a) Each pedestal base must be formed of a fiberglass composite consisting of a polyester resin and containing a minimum of 65% fiberglass by weight. The resin must contain no clay fibers. The composite must be UV and weather resistant.

Alternate materials may be considered. Each base half must be permanently marked on the inside identifying it as a base for a pedestrian pole.

- (b) The split pedestal base must conform in detail and dimensions to Standard Drawing 928.
- (c) The two halves of the clamshell must be identical to each other. They must be perfectly matched and when installed there shall be no more than a 0.125 inch gap between the inside top of the assembled base and the outside surface of the mast.
- (d) Once installed, the base should be designed to remain in place without the use of set screws. An installed base should not be able to be shifted or rotated.
- (e) The color of the base must be gloss black and must match the color of existing and proposed Chicago 2000 pedestrian poles. The resin must contain color pigment throughout. The pigment must be even throughout the thickness of the base. A finish coat of urethane enamel must be applied to the surface of the base to a minimum dry thickness of 1.5 mils. The resin color must match the enamel color. A paint sample on fiberglass must be submitted for approval prior to production. The paint manufacturer's name and any information necessary to acquire the same color for the pole must be provided. The contractor must supply one quart of touch-up paint for every 50 bases ordered.
- (f) The texture of the fiberglass base exterior surface must be equal to that of a cast iron base. Acceptance of the aesthetic appearance of the base will be by the Commissioner.
- (g) The two halves of the shroud must be affixed by means of screws as shown on Standard Drawing 928. The screws must fit so that the halves of the base are drawn together so that the edges of the base fit snug against each other. Threaded stainless steel inserts in the base must be used to affix the screws. The screws must not detract from the appearance of the base. Other methods of attachment may be considered. Any method of attachment must be approved by the Commissioner.

**TESTING**

- 5. (a) Testing. All completed fiberglass bases must be available for testing. Unless specifically authorized in writing, all tests must be at the manufacturer's plant. A record of every test must be made and a certified copy of the test record must be submitted to the Commissioner before the units are shipped. Tests shall be standardized according to ASTM requirements or other suitable organization's standards. The manufacturer must provide evidence that the bases are structurally sound and are able to take the normal abuse of salt spray, freeze-thaw cycles, and exposure to moisture. The bases must be impact resistant and must be resistant to UV damage.

**PACKAGING**

6. (a) General. The split pedestal bases must be carefully inspected at the factory prior to shipment to assure that the bases are complete and free of defects. When bases are stacked together, they must be supported with suitable spacers or must otherwise be protected from dents and other potential shipping damage. The spacing and protective materials must be suitable for and usable in the storage of the bases. All hardware must be packaged in a clear container and labeled as to size, quantity, and part association.
- (b) Packaging. The split pedestal bases must be shipped on pallets with at least six units per pallet. Each base must be individually wrapped and protected so that it can be bundled and unbundled without damage to the base or its finish. The base wrapping must be labeled to identify the base. Specific instructions must be securely attached to each pallet indicating the proper methods of storage. In addition, each pallet must contain specific instructions on the installation of the split pedestal bases. Instructions must be printed on a fiber based paper with a permanent ink so that instructions will be completely legible after weathering outdoors for a minimum of 5 years. The pallets must be labeled in 3/8 inch high lettering indicating the type of base as “FIBERGLASS BASE FOR PEDESTRIAN POLE”, the part number, the manufacturer, the date of manufacture, and the contract number.
- (c) Hardware. Any hardware not attached to the bases must be carefully wrapped and securely attached to each pallet. Hardware must be packaged in a clear bag with a label indicating the type of hardware and quantity. Payment will be withheld for any units provided without the appropriate hardware, or for any missing or improper packaging or labeling. Cracked, broken, chipped or damaged units will also be considered as incomplete quantities as regards payment.
- (d) Touch-up Paint. Touch-up paint and appurtenant materials must be packaged in units sufficient for the number of bases on each pallet. These units will be securely attached to each pallet.

**THIS SPECIFICATION SHALL NOT BE ALTERED**

**ELECTRICAL SPECIFICATION 1513  
DIVISION OF ELECTRICAL OPERATIONS  
DEPARTMENT OF TRANSPORTATION  
CITY OF CHICAGO  
REVISED JULY 17, 2006**

**SPLIT PEDESTAL BASE: FOR CHICAGO 2000 LIGHT POLE**

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**SUBJECT**

1. This specification states the requirements for a split pedestal base (Clamshell) for installation on a 10" x 32'-6" fluted, tapered steel Chicago 2000 light pole. This specification will address the requirements for a split aluminum base with aluminum doors, a split fiberglass base without doors, and non-metallic doors only.

**SUBMITTAL INFORMATION REQUIRED**

2. (a) Manufacturer's Certification of Compliance. The submittal information must include a written certification of compliance with this Specification from the Manufacturer.
- (b) Manufacturer's Shop Drawings. Scaled manufacturer's shop drawings showing actual split pedestal base and/or door dimensions, details, and welds. Shop drawings must be original engineering drawings created by the manufacturer; photocopied or scanned copies of the Standard Drawings will not be accepted, and will be rejected as an incomplete submittal. These drawings will also be submitted in electronic format in Microstation 95, if requested by the City; failure to provide drawings in this format will be cause for rejecting the submittal.

Dimensions must include but will not be limited to: base height, width, pattern, and fluting; access door opening length, width, plan location, and height above base bottom.

Details must include scaled and dimensioned plan views, front elevations, side elevations, and section views as required for components including but not limited to: base, access doors and door attachments.

Welds must include but will not be limited to: locations, sizes, and types of welds in accordance with the WELDING Section of this Specification.

- (c) Manufacturer's catalog cut sheets showing split pedestal base and/or door designation(s), characteristics, and catalog number(s).

- (d) Manufacturer's specifications including fabricating materials and processes.
- (e) Manufacturer's written installation instructions and maintenance manuals including recommendations and/or procedures for storage, assembly, orientation, installation, and numeric tolerances for torquing the access door bolts to the split pedestal base.
- (f) Sample. If requested by the Chief Procurement Officer, one completely assembled split pedestal base and/or doors with hardware and all components, of the manufacture intended to be furnished, will be submitted for review within fifteen (15) business days from the receipt of notice. The sample base must be coordinated with an existing Chicago 2000 light pole for accuracy of fit. The sample door must be coordinated with an existing base for accuracy of fit.
- (g) Warranty. The manufacturer must warrant the performance and construction of these split pedestal bases and/or doors to meet the requirements of this Specification and must warrant all parts, components, and appurtenances against defects due to design, workmanship, or material developing within a period of three years after the bases and/or doors have been delivered. This will be interpreted particularly to mean structural or mechanical failure of any component, failure of any weld, or failure of any portion of the painting system. The warranty must be furnished in writing guaranteeing replacement, including shipment, free of charge to this Contract and to the City, of any split pedestal base or door assembly, or any component parts thereof, which, as determined by the Commissioner, would develop aforesaid failures. The warranty must accompany submittal information. Any split pedestal base, door, or part thereof not performing as required or developing defects within this period, must be replaced by the manufacturer at no cost to the City. The Commissioner will be the sole judge in determining which replacements are to be made and the Commissioner's decision will be final. Any cost for the warranty as specified will be incidental to this contract.

**GENERAL**

- 3. (a) Products. Split pedestal bases and/or doors and component equipment must be the products of established manufacturers and must be suitable for the service required. Split pedestal bases or component equipment items which are proposed as similar or identical must be the products of a single manufacturer. Aluminum Bases and/or doors may be manufactured by Union Metal Corporation or Holophane Corporation. Fiberglass bases or doors may be manufactured by Shakespeare Company or W.J. Whatley, Incorporated.

- (b) Specifications. The split pedestal bases and/or doors must conform in detail to the requirements herein stated, and to the Specifications and Methods of Test of the American Society for Testing and Materials cited by ASTM Designation Number, of which the most recently published revision will govern.
- (c) Drawings. The drawings mentioned herein are drawings of the Department of Transportation being an integral part of this specification cooperating to state the necessary requirements.
- (d) Design. The base and/or doors must conform in design and dimensions to corresponding Standard Drawings 930 and 930A.
- (e) Approval. Whenever “approval” and “approved” are used in this specification they will mean a written approval by the Commissioner to be secured prior to proceeding with manufacture of these split pedestal bases and/or doors.
- (f) Commissioner’s Review. The Commissioner will be the sole judge in determining the submitted split pedestal bases and/or doors compliance with this Specification. The Commissioner’s decision will be final.

**OPTION 1. ALUMINUM BASE WITH DOORS**

- 4. (a) Each split pedestal base must be cast aluminum conforming to ASTM B26/B26M, Grade 356. Each base must be certified as pure #356 alloy, free of foreign materials or cosmetic fillers.
- (b) The split pedestal base must conform in detail and dimensions to Standard Drawings 930 and 930A.
- (c) All castings must be done in a workmanlike manner which will result in uniform casting without warping or mold shifting. Castings must have smooth external surfaces free from protuberances, dents, cracks or other imperfections marring their appearance. Welding or plugging of casting defects is prohibited. All castings and parts must be permanently labeled for easy identification.
- (d) The two halves of the split base casting must be perfectly matched to each other and to the poles such that when they are attached to the mast, the base and mast assembly must appear as a one piece unit. No tolerance greater than 0.125" will be accepted.
- (e) The split pedestal base attachment to the mast must provide the structural integrity to ensure the base will not vibrate, twist or bounce during the sidewalk movement experienced when an elevated train or heavily loaded

vehicle passes. Where set screws are used to secure the split pedestal base to the mast, a minimum of 3/8" thickness of metal must be provided where the set screws are inserted to minimize the possibility of stripping the threads when the set screws are tightened into place. The set screws will be 3/8"-16 steel allen head screws and a minimum of four set screws must be provided, two per base half. The set screws must be black.

- (f) The split pedestal base must provide two entry doors, opposite each other, whose appearance and fit are in consonance with the mast and base design both aesthetically and structurally. The doors must be of the same material as the base.
  - 1. The doors must be securely fastened in place with four 1/4"-20 hex head stainless steel screws which will thread into a rigid door frame. The door frame must be drilled and tapped. The door must be drilled only.
  - 2. All doors must be interchangeable with any other base, including bases of like design which have already been installed and accepted by the City. Bases whose doors are matched to a single base will be rejected.
  - 3. The doors must be positioned in the base such that the base can be attached to the mast with the base doors in perfect alignment with the mast handhole door.
  - 4. The doors must provide ample room for a worker to reach into the base with hand tools, open the mast handhole door, splice wires, change connectors and read the identification tag on the mast.
- (g) Interchangeability. Each member including the access doors in the base and all component equipment must be mutually interchangeable for assembly, so that no work will be required to make any member fit properly in the place of any other similar member of any other similar base.
- (h) Fabrication. It is preferred that the split pedestal base is cast as a single unit and sawcut into identical halves.
- (i) Standards. Each split pedestal base must be made in conformity with the proper interpretation of the applicable ASTM Standards, and as indicated on the drawings.
- (j) Certification. All split pedestal bases must be made by personnel who are certified for that type of work. Work must be performed in accordance with NIST Certification.



- (k) Finishing. Finishing work must be performed at the manufacturer's facility. All work must be inspected for shop finish, soundness and appearance by the Commissioner.

**OPTION 2. FIBERGLASS BASE WITHOUT DOORS**

- 5. (a) Each pedestal base must be formed of a fiberglass composite consisting of a polyester resin and containing a minimum of 65% fiberglass by weight. The resin must contain no clay fibers. The composite must be UV and weather resistant. Alternate materials may be considered. Each base half must be permanently marked on the inside identifying it as a base for a pedestrian pole.
- (b) The split pedestal base must conform in detail and dimensions to Standard Drawings 930 and 930A.
- (c) The two halves of the clamshell must be identical to each other. They must be perfectly matched and when installed there must be no more than a 0.125 inch gap between the inside top of the assembled base and the outside surface of the mast.
- (d) Set screws must be used at the top of the base to attach the base to the mast, giving the base some rigidity and allowing the base to be positioned level. There must be four set screws (two in each half) evenly spaced at 90 degrees. The set screws will be 5/16"-18 allen head steel screws. The set screws must be black.
- (e) The color of the base must be gloss black and must match the color of existing and proposed Chicago 2000 poles. The resin must contain color pigment throughout. The pigment must be even throughout the thickness of the base. A finish coat of urethane enamel must be applied to the surface of the base to a minimum dry thickness of 1.5 mils. The resin color must match the enamel color. A paint sample on fiberglass must be submitted for approval prior to production. The paint manufacturer's name and any information necessary to acquire the same color for the pole must be provided. The contractor must supply one quart of touch-up paint for every 50 bases ordered.
- (f) The texture of the fiberglass base exterior must be equal to that of the aluminum cast base. Acceptance of the aesthetic appearance of the base will be by the Commissioner.
- (g) The two halves of the clamshell must be affixed by means of screws as shown on Standard Drawing 930A. The screws must fit so that the halves of the base are drawn together so that the edges of the base fit snug against each other. Threaded stainless steel inserts in the base must be used to

affix the screws. The screws must be flush with the surface of the base and must not detract from the appearance of the base. Other methods of attachment may be considered. Any method of attachment must be approved by the Commissioner.

**OPTION 3. NON-METALLIC DOORS**

6. (a) Each base door must be formed of fiberglass (as described in Section 5.) or from another non-metallic material. The material must be UV and weather resistant. Any material other than fiberglass must be approved by the Commissioner. Each door must have a permanent marking on the back describing the part as a door for a Chicago 2000 light pole base.
- (b) The door must conform to the detail and dimensions of Standard drawings 930 and 930A. All doors must be interchangeable in both existing and proposed Chicago 2000 light poles bases.
- (c) The color of the door must be gloss black and must match the color of existing and proposed Chicago 2000 light poles and bases. The non-metallic door must be pigmented throughout the material. The pigment must be even throughout the thickness of the door. A finish of urethane enamel must be applied to the door surface to a minimum dry thickness of 1.5 mils. A sample of the door with paint must be submitted for approval prior to production.
- (d) The door appearance must be of a texture and of a fit that it will appear to be part of the original base. Acceptance of the aesthetic appearance and fit of the door will be by the Commissioner.
- (e) The doors must be securely fastened in place with four 1/4"-20 hex head stainless steel screws which will thread into the base frame. The door will be properly drilled to accept the screws. The holes must not be tapped. The screws must have a stainless steel core within a threaded nylon body. Screws must be supplied with the doors.

**OPTION 4. ALUMINUM BASE WITH NON-METALLIC DOORS**

7. Each aluminum base must meet the requirements of Option 1, with the exception of the doors. Each door must be non-metallic meeting the requirements of Option 3.

**WELDING FOR ALUMINUM BASES**

8. (a) General. Where welds are required and approved, each welded joint must be thoroughly cleaned of flux and spatter, and must be made in conformity with the standards of the American Welding Society. Each bidder must

submit with his proposal a drawing showing the sizes and types of welds, in conformity with the proper interpretation of the standard welding symbols of the American Welding Society. The bidder's proposal must state the type of electrode and must describe the welding methods proposed for use in fabricating the base.

- (b) Certifications. Welders must have proper certification for the welding operations required. Welding by non-certified personnel will not be allowed. Certifications for welding personnel must be included with the submittal information package for review.
- (c) Testing. All welds of 5% of the bases in every lot must be inspected for penetration and soundness of the welds by the magnetic particle inspection method or by radiography. Acceptance or rejection must be governed by the same conditions as in the testing section. If the magnetic inspection process is used, the dry method with direct current must be employed. All transverse welds must be magnetized by the "prod" (Circular Magnetization) method. Proposed weld inspection method must be included with the submittal information package for review.

**PAINTING OF ALUMINUM BASES**

- 9. (a) Oil and Grease Removal. All metal surfaces must be washed with an alkaline detergent to remove oils and grease.
- (b) Chemical Pretreatment. The cleaned metal surfaces must then be treated with a hot, pressurized phosphate wash and must be dried by convection heat.
- (c) Exterior and Interior Coat. A thermosetting, weathering, Polyester powder coat must be applied electrostatically to all cleaned and treated surfaces to a uniform eight mil thickness in a one coat application. This powder coat must be cured in a convection oven at a minimum temperature of 400°F to form a high molecular weight fusion bonded finish.
- (d) Alternate Methods. Alternate powder coat methods may be reviewed and tested on a case by case basis. However, no coating method will be accepted unless the Commissioner judges such alternate to be equal to the coating herein specified.
- (e) Durability. Both the exterior and interior coats must be capable of passing 1,000 hours of salt spray exposure as per ASTM B117 in a 5% Na Cl (by weight) solution at 95°F and 95% relative humidity without blistering. Before test, the panel must be scribed with an "X" down to bare metal.

- (f) Coating Measurement. Measurement of coating thickness must be done in accordance with SSPC-Pa 2-73T, "Measurement of Dry Paint Thickness with Magnetic Gauges," except that the lowest "single spot measurement" in an area of two square inches must be not less than 7.0 mils.
- (g) Color. Color must be gloss black unless noted otherwise in the order. A 4" square color chip sample must be submitted for approval prior to fabrication. The chip sample must be of the same material as the split pedestal base, and must include the manufacturer's name and the manufacturer's color name as well. The sample must also include any other information required to purchase the same color for the pole, mast arm(s), and the cast aluminum finial.
- (h) Field Touch-up. Any minor damage to the split pedestal base surfaces must be touched-up in a professional manner as recommended by the paint manufacturer, with protective coating solutions as provided by the split pedestal base manufacturer at no additional cost to the City. Any major damage to the split pedestal base or components surfaces must be repaired at the manufacturer's place of business, or must be replaced as directed by the Commissioner. The Commissioner will be the sole judge of the extent of any such damage and the adequacy of repair. The Contractor must supply a field touch-up kit for every 20 bases or fraction thereof. Each kit must consist of a highly legible instruction sheet, one gallon of the recommended touch-up paint and all other materials required to touch-up 20 bases.

**FABRICATION REQUIREMENTS FOR ALUMINUM BASES**

- 10. (a) Foundry Qualifications. The manufacturer must demonstrate that the foundry proposed to fabricate the split pedestal bases must meet or exceed the specified qualification requirements under the following set of conditions. The manufacturer must provide foundry qualifications using published capacity data as part of the submittal package, and must include the actual molding and core equipment proposed for use in fabricating the split pedestal bases for the specific order. The responsible material proposal must contain verification of production capacity including the number of shifts per day running in the plant. Submittal information must include the foundry's written Quality Assurance Plan which demonstrates achievement of the latest industry technology in testing requirements. Submittal information must demonstrate that the work performed by the foundry will be done in accordance with both ASTM Standards and NIST Certification. Further, the foundry must be a domestic facility, unless proven to be directly owned and operated by the manufacturer.
- (b) Verification of Data. All foundry qualifications must be based on the parameters listed above. This data must be verified by an independent

witness or representative as approved by the Commissioner. All verification must be performed on site at the foundry. The cost of verification must be included in this item. Should the foundry be deemed incapable of meeting this Specification after verification, the Contractor must provide an alternate foundry as approved by and at no additional costs to the Commissioner. The foundry qualifications and verification process must be repeated in its entirety.

**TESTING**

11. (a) Testing. Testing must be conducted on five percent of the manufacturer's production bases or doors for each order in which the quantity is 20 or more. All testing must be certified by the manufacturer, or by an independent lab.
- (b) The selection of bases or doors must be a random selection from the entire completed lot ordered.
- (c) Requirements for Aluminum Bases. All completed aluminum bases must be available for testing. The following tests must be included in the testing procedure:
  1. Bar tests as outlined in ASTM B26.
  2. Weld tests as described in the WELDING Section of this Specification.
- (d) Requirements for Fiberglass Bases and Non-Metallic Doors. All completed fiberglass bases and non-metallic doors must be available for testing. The manufacturer must provide evidence that the bases and doors are structurally sound and are able to withstand the normal abuse of salt spray, freeze-thaw cycles, and exposure to moisture. The bases and doors must be impact resistant and must be resistant to UV damage.
- (e) The summary report and the test results must be certified by the independent test laboratory or the manufacturer's laboratory, as applicable, and must be sent directly to the Commissioner before the bases and/or doors are shipped.
- (f) Acceptance of Equipment. Tests must be made on 5% of all bases or doors in the order. If any of the bases or doors fail to meet these specifications, an additional three bases or doors must be tested for each failed unit. Should any of these additional units fail to meet these specifications, the entire lot will be subject to rejection. The Commissioner will then decide, based on the nature of the failure, whether the entire lot will be rejected outright or whether the manufacturer may

subject each base or door in the order to testing. If each base or door in the order is tested, those units which fulfill the specified requirements may be accepted at the discretion of the Commissioner.

**SHIPMENT AND DELIVERY**

12. (a) General. The split pedestal bases and/or doors must be carefully inspected at the factory prior to shipment to assure that the bases and/or doors are complete and free of defects. When bases or doors are stacked together, they must be supported with suitable spacers or must otherwise be protected from dents and other potential shipping damage. The spacing and protective materials must be suitable for and usable in the storage of the bases and doors. All hardware must be packaged in a clear container and labeled as to size, quantity, and part association.
- (b) Packaging. The split pedestal bases must be shipped on pallets with at least six units per pallet. Each base must be individually wrapped and protected so that it can be bundled and unbundled without damage to the base or its finish. Each base wrapping must be labeled to identify the base. Specific instructions must be securely attached to each pallet indicating the proper methods of storage. In addition, each pallet must contain specific instructions on the installation of the split pedestal bases. Instructions must be printed on a fibre based paper with a permanent ink so that instructions will be completely legible after weathering outdoors for a minimum of 5 years. Doors must be individually wrapped and packaged in cartons. The cartons must be labeled in 3/8 inch high lettering indicating the type of door (i.e. FIBERGLASS DOOR FOR CHICAGO 2000 POLE BASE), the part number, the manufacturer, the date of manufacture, and the contract number.
- (c) Appurtenant Devices and Hardware. Any appurtenant devices and hardware not attached to the bases must be carefully wrapped, labeled, and securely attached to each pallet. Hardware for doors must be packaged in a clear bag with a label indicating the type of hardware, the quantity of hardware, and the associated door type. Hardware for doors must be in the same carton as the doors. Payment will be withheld for any units provided without the appropriate appurtenant devices and hardware, or for any missing or improper packaging or labeling. Cracked, broken, chipped or damaged units will also be considered as incomplete quantities as regards payment.
- (d) Touch-up Paint. Touch-up paint and appurtenant materials must be packaged in units sufficient for the number of bases on each pallet. These units will be securely attached to each pallet.

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- (e) Delivery. Split pedestal bases and/or doors will be delivered to the Division of Electrical Operations storage yard at 4101 South Cicero in Chicago, or as indicated on the order. Split pedestal base information submitted for approval will include any recommendations of the Manufacturer for storage.

THIS SPECIFICATION SHALL NOT BE ALTERED

**ELECTRICAL SPECIFICATION 1514  
DIVISION OF ELECTRICAL OPERATIONS  
DEPARTMENT OF TRANSPORTATION  
CITY OF CHICAGO  
REVISED JULY 23, 2001**

**CHICAGO 2000 MAST ARM: 8-FOOT, STEEL**

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**SUBJECT**

1. This specification covers the requirements for an 8-foot straight steel mast arm and decorative scroll for supporting a teardrop street light luminaire on a Chicago 2000 light pole or other pole fitted for a simplex attachment.

**SUBMITTAL INFORMATION REQUIRED**

2. (a) Manufacturer's Certification of Compliance. The submittal information must include a written certification of compliance with this specification from the Manufacturer
- (b) Manufacturer's Shop Drawings. Scaled manufacturer's shop drawings showing actual mast arm and scroll dimensions, details, and welds. Shop drawings must be original engineering drawings created by the manufacturer; photocopied or scanned copies of the Standard Drawings will not be accepted, and will be rejected as an incomplete submittal. These drawings must also be submitted in electronic format in Microstation 95, if requested by the City; failure to provide drawings in this format will be cause for rejecting the submittal.

Dimensions must include but will not be limited to: mast arm length, diameter, and ornamentation; attachment plate length, width, thickness, and bolt circle; scroll length, cross section dimensions, and shape.

Details must include scaled and dimensioned plan views, front elevations, side elevations, and section views as required for components including but not limited to: attachment plates; ornamentation; and arm attachments.

Welds must include but will not be limited to: locations, sizes, and types of welds in accordance with the WELDING Section of this specification.

- (c) Manufacturer's catalog cut sheets showing mast arm and scroll designation(s), characteristics, and catalog number(s).



- (d) Manufacturer's specifications including fabricating materials and processes.
- (e) Manufacturer's written installation instructions and maintenance manuals including recommendations and/or procedures for storage, assembly, orientation, installation, component access and wiring, and numeric tolerances for torquing the attachment plate bolts to the light pole mast arm support plate.
- (f) Sample. If requested by the Chief Procurement Officer, one completely assembled gateway mast arm with scroll and integral components, of the manufacture intended to be furnished, must be submitted for review within fifteen (15) business days from receipt of notice.
- (g) Warranty. The manufacturer must warrant the performance and construction of these mast arms and scrolls to meet the requirements of this specification and must warrant all parts, components, and appurtenances against defects due to design, workmanship, or material developing within a period of three years after the mast arms and scrolls have been delivered. This will be interpreted particularly to mean structural or mechanical failure of any component, failure of any weld, or failure of any portion of the painting system. The warranty must be furnished in writing guaranteeing replacement, including shipment, free of charge to this Contract and to the City, of any mast arm assembly, or any component parts thereof, which, as determined by the Commissioner, would develop aforesaid failures. The warranty must accompany submittal information. Any mast arm or part thereof not performing as required or developing defects within this period, must be replaced by the manufacturer at no cost to the City. The Commissioner will be the sole judge in determining which replacements are to be made and the Commissioner's decision will be final. Any cost for the warranty as specified will be incidental to this contract.

**GENERAL**

- 3. (a) Products. Mast arms and component equipment must be the products of established manufacturers, and must be suitable for the service required. Mast arm or component equipment items which are proposed as similar or identical must be the products of a single manufacturer. Mast arms must be manufactured by Union Metal Corporation or Valmont Industries Incorporated.
- (b) Specifications. The mast arm and scroll must conform in detail to the requirements herein stated, and to the Specifications and Methods of Test of the American Society for Testing and Materials cited by ASTM Designation Number, of which the most recently published revisions will govern. The arm must be manufactured in accordance with AASHTO's

1994 “Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals.” The mast arm and attachment plate assembly must be designed to meet AASHTO’s 1994 criteria for 80 MPH wind loading with a 30% gust factor, for gateway luminaires of not less than 65 pounds each and having an effective projected area (EPA) of not less than 1.70 square feet each; and twin gateway luminaire fitters of not less than 50 pounds each and having an EPA of not less than 3.5 square feet each.

- (c) Drawings. The drawings mentioned herein are drawings of the Department of Transportation being an integral part of this specification cooperating to state the necessary requirements.
- (d) Design. The mast arm and scroll must conform in design and dimensions to Standard Drawings 930 and 930C.
- (e) Approval. Whenever “approval” and “approved” are used in this specification they will mean a written approval by the Commissioner to be secured prior to proceeding with manufacture of these mast arms and scrolls.
- (f) Commissioner’s Review. The Commissioner will be the sole judge in determining the submitted mast arms compliance with this specification. The Commissioner’s decision will be final.

**ARM DESIGN**

- 4. (a) 8-Foot Mast Arm. Each 8-foot mast arm must be fabricated from a continuous, single piece, two (2) inch "extra strong" steel pipe conforming to the requirements of ASTM A53, Table X2. It must conform in detail with the mast arm shown on Standard Drawings 930 and 930C.
- (b) Mast Arm Attachment. The mast arm attachment to be welded to all mast arms must conform to Standard Drawing 724. It must be a steel forging per ASTM A668, Class D, or cast steel conforming to the requirements for Grade 65-35 cast steel of ASTM A27, or it can be fabricated from corrosion resistant steel plate such as "Cor-Ten". It must be so designed that it may be fitted over the mast arm supports on the pole and be held by the mast arm supports in proper position without other support. Provision must be made for fastening the attachment to each mast arm support by two special screws and washers as noted in the HARDWARE Section of this Specification.
- (c) Entryway for Wires. A drilled opening lined with a neoprene grommet having inserted therein a neoprene plug must be provided on the underside of the upper member of all arms approximately three inches from the point

of attachment. The clear opening must not be less than 5/8 inch in diameter. Its design must be submitted for approval by the Commissioner or his authorized representative.

- (d) Mast Arm Members. All mast arm members must conform with the type of steel required for the arm specified. The members must be continuous lengths of pipe and bar cut to the proper size to fabricate the mast arm lengths requested. No butt welded, swaged and welded or other pieced together configurations of pipe and bar lengths will be accepted. The outer and inner surfaces of the pipes and bars must be smooth and even without protrusions, nicks, holes or other imperfections.
- (e) Interchangeability. Each member including the arm and all component equipment must be mutually interchangeable for assembly, so that no work will be required to make any member fit properly in the place of any other similar member of any other similar mast arm.

### **SCROLL DESIGN**

- 5. (a) Scroll. The scroll must be fabricated out of 3/4 inch thick by 2-1/2 inch wide bar stock meeting the requirements of ASTM A36. The scroll must be formed as shown on Standard Drawing 930.
- (b) Clamps. The scroll must be attached to the mast arm and pole by clamps, as shown on Standard Drawing 930. The clamps must meet the requirements of ASTM A307 galvanized to ASTM A153. All connecting hardware must meet the Hardware requirements of the HARDWARE Section of this Specification.
- (c) Identification. The scroll and clamps must be permanently labeled for identification purposes. The identification must not affect the aesthetics of the scroll.
- (d) Painting. The scroll and clamps must be painted per the requirements of the PAINTING Section in this Specification.
- (e) Welding. The scroll must be welded per the requirements of the WELDING Section in this Specification.

### **WELDING**

- 6. (a) General. Where welds are required and approved, each welded joint must be thoroughly cleaned of flux and spatter, and must be made in conformity with the standards of the American Welding Society. Each bidder must submit with his proposal a drawing showing the sizes and types of welds, in conformity with the proper interpretation of the standard welding

symbols of the American Welding Society. The bidder's proposal must state the type of electrode and must describe the welding methods proposed for use in fabricating the mast arm.

- (b) Certifications. Welders must have proper certification for the welding operations required. Welding by non-certified personnel will not be allowed. Certifications for welding personnel must be included with the submittal information package for review.
- (c) Testing. All welds of 5% of the mast arms and scrolls in every lot must be inspected for penetration and soundness of the welds by the magnetic particle inspection method or by radiography. Acceptance or rejection will be governed by the same conditions as in the TESTING Section. If the magnetic inspection process is used, the dry method with direct current must be employed. All transverse welds must be magnetized by the "prod" (Circular Magnetization) method. Proposed weld inspection method must be included with the submittal information package for review.

### **HARDWARE**

- 7. Two (2) special 1/2" - 13 NC x 1-1/2" long stainless steel cap screws, and two (2) stainless steel flat washers, must be provided for each mast arm attachment. All other hardware necessary to complete the assembly of the mast arm and scroll must be furnished. All hardware must be stainless steel, corrosion-resistant metal, subject to approval.

### **PAINTING**

- 8. (a) Oil and Grease Removal. All metal surfaces must be washed with an alkaline detergent to remove any oils or grease.
- (b) Metal Cleaning. All exterior metal surfaces must be cleaned by blasting with a combination of shot and grit to remove all dirt, mill scale, rust, corrosion, oxides and foreign matter and provide a "near white" surface in accordance with SSPCS-SP10.
- (c) Chemical Pretreatment. The cleaned metal surfaces must be treated with a hot, pressurized iron phosphate wash and must be dried by convection heat.
- (d) Exterior Coat. A Thermosetting, polyester powder coat must be applied electrostatically to all cleaned and treated surfaces to a uniform eight (8) mil thickness in a one coat application. This powder coat must be cured in a convection oven at a minimum temperature of 400°F to form a high molecular weight fusion bonded finish.

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- (e) Alternate Methods. Alternate powder coat methods may be reviewed and tested on a case by case basis. However, no coating method will be accepted unless the Commissioner judges such alternate to be equal to the coating herein specified.
- (f) Interior Coat. The interior metal surfaces must be powder coated with a thermoplastic hydrocarbon resin containing corrosion inhibitors. The resin must be formulated for application over untreated metal surfaces. The resin must be applied at a temperature of approximately 200°F to a minimum thickness of three (3) mils. The interior thermoplastic coat must overlap the interior, thermosetting base coat by approximately one (1) inch. Alternate interior coatings may be used subject to prior approval of the Commissioner.
- (g) Durability. Both the exterior and interior coats must be capable of passing 1,000 hours of salt spray exposure as per ASTM B117 in a five percent (5%) NaCl solution at 95°F and 95% relative humidity without blistering.
- (h) Coating Measurement. Measurement of coating thickness must be done in accordance with SSPC-PA 2-73T, "Measurement of Dry Paint Thickness with Magnetic Gauges", except that the lowest "Single spot measurement" in an area of two square inches must be not less than 7.0 mils.
- (i) Color. Color must be gloss black unless noted otherwise in the order. A 4" square color chip sample must be submitted for approval prior to fabrication. The chip sample must be of the same material as the mast arm, and must include the manufacturer's name and the manufacturer's color name as well. The sample must also include any other information required to purchase the same color for the pole mast and the cast aluminum finial and split pedestal base.
- (j) Field Touch-up. Any minor damage to the mast arm surfaces must be touched-up in a professional manner as recommended by the paint manufacturer, with protective coating solutions as provided by the mast arm manufacturer at no additional cost to the City. Any major damage to the mast arm shaft or component surfaces must be repaired at the manufacturer's place of business, or must be replaced as directed by the Commissioner. The Commissioner will be the sole judge of the extent of any such damage and the adequacy of repair. The Contractor must supply a field touch-up kit for every 20 mast arms or fraction thereof. Each kit must consist of a highly legible instruction sheet, one gallon of the recommended touch-up paint and all other materials required to touch-up 20 mast arms and scrolls.

**STRUCTURAL REQUIREMENTS**

9. (a) Calculations: The manufacturer must provide certified deflection calculations showing compliance with 1994 AASHTO wind loading requirements for 100 mph winds with 30% gusts. The calculations must be performed based on a completely assembled gateway mast arm and luminaire, as specified herein. The scroll must not be considered as a structural element for the calculations. The structural calculations must be signed and sealed by a registered structural engineer.
- (b) Parameters. The manufacturer must demonstrate that the mast arms will meet or exceed the specified structural requirements under the following set of conditions. The manufacturer must provide structural calculations using published loading data as part of the submittal package, and must perform structural testing using actual completed mast arms from the specific order as part of the testing. The responsible material proposal must contain verification of structural performance with results equal to or better than those listed in these Specifications. Submittal information must include computer calculations based on the controlling given conditions which demonstrate achievement of all listed performance requirements. Computer calculations must be done in accordance with both 1994 AASHTO recommendations and the City of Chicago requirements. The program(s) used to perform the calculations must be identified in the submittal. The structural testing must include maximum deflection and set as well as listings of all indicated test loads.
- (c) Verification of Data. All structural data must be based on the parameters listed above. This data must be verified by an independent testing laboratory or manufacturer's laboratory as approved by the Commissioner. All testing must be performed on completed mast arms. Where this data causes the structural integrity to fall below the values required by this Specification, the masts must be redesigned in a manner acceptable to the Commissioner and retested until all requirements of this Specification are met. Should the mast arms be incapable of meeting this Specification after modification, the Contractor must provide suitable replacement mast arms as approved by and at no additional costs to the Commissioner.

**TESTING**

10. (a) Testing. Structural testing must be conducted on five percent of the manufacturer's production mast arms and scrolls for each order in which the quantity is 20 or more. The testing must include coupon tests, load tests, and weld tests. All testing must be certified by the manufacturer, or an independent lab.
- (b) The selection of mast arms and scrolls must be a random selection from

the entire completed lot required in the order.

- (c) Coupon tests for the arm and the scroll as outlined in ASTM A53, A 668, A27, or A36.
- (d) Load tests for mast arms. The scroll must not be considered as part of the load test. With mast arm rigidly anchored, a test load of 300 pounds must be applied at a point approximately one foot (1' - 0") from the free end. The load must be applied at right angles to the center line of the mast arm and in the same vertical plane. The deflection must not be greater than 3". Within one (1) minute after the test load is released, measurement must be made of the set taken by the mast arm. This set must not be greater than 0.5". The deflection measurement device must be reset to zero and the test load must be reapplied. The deflection must not change from the deflection noted in the first test by more than  $\pm 5\%$ . No measurable set must be noted within one (1) minute after test load is released. The mast arm must then be checked to insure that it is still securely fastened, that it is plumb, and that no cracks have developed in either the mast arm or attachment plate.
- (e) Weld tests for both the arm and the scroll as described in the WELDING Section of this Specification.
- (f) Acceptance of Equipment. Tests must be made on 5% of all mast arms and scrolls in the order. If any of the mast arms or scrolls fail to meet these specifications, an additional three mast arms or scrolls must be tested for each failed unit. Should any of these additional units fail to meet these specifications, the entire lot will be subject to rejection. The Commissioner will then decide, based on the nature of the failure, whether the entire lot will be rejected outright or whether the manufacturer may subject each mast arm or scroll in the order to testing. If each mast arm or scroll in the order is tested, those mast arms or scrolls which fulfill the specified requirements may be accepted at the discretion of the Commissioner.

### **SHIPMENT AND DELIVERY**

- 11. (a) General. The mast arms and scrolls must be carefully inspected at the factory prior to shipment to assure that the mast arms and scrolls are complete and free of defects. When mast arms are stacked together, they must be supported with suitable spacers or must otherwise be protected from dents and other potential shipping damage. The spacing and protective materials must be suitable for and usable in the storage of the mast arms. The same requirements apply to the scrolls. All hardware must be packaged in a clear container and labeled.

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- (b) Packaging. The mast arms and scrolls must be shipped in bundles weighing a maximum of 1,000 pounds. Mast arms and scrolls must be in separate bundles. Each mast arm or scroll must be individually wrapped and protected so that it can be bundled and unbundled without damage to the unit or its finish. The wrapping must be clearly marked to identify the arms and scrolls. Specific instructions must be securely attached to each bundle indicating the proper methods of storage. In addition, each bundle must contain specific instructions on unbundling and erection of the mast arms or scrolls. Instructions must be printed on a fiber based paper with a permanent ink so that instructions will be completely legible after weathering outdoors for a minimum of 5 years.
- (c) Bundles. The bundles must consist of arms or scrolls laid to form an approximately rectangular cylinder. Arms and scrolls must be packaged in separate bundles. Materials such as lumber (2" x 4" min.) non-marring banding, and other appropriate bundling materials must be used to make a rigid, long lasting bundle capable of being handled, shipped and stored without shifting of contents or breaking. Bundling procedure will be subject to approval. Any bundles, in which either mast arms, scrolls or packaging is received broken, damaged or with contents shifted, will not be accepted and it will be the responsibility of the supplier to return the bundle to its original destination at no cost to the City of Chicago. The bundles should be capable of being stacked two high without breaking, or shifting of the contents. Each bundle must be capable of being lifted by a fork lift truck or crane and the bundles must be shipped on a flat bed truck to facilitate unloading.
- (d) Appurtenant Devices and Hardware. Any appurtenant devices and hardware not attached to the mast arm or scroll must be carefully wrapped and securely attached to each bundle. All device and hardware containers must be clearly labeled as to the contents. Labels must identify the quantity of parts and their relationship to the arms or scrolls. Payment will be withheld for any units provided without the appropriate appurtenant devices and hardware. Cracked, broken, chipped or damaged units will be considered as incomplete quantities as regards payment. Improperly labeled units will also be considered as incomplete.
- (e) Touch-up Paint. Touch-up paint and appurtenant materials must be packaged in units sufficient for twenty 20 mast arms and 20 scrolls. These units will be securely attached to a sufficient number of bundles to fulfill the touch-up paint requirements stated herein.
- (f) Delivery. Mast arms and scrolls must be delivered to the Division of Electrical Operations storage yard at 4101 South Cicero in Chicago, or to a location indicated on the order. Mast arm and scroll information



## **SPECIFICATION 1514**

submitted for approval must include any recommendations of the Manufacturer for storage as required under this Contract.

THIS SPECIFICATION SHALL NOT BE ALTERED

**SPECIFICATION 1528  
BUREAU OF ELECTRICITY  
DEPARTMENT OF STREETS AND SANITATION  
CITY OF CHICAGO  
OCTOBER 9, 2002**

**PRECAST CONCRETE STRUCTURES**

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**SUBJECT**

1. This specification covers the requirements for precast concrete structures to be used as Bureau of Electricity facilities. The structures will include manholes, handholes, and street light pole foundations.

**GENERAL**

2.
  - (a) Specifications. The precast structures must conform in detail to the requirements herein stated and to the Specifications and Methods of Test of the American Society for Testing and Materials cited by ASTM Designation Number of which the most recently published revision will govern.
  - (b) Acceptance. Precast structures not conforming to this specification will not be accepted. The Commissioner or his representative will be the sole judge in determining if the precast structures meet this specification. The Commissioner's decision will be final.
  - (c) Drawings. The drawings mentioned herein are drawings of the Department of Streets and Sanitation. They are integral parts of this specification cooperating to state necessary requirements.
  - (d) Bidders Drawings. Bidders must submit with their bids detailed scale drawings of the precast structures showing actual dimensions and details. Shop drawings must be original engineering drawings created by the manufacturer. The drawings must give every dimension necessary and show how the structure is assembled.
  - (e) Sample. One complete precast structure of each item must be submitted within 14 business days upon request of the Commissioner.
  - (f) Warranty. The manufacturer must warrant the performance and construction of the precast structures to meet the requirements of this Specification and must warrant all parts, components, and appurtenances against defects due to design, workmanship, or material developing within a period of one (1) year after the precast structures have been delivered. This will be interpreted particularly to mean structural failure of any element. The warranty must be furnished in writing guaranteeing material replacement including shipment, free of charge to the City.

The Commissioner will be the sole judge in determining which replacements are to be made. The Commissioner's decision will be final.

### **DESIGN**

3. (a) Material. Concrete must be Portland cement concrete, Class PC, meeting current IDOT specifications. Pulling irons in manholes must meet or exceed the requirements of ASTM A36 steel. Pulling irons must be hot dipped galvanized. Steel reinforcing bars must meet or exceed the requirements of ASTM A615, Grade 60. Cable racks in manholes must be manufactured for that specific purpose and must be capable of accommodating several different sizes of cable hooks at various elevations. A minimum of eight cable hooks, 4 inches in length, must be provided with each manhole, and should include any hardware necessary to affix the hooks to the racks. Cable hooks for handholes must be manufactured for that specific purpose. Cable hooks for handholes must be a minimum of 3 inches in length and 3 inches in depth. Anchor rods in foundations must meet the latest Bureau of Electricity Material Specification 1467. Conduit elbows in foundations must meet the latest Bureau of Electricity Material Specification 1462.

Foundations must include conduit elbows, anchor rods, washers, and nuts. Handholes must include cable hooks. Manholes must include cable racks, pulling irons, and cable hooks. Frames and covers, sump grates, clay tile, and ground rods are not included under this specification.

- (b) Dimensions. Each manhole, handhole, and foundation must be dimensioned as shown on the appropriate standard drawing. The 30 inch diameter handhole is Standard Drawing 867. The 36 inch diameter handhole for 24 inch frame and cover is Standard Drawing 866. The 36 inch diameter handhole for 30 inch frame and cover is Standard Drawing 871. The 3 foot by 4 foot by 4 foot manhole for a 24 inch diameter frame and cover is Standard Drawing 730. The 3 foot by 4 foot by 4 foot manhole for 30 inch frame and cover is Standard drawing 729. The 4 foot by 6 foot by 6 foot manhole for 24 inch frame and cover is Standard Drawing 732. The 4 foot by 6 foot by 6 foot manhole for 30 inch frame and cover is Standard Drawing 733. The 5 foot - 4 inch by 7 foot - 4 inch manhole roof is Standard Drawing 733. The precast 5 foot foundation is Standard Drawing 565.
- (c) Construction. Each manhole and each handhole must have lifting anchors cast in the concrete to facilitate shipment and installation. If the manhole or handhole is in more than one piece, instructions for assembly must be provided. Also, a sufficient amount of bonding agent must be provided. The bonding agent must be 1" diameter butyl rubber joint sealant or another approved material.

**DELIVERY**

4. (a) All manholes, handholes, and foundations will be delivered to the Bureau of Electricity storage yard at 4101 South Cicero Avenue in Chicago, or to another location within the City as indicated on the order. Any manhole, handhole, or foundation deemed to be defective by the Commissioner or his representative must be removed and replaced at no cost to the City. The Commissioner's decision will be final.

**THIS SPECIFICATION MUST NOT BE ALTERED**

**ELECTRICAL SPECIFICATION 1533**  
**DIVISION OF ELECTRICAL OPERATIONS**  
**DEPARTMENT OF TRANSPORTATION**  
**CITY OF CHICAGO**  
**AUGUST 8, 2006**

**NON-METALLIC CONDUIT**

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**SCOPE**

1. This specification states the requirements for both rigid and coilable non-metallic conduit. The conduit will be used for low voltage (600 volt rated cables) electrical street lighting and traffic control systems. It may also be used for fiber-optic communications cables. This conduit will be installed underground. Rigid non-metallic conduit may be installed on structure.

**GENERAL**

2. (a) Standards. The following standards are referenced herein.

ASTM – American Society for Testing and Materials  
NEC – National Electrical Code  
NEMA – National Electrical Manufacturer’s Association  
UL – Underwriter’s Laboratories

- (b) Warranty. The manufacturer must warrant the conduit against defective workmanship and material for a period of one year from date of installation or date of delivery. Any conduit that is found to be defective must be replaced without cost to the City.
- (c) Sample. If requested by the Chief Procurement Officer, a sample of the conduit intended to be furnished under this specification, must be submitted to the Engineer of Electricity within fifteen (15) business days upon receipt of such request.

**MATERIAL**

3. (a) Rigid non-metallic conduit will be made of polyvinyl chloride (PVC). All conduit and fittings must comply with ASTM D 1784 and with the applicable sections of NEMA TC2, UL standard 651, and NEC Article 347. Fittings must meet the standards of NEMA TC3 and TC6, as well as UL 514.
- (b) Coilable non-metallic conduit will be made of high density polyethylene (HDPE). All conduit must comply with ASTM D3485, ASTM D 1248, and NEMA TC7.

**SIZES**

4. (a) PVC and HDPE will come in two wall thicknesses; schedule 40 and schedule 80.
- (b) PVC will come in ten foot sections. HDPE will come on reels.
- (c) Nominal inside diameters ( in inches) for non-metallic conduits will include the following:  $\frac{1}{2}$  ,  $\frac{3}{4}$  , 1,  $1\frac{1}{4}$ ,  $1\frac{1}{2}$  , 2,  $2\frac{1}{2}$  , 3,  $3\frac{1}{2}$ , 4.

**PACKING**

5. Rigid conduit must be shipped in bundles. Coilable conduit must come on wooden reels. Both bundles and reels must be tagged to indicate the size and diameter of the conduit, the quantity in feet, the weight, and the manufacturer's name. The conduit itself must be marked to indicate the type and size, as well as the manufacturer.

**THIS SPECIFICATION MUST NOT BE ALTERED**

**ELECTRICAL SPECIFICATION 1534  
DIVISION OF ELECTRICAL OPERATIONS  
DEPARTMENT OF TRANSPORTATION  
CITY OF CHICAGO  
SEPTEMBER 25, 2006**

**CABLE: SINGLE-CONDUCTOR, COPPER 600 VOLT**

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**SUBJECT**

1. This specification states the requirements for cables intended to be used as conductors in 120/240 VAC, 60 cycle, single phase, street lighting circuits. The cables will be installed in underground ducts or conduit.

**GENERAL**

2. (a) Specifications. The cable must conform in detail to the requirements herein stated, and to the applicable portions of the latest revisions of the specifications and methods of test of the following agencies:
  - (1) ICEA Specification S-95-658
  - (2) IEEE Standard 383
  - (3) ASTM Standard E662-06
  - (4) ASTM Standard D470-05
  - (5) U.L. 44
  - (6) U.L. 854
- (b) Acceptance. Cable not in accordance with this specification will not be accepted.
- (c) Sample. If requested by the Chief Procurement Officer, a three (3) foot sample of the cable intended to be provided under this specification must be sent to the attention of the Engineer of Electricity within fifteen (15) days of receipt of such request.
- (d) Warranty. The manufacturer must warrant the cable to be first class material throughout. In lieu of other claims against them, if the cables are installed within twelve (12) months of date of shipment, the manufacturer must replace any cable failing during normal and proper use within two years of date of installation. All replacements under this warranty must be made free of charge F.O.B. delivery point of the original contract.

**CONSTRUCTION**

- 3. This cable must consist of a round copper conductor with a tight fitting, free stripping, concentric layer of ethylene propylene (EPR) insulation and a concentric low lead chlorosulfonated polyethylene (CSPE) jacket extruded in tandem with, and bonded to, the insulation, or ethylene propylene (EPR) insulation only. The cable must be rated for continuous duty in wet or dry conditions at 90° C operating temperature, 130° C emergency overload temperature and 250° C short circuit temperature.

**CONDUCTOR**

- 4. (a) Material. The conductor must either be soft or annealed round copper wire.
- (b) Specifications. The conductor must meet the requirements of ASTM B3, B8 or B258, as applicable.
- (c) Sizes. The conductor size must be as stated in the PROPOSAL and in accordance with all requirements in Table A of this specification.
- (d) Stranding. The number of strands must be as indicted in Table A. Stranding must meet the requirements of ASTM B8, Class B.

**INSULATION**

- 5. (a) Type. The insulation must be ethylene propylene rubber compound meeting the physical and electrical requirements specified herein.
- (b) Thickness. The insulation must be circular in cross-section, concentric to the conductor, and must have an average thickness not less than that set forth in Table A of this specification, and a spot thickness not less than ninety percent (90%) of the average thickness.
- (c) Initial Physical Requirements:
  - 1. Tensile strength, min., psi. 1,200
  - 2. Elongation at rupture, min. % 250
- (d) Air Oven Exposure Test. After conditioning in an air oven at 121 +/- 1°C for 168 hours using methods of test described in ASTM-D 573:
  - 1. Tensile strength, minimum percent of unaged value.....75
  - 2. Elongation at rupture, minimum percent of unaged value.....75



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- (e) Mechanical Water Absorption:  
GRAVIMETRIC METHOD: After 168 hours in water at 70+/- 1°C:  
water absorption, maximum, milligrams per square inch.....5
- (f) Cold Bend Test Requirements. The completed cable must pass the "Cold-Bend, Long-Time Voltage Test on Short Specimens" of ASTM D-470 except that the test temperature must be minus (-) 25°C.
- (g) Electrical Requirements
  - 1. Voltage Test. The completed cable must meet an A.C. and D.C. voltage test in accordance with ASTM D-470 and D-2655.
  - 2. Insulation Resistance. The completed cable must have an insulation resistance constant of not less than 20,000 when tested in accordance with methods shown in ASTM D-470.

**JACKET**

- 6. (a) Type. If the cable is jacketed, the jacket must be a chlorosulfonated polyethylene (CSPE) compound meeting the physical and electrical requirements specified herein. The CSPE jacket must meet CFR Title 40, Part 261, for leachable lead.
- (b) Thickness. The jacket must be circular in cross-section, concentric with the insulation, must have an average thickness not less than that set forth in Table A of this specification and a spot thickness not less than ninety percent (90%) of the average thickness.
- (c) Initial Physical Requirements:
  - 1. Tensile strength minimum PSI 1800
  - 2. Elongation at rupture, minimum percent 300
- (d) Air Oven Exposure Test. After conditioning in an air oven at 121 +/- 1°C for 168 hours:
  - 1. Tensile strength, minimum percent of unaged value 75
  - 2. Elongation at rupture, minimum percent of unaged value 60
- (e) Mechanical Water Absorption. After 168 hours at 70 +/- 1°C:
  - 1. Milligrams per square inch, maximum 20

**TESTING**

7. (a) General. Tests must be performed on insulation, jacket and completed cables in accordance with applicable standards as listed in these specifications. Where standards are at variance with each other or with other portions of this specification, the most stringent requirements, as determined by an engineer from the City, will apply. All tests must be conducted on cable produced for this order. Where cable insulation and/or jacket thickness preclude obtaining samples of sufficient size for testing, special arrangements must be made with the engineer to obtain samples of unprocessed materials directly from the extrusion feed bins which will be separately processed and prepared for tests.
- (b) Number Of Tests. Insulation and jacket tests must be conducted on samples taken every 25,000 feet or fraction thereof of each conductor size. In no case must samples be taken closer than 15,000 feet apart.
- (c) Flame Tests. Included in the tests will be a 70,000 BTU per hour flame test in accordance with IEEE 383. Reels to be tested will be selected at random.
- (d) Test Reports. No cable may be shipped until certified copies of all factory tests have been reviewed and approved by the engineer.
- (e) Acceptance. Samples must be taken from each reel and must successfully conform to all tests specified herein. Reels, from which samples fail to conform, will be rejected.

**PACKAGING**

8. (a) Cable Marking. The cable must be identified by a permanently inscribed legend in white lettering as follows:
- 1/c No. (conductor size) AWG-600V-90°C-EPR or EPR/CSPE
- The legend must be repeated at approximately eighteen (18) inch intervals on the outside surface of the cable parallel to the longitudinal axis of the conductor. A sequential footage marking must be located on the opposite side from the legend.
- (b) All cable will be black pigmented. When three conductors (triplex) are specified, one conductor will be black, another will be red or black with a red tracer, the smaller of the conductors must have a green colored jacket and the three conductors must be triplexed with a 16"-18" lay. The insulation color must not be unduly affected by cable installation, or prolonged exposure to either direct sunlight or moisture.
- (c) Reels. The completed cable must be delivered on sound substantial, non-returnable reels. Both ends of each length of cable must be properly sealed

## ELECTRICAL SPECIFICATION 1534

against the entrance of moisture and other foreign matter by the use of clamp-on cable caps, such as the Reliable Electric Company neoprene cable cap No. 1405. The ends must be securely fastened so as not to become loose in transit. Before shipment, all reels must be wrapped with cardboard or other approved wrapping.

- (d) Footage. Each reel must contain the length of cable as set forth in Table A of this specification. Alternate lengths may be considered.
- (e) Reel Marking. A metal tag must be securely attached to each reel indicating the reel number, contract number, date of shipment, gross and tare weights, description of the cable, the total footage, and the beginning and ending sequential footage numbers. Directions for unrolling the cable must be placed on the reel with an approved permanent marking material such as oil-based paint or a securely attached metal tag.

**TABLE "A"**

<b>CONDUCTOR</b>		<b>INSULATION/JACKET THICKNESS</b>		<b>A-C TEST</b>	<b>REEL LENGTH</b>
<b><u>AWG</u></b>	<b><u>STRANDS</u></b>	<b><u>MILS</u></b>	<b><u>MILS</u></b>	<b><u>VOLTS</u></b>	<b><u>FEET</u></b>
14	7	30	15	5500	2000
8	7	45	15	5500	2000
6	7	45	30	5500	2000
4	7	45	30	5500	2000
2	7	45	30	5500	1000
0	19	55	45	7000	1000
00	19	55	45	7000	1000
000	19	55	45	7000	1000
0000	19	55	45	7000	1000
250 MCM	37	65	65	8000	1000

THIS SPECIFICATION MUST NOT BE ALTERED

**ELECTRICAL SPECIFICATION 1537  
DIVISION OF ENGINEERING  
DEPARTMENT OF TRANSPORTATION  
CITY OF CHICAGO  
REVISED AUGUST 5, 2013**

**CABLE: TRAFFIC SIGNAL, MULTIPLE CONDUCTOR,  
COPPER WIRE, 600 VOLT**

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**SUBJECT**

1. This specification states the requirements for a multiple conductor cable to be installed in underground conduits and used to distribute electrical energy to operate automatic traffic control signals for both vehicular and pedestrian traffic at street intersections within the City of Chicago. The cable will be used between the traffic controller cabinet and the junction boxes on the traffic signal poles. The cable will be rated as 600 volt.

**GENERAL**

2. (a) Specification. The cable must conform in detail to the requirements herein stated, and to the specifications and methods of test of the following:  
  
ASTM - American Society for Testing and Materials  
ICEA - Insulated Cable Engineers Association  
IEEE - Institute of Electrical and Electronic Engineers  
UL - Underwriters Laboratories
- (b) Acceptance. Cable not conforming to this specification will not be accepted.
- (c) Sample. If requested by the Chief Procurement Officer, a three (3) foot sample of the cable intended to be furnished under this specification must be submitted to the attention of the Engineer of Electricity within fifteen (15) business days of receipt of such request.
- (d) Warranty. The manufacturer must warrant the cable to be first class material throughout. In lieu of other claims against them, if the cable is installed within twelve (12) months of date of shipment, the manufacturer must replace any cable failing during normal and proper use within two years of date of installation. All replacements under this warranty must be made free of charge F.O.B. delivery point of the original contract.

**CABLES**

3. (a) Construction. The cable must consist of coated conductors each concentrically encased with a free- stripping, thermoset cross-linked polyethylene insulation. Suitable fillers must be used to produce an essentially round cross-section. A Mylar tape must be wrapped over the conductor assembly, and a thermoset low smoke zero halogen polyolefin (LSZH) jacket applied overall.

(b) Outer Diameter. The maximum allowable outer diameter for round cables must be as follows:

<u>No. Of Conductors</u>	<u>Outer Diameter</u> (inches)
Ten	0.69
Nineteen	0.90

(c) Cable shall be UL approved for sunlight resistance and for direct burial applications.

(d) Cable must meet IEEE 383 and UL 1581 and UL1202 70,000 BTUs per hour flame test requirements.

**COLOR CODE**

4. Conductor identification must be provided by color synthetic-resin coverings. Table A sets forth the color code for the various conductor arrangements.

**CONDUCTOR**

5. (a) Material. Solid, soft or annealed, tinned copper wire, meeting the requirements of ASTM B-33 and B-258.

(b) Size. Cables must be made up of conductor sizes as set forth in this specification. The Number 14 AWG will be solid.

**INSULATION**

6. (a) Type. The insulation must be a thermoset cross-linked polyethylene compound meeting the requirements of ICEA S-73-532 and UL 44 for XHHW-2 cable.

(b) Thickness. The insulation must be circular in cross-section and have the following minimum thicknesses.

<u>Conductor</u> <u>Size. AWG</u>	<u>stranding</u> <u>(No. Of Wires)</u>	<u>No. of</u> <u>Conductors</u>	<u>Insulation</u> <u>Thickness (mils)</u>
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#14	1	10	30
#14	1	19	30

**CABLE TAPE**

7. The assembled and cabled conductor core must be wrapped with a one mil (0.001 inch) thick Mylar tape allowing a minimum of ten percent (10%) overlap.

**JACKET**

8. (a) Material. The jacket must be a thermoset low smoke zero halogen (LSZH) polyolefin.
- (b) Workmanship. The jacket must have a smooth exterior surface free from holes, cracks and splits, and must be tough, elastic, homogeneous in composition, and properly vulcanized.
- (c) Thickness. Thickness of the jacket must be 4/64 inches. Minimum thickness must be not less than ninety percent (90%) of the average thickness.
- (d) Cable Marking. Outer Jacket must be embossed or printed with the manufacturer's name, year of manufacture, insulation and jacket materials, conductor number, conductor size, at approximately 18" intervals. On the side opposite, the cable must be sequentially marked in one (1) foot increments. The jacket must be black.

**TESTING**

9. (a) Initial Physical Properties of Insulation.
1. Tensile Strength, minimum 1200psi
  2. Elongation at Rupture, minimum 250%
- (b) Physical Properties of Insulation After Aging. After 168 hours in air oven at 121° C.
1. Tensile Strength 75% of initial value
  2. Elongation 75% of initial value
- (c) Initial Physical Properties of Jacket.
1. Tensile Strength, minimum 1800psi
  2. Elongation at Rupture, minimum 300%
- (d) Physical Properties of Jacket After Aging. After 168 hours in air oven at 121° C.

- 1. Tensile Strength     75% of initial value
- 2. Elongation             65% of initial value
  
- (e) Water Absorption. Tests must be made in accordance with ASTM D 470. After 168 hours in distilled water at 70° C., water absorption of the insulation material must not exceed 5 milligrams of water per square inch. For the jacket material the water absorption must not exceed 1 milligram per square inch under the same conditions.
  
- (f) Cold-Bend Test. The completed cable must pass cold bend test of ASTM D 470, except that the test temperature must be minus(-)25°C.
  
- (g) Electrical Requirements.
  - 1. Voltage. The completed cable must meet an A.C. and D.C. voltage test in accordance with ASTM D 470 and D 2655.
  - 2. Insulation Resistance. The completed cable must have an insulation resistance of not less than 20,000 ohms when tested in accordance with methods in ASTM D 470.
  
- (h) Flame Tests. Cable must pass a 70,000 BTU flame test in accordance with IEEE 383.
  
- (i) Tests. The above tests must be performed on the insulation, the jacket, and the completed cable as required above. Tests must be performed on samples taken every 25,000 feet or fraction thereof of each cable size.
  
- (j) Reports. No cable will be accepted until certified copies of the test reports have been reviewed and approved by the City. Cable that does not pass any of the above tests will be rejected.

**PACKAGING**

- 10. (a) Reels. The completed cable must be delivered on sound substantial, non-returnable reels. Both ends of each length of cable must be properly sealed against the entrance of moisture and other foreign matter by the use of clamp-on cable caps. The ends must be securely fastened so as not to become loose in transit. Before shipment, complete 2 x 4 lagging must be applied to all reels.
  
- (b) Footage. Each reel must contain the length of cable as set forth below.
  - (1) Ten-Conductor                         2000 feet
  - (2) Nineteen-Conductor                 1000 feet
  
- (c) Marking. A metal tag must be securely attached to each reel indicating the reel number, contract number, date of shipment, gross and tare weights, the

appropriate City commodity Code Number if applicable, and a description of the cable. Also, each reel must have permanent marking on it indicating directions for unrolling the cable and the footage of cable contained in the reel. Indelible ink or other such material susceptible to washing off or fading will not be permitted; and approved permanent marking material such as paint or a securely attached metal tag is required.

**TABLE A COLOR CODE CONDUCTOR IDENTIFICATION**

Base Color	First Tracer	Second Tracer	10	19
White	Black	Red	--	14
White	Red	Green	--	14
Black	--	--	14	14
White	--	--	14	14
Red	--	--	14	14
Green	--	--	14	14
Orange	--	--	14	14
Blue	--	--	14	14
White	Black	--	--	--
Red	Black	--	14	14
Green	Black	--	14	14
Orange	Black	--	14	14
Blue	Black	--	14	--
Black	White	--	--	--
Red	White	--	--	14
Green	White	--	--	14
Blue	White	--	--	14
Orange	White	--	--	14
White	Red	--	--	--
Blue	Orange	--	--	14
Red	Blue	--	--	14
Green	Blue	--	--	14
Orange	Blue	--	--	14



**ELECTRICAL SPECIFICATION 1540  
DIVISION OF ENGINEERING  
DEPARTMENT OF TRANSPORTATION  
CITY OF CHICAGO  
OCTOBER 30, 2006**

**VIDEO DETECTION CAMERA AND MOUNT**

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**SUBJECT**

1. This specification states the requirements for a video camera to be used to detect vehicular traffic at a signalized intersection. The camera will be mounted to a traffic signal arm or a luminaire arm with a mounting bracket specifically manufactured for that purpose.

**GENERAL**

2. (a) Standards. The camera and enclosure must meet NEMA, MIL-STD-810E, and FCC Class B, Part 15 standards.
- (b) Sample. One camera and mount of the manufacture proposed to be furnished must be submitted along with specification sheets within fifteen (15) business days upon request of the Chief Procurement Officer. The sample must be delivered to the Division of Electrical Operations, 2451 South Ashland Avenue, Chicago, Illinois 60608.
- (c) Warranty. The manufacturer must warrant the camera and mount to meet the requirements of this specification, and must warrant all components against defective design, material and workmanship for a period of five (5) years from date of acceptance. In the event that defects or failures occur during the warranty period, the manufacturer must repair and/or replace all defective materials at no expense to the City. This warranty must be evidenced by a letter or certificate of warranty submitted to the City at the time final delivery is made. The warranty must cover all units delivered in an order. The warranty must be signed by an official of the manufacturer who is empowered by the manufacturer to enter into such an agreement.
- (d) Compatibility. The camera must be compatible with the associated digital video detector processing equipment and traffic signal controller equipment used by the City of Chicago.

**CAMERA REQUIREMENTS**

3. (a) Power Lens.
  1. 1/3-inch format.
  2. Focal Length: 6-60mm.
  3. Iris range: f1.4-360
  4. Focus range: 1.3m.
  5. Angle of view (wide angle): (hvx) 43.4° x 32.7°
  6. Angle of view (telephoto): (hvx) 4.5° x 3.5°
  7. Focus control: motor, 12VDC, < 70mA
  8. Zoom Control: motor, 12VDC, < 70 mA
- (b) Must be fully automatic to adjust for lighting conditions.
- (c) Imager: interline transfer CCD, 1/3-inch image format.
- (d) Active picture elements: 582 horizontal by 494 vertical.
- (e) Horizontal resolution: 570 TVL
- (f) Digital signal processing.
- (g) Illumination at Imager: minimum of .018 lux.
- (h) Electromagnetic interference: must meet FCC Class B, Part 15 requirements.
- (i) Power: the camera will consume no more than 4 watts. The heater must consume no more than 11 watts.
- (j) The camera will operate within the temperature range of -20° C. to +50° C.

**ENCLOSURE**

4. (a) The camera must be housed in an extruded aluminum housing with a white epoxy powder coat.
- (b) The window will be 3mm thick glass.
- (c) Heater: a built-in thermostatically controlled heater will keep the window from fogging or from icing up.
- (d) The enclosure must provide protection from the environment. The enclosure must meet military specification MIL-STD-810-E for salt air, and NEMA-6P, IP68 for dust.

- (e) Sunshield: a sunshield will protect and shield the window, as well as provide a heat sink for the camera.
- (f) The rear of the housing will have a cable connector. The plug will be a MIL-3102 for a 16 pin arrangement.
- (g) Camera cradle: the camera housing will be attached to an extruded aluminum cradle. The cradle can be rotated 360°. The cradle will be tapped in the base for at least two (2) 1/4-20 mounting screws.

**ENCLOSURE MOUNTS**

- 5. (a) The mount will have a swivel head and tilt mechanism. The swivel will allow for full 360° rotation and the tilt will allow for 75° tilt both above and below the horizontal. Both the swivel and tilt will be locked in position with stainless steel bolts. The camera enclosure will be attached to the mount with a minimum of two (2) 1/4-20 stainless steel bolts. The mount will be attached to the arm or pole with two (2) lengths of stainless steel banding, or similar. The mounts will be constructed of aluminum, with a white epoxy powder coat. The mount must provide for cable. The construction must be structurally sound and be able to withstand the loads as indicated in ASSTHO's Structural Supports – 1994 edition.
- (b) The mast arm mount will have a two (2) inch diameter pipe welded to a contoured plate. The plate will be sized to accept banding. The swivel head will be welded to the top of the pipe. The length of the entire assembly will be approximately 10 inches.
- (c) The pole mount will have a two (2) inch pipe welded to a contoured plate. The plate will be sized to accommodate 2 lengths of steel banding. The other end of the pipe will have a 90° bend to which the swivel head will be welded. The entire length of the assembly will be approximately 15 inches.

**PACKING**

- 5. (a) Each camera and enclosure must be packed in a cardboard container so that the contents will not be damaged in shipping or handling. Instructions must be included in each container.
- (b) Each package must be clearly labeled as to the contents.

**THIS SPECIFICATION MUST NOT BE ALTERED**

**ELECTRICAL SPECIFICATION 1541  
DIVISION OF ELECTRICAL OPERATIONS  
DEPARTMENT OF TRANSPORTATION  
CITY OF CHICAGO  
SEPTEMBER 16, 2004**

**REINFORCING ROD FORMED STEEL CAGES**

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**SUBJECT**

1. This specification is for steel cages. The cages are to be used in street light pole foundations to provide the necessary strength to support street light poles.

**DESCRIPTION**

2.
  - (a) The steel must conform to the requirements of the American Society for Testing and Materials cited by ASTM designation number, of which the latest revision will govern.
  - (b) The steel cages must conform to all the requirements shown on Electrical Standard Drawing 793A.
  - (c) The steel cages must be constructed of number 3 and number 6 reinforcing bars, as shown on Electrical Standard Drawing 793A. Reinforcing steel must conform to ASTM A615, Grade 60, with a yield strength of 60,000 psi. All joints must be welded according to the latest recommendations of the American Welding Society's (AWS) Document 1.4.

**ACCEPTANCE**

3. If so requested, a sample cage must be delivered to the City within fifteen (15) business days of such request by the Chief Procurement Officer. The contractor must present certification that the steel used meets this specification. The City reserves the right to reject any cages which do not completely meet this specification.

**DELIVERY**

4. The Contractor must furnish and deliver the steel cages to the City of Chicago, Department of Transportation, Division of Electrical Operations, 4101 South Cicero Avenue, Chicago, Illinois 60650, or to a location as directed in the contract. Any cages that do not meet the specification or are delivered damaged will be rejected.

**THIS SPECIFICATION MUST NOT BE ALTERED**

**ELECTRICAL SPECIFICATION 1543  
DIVISION OF ENGINEERING  
DEPARTMENT OF TRANSPORTATION  
CITY OF CHICAGO  
REVISED FEBRUARY 7, 2014**

**TRAFFIC SIGNAL: OPTICALLY PROGRAMMED, TWELVE-INCH SINGLE FACE,  
SINGLE OR MULTIPLE-SECTION, LED**

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**SUBJECT**

1. This specification states the requirements for optically programmed, twelve-inch, single face, single and multiple-section, electric traffic signals with aluminum housings for use in the traffic control system of the City of Chicago. Indications shall include red, yellow, green, yellow arrow, and red arrow.

**GENERAL REQUIREMENTS**

2. (a) Sample and Certified Test Reports. One complete signal, fully assembled and wired, of the manufacture proposed to be furnished, must be submitted along with the required certified test reports, within 15 business days upon request of the Chief Procurement Officer. The sample must be delivered to the Division of Electrical Operations, 2451 South Ashland Avenue, Chicago, Illinois 60608.
- (b) Standards. Equipment furnished under this specification shall meet the appropriate requirements of the following standards, as required within the body of this specification:  
  
American Association of State Highway and Transportation Officials (AASHTO)  
American Iron and Steel Institute (AISI)  
American Society for Testing and Materials (ASTM)  
Institute of Transportation Engineers (ITE)  
National Electrical Manufacturers Association (NEMA)  
Underwriters Laboratories (UL)
- (c) The traffic signal heads shall conform to ITE Standard "Vehicle Traffic Control Signal Heads" (VTCSH), in which the most recently published revisions will govern.
- (d) Approval. Approval will mean approval in writing by the Commissioner or his duly authorized representative.

**HOUSING REQUIREMENTS**

3. (a) Housing. The housing of each section shall be one piece, cast aluminum, complete with integral top, bottom, and sides. The aluminum die casting material shall meet or exceed the ITE alloy composition and tensile strength requirements. The housing shall be prepared with chromate treatment primer and painted with two coats of enamel in color as specified in the line item or contract plans.
- (b) Assembly. A traffic signal section shall be comprised of, but not limited to, the housing, hinged front and rear doors, visor, optical unit and all necessary gaskets and hardware. The multi-section, single face, traffic signal shall be comprised of single face single sections assembled together, containing an internally mounted terminal block. Arrow indications must be shipped as single sections. The traffic signals shall be designed and constructed to permit sections to be assembled together, one above the other, forming a weatherproof and dust-tight unit. Each housing must be equipped with holes to be used for mounting back-plates.
- (c) Individual sections shall be fastened together with adjustable coupling assemblies which lock the individual sections together. The assembly must allow the incremental tilting of the signal faces  $\pm 10\%$  from horizontal while maintaining a common vertical axis for the sections.
- (d) Height. The overall height of an assembled traffic signal must be 14 inches  $\pm 1$  inch for a single-section signal, 42 inches  $\pm 3$  inches for a three-section signal, and 70 inches  $\pm 5$  inches for a five-section signal.
- (e) Mounting. The traffic signal shall be designed for mounting with standard traffic signal brackets using 1.5 inch pipe size fittings.
- (f) Positioning Device. The top and bottom opening of each housing must have integral serrated bosses that will provide positive positioning of the signal head in  $5^\circ$  increments. A total of 72 teeth must be provided in the serrated bosses to allow the signal face to be rotated  $360^\circ$  about its axis. The teeth shall be clean and well defined to provide positive positioning.
- (g) Hinges. The signal housing shall be sectional; one section for each optical unit. Each housing must have 4 integral hinge lugs, with stainless steel hinge pins (AISI 304), located on the left side for mounting the front door and on the right side for the rear door. The hinge pins must be straight and not protrude past the outside of the housing lugs. The housing must have 2 integral latching bolt lugs on the right side of the front door and 1 bolt lug on the left side of the rear door. Each closure must consist of a stainless steel hinge pin to which a latching bolt (AISI 304), washer, and wing nut will be attached. The wing nuts must be captive and must provide for opening and closing the door without the use of tools.
- (h) Front and Rear Doors. The doors shall be one piece die cast aluminum

construction. The front door shall house the objective lens and allow access to the optical-limiter diffuser. Two hinge lugs on the left side and 2 sets of latch screw jaws centered on the right side, as viewed from the front of the signal, must be integrally cast with the housing front door. The front door shall be prepared with chromate treatment primer and painted with 2 coats of flat black enamel. The rear door shall allow access to the lamp. Two hinge lugs on the right side and 1 set of latch screw jaws centered on the left side, as viewed from the rear of the signal, must be integrally cast with the housing rear door. The rear door shall be prepared with chromate treatment primer and painted with 2 coats of enamel in color matching the signal housing. The doors must be hinged to the housing with 2 stainless steel hinge pins, drive fitted. The inside of the doors must be grooved to accommodate a one piece, air-cored ethylene propylene diene monomer (EPDM) gasket to provide a weatherproof and dust proof seal when the door is closed.

- (i) Gaskets. Wherever necessary to make a completely dust-proof, moisture-proof and weatherproof assembly of the housing and optical system, approved type gaskets of neoprene or silicone rubber shall be provided.
- (j) Visor. Each traffic signal shall have a visor for each signal indication (section). The visor must be the cutaway type, a minimum 9 inches long, fabricated of sheet aluminum, prepared with chromate treatment primer and painted with 2 coats of flat black enamel. The visor shall fit tightly against the front door and not permit any light leakage between the door and visor. All hardware necessary for attachment of the visor must be of stainless steel. The visor must have four mounting lugs for attaching the visor to the door. Screws must go through the visor lugs into the metal door to secure the visor.

**OPTICAL UNITS**

- 4. (a) The traffic signal heads shall be provided with 12 inch acrylic Fresnel lenses colored to ITE specifications. A smaller clear objective lens shall be mounted behind the Fresnel lens. Masked off portions of the clear lens will control the direction of light. A masking kit shall be provided with each individual head section. Masking shall provide a selectively visible or veiled projected indication anywhere within 15° of the signal optical axis.
- (b) An LED lamp shall be held in a 3-prong base by a wire ring and a spring load clip.
- (c) Lamp Collar. The lamp housing must consist of an integral lamp support, indexed ceramic socket, and quick release self-aligning lamp retainer. The electrical connection between the lamp housing and signal case must be accomplished with an interlock assembly which disconnects the lamp housing when opened.
- (d) Optical Limiter - Diffuser. The optical limiter-diffuser must provide an imaging

surface at focus on the optical axis for objects 900 to 1,200 feet distance and permit an optical masking tape to be variously applied as determined by the desired visibility zone. The optical limiter-diffuser must be provided with positive indexing means and composed of heat-resistant glass.

- (e) Objective Lens. The objective lens must be a high resolution planar incremental lens hermetically sealed with a flat laminate of weather-resistant acrylic. The lens must be symmetrical in outline and capable of being rotated to any 90° orientation about the optical axis. The projected signal indication must be capable of being veiled anywhere within 15° of the optical axis. The indication must not result from external illumination and must conform to ITE standards.
- (f) The optical unit with lamp shall meet the applicable requirements of the ITE standards for Vehicle Traffic Control Signal Heads(VTCSH) Part 2: LED Vehicle Signal Modules, for signal brightness (luminance), and beam spread (luminance at various vertical and horizontal angles).

**LED LAMPS**

- 5. (a) LED lamp shall consist of an integral sealed unit containing the following components: housing, integral lens, matrix of light emitting diodes (LEDs) emitting white monochromatic light, and electronic and electrical components necessary to permit operation at nominal 120 volt, 60 Hertz power.
- (b) LED lamp shall be of such dimensions as to permit mounting in the signal head, and be interchangeable with incandescent lamps manufactured for the same purpose.
- (c) Minimum brightness of LED lamps shall be in accordance with the luminous requirements of ITE. During the required operating life of LED lamps, the luminance output of the lamps must not be less than 60% of the values specified in the standard.
- (d) LED lamps shall be equivalent to an incandescent 150 watt PAR-46 lamp. The lamp shall have the same shape as a PAR-46 lamp and shall have a 3-prong base.
- (e) LED lamp power supply shall be current regulated and filtered to provide instant on indications, and to prevent momentary signal outages or flicker. Units must be fully operable over a range of 90 volts to 130 volts at 60 Hertz ± 3 Hertz.
- (f) Lamps must be fully operable at temperature ranges of -40° F. (-40° C.) to +165° F. (+74° C.) at up to 100% relative humidity.
- (g) Lamps shall be clearly marked in a permanent manner showing information required for warranty and long term performance. Information to be shown must include manufacturer name, date of manufacture, and electric power



requirements.

- (h) The LED lamp shall be compatible with the traffic signal controller equipment currently in use by the City of Chicago, and meeting the City's latest specifications for traffic signal control equipment. In particular the LED unit shall be compatible with the NEMA TS-1 and later traffic signal load switches and conflict monitors.
- (i) LED lamps shall meet applicable sections of Title 47, Sub-Part B, Section 15 of the Federal Communications Commission (FCC) rules as applies to electronic noise limitation and electromagnetic interference.

**WIRING**

- 6. (a) Wire Leads. Each lamp connector must be furnished with 2 wire leads color coded as follows:

First Wire:

White	Common
-------	--------

Second Wire:

Red	Red Section
Yellow	Yellow Section
Green	Green Section
Yellow with Black Tracer	Yellow Arrow Section
Green with Black Tracer	Green Arrow Section

The wires must be No. 18 AWG stranded copper wire rated at 600 volt, 105°C., with thermo-plastic insulation. The leads must connect to the terminal strip without being spliced. The ends of the lamp leads must be stripped of 0.5 inches of insulation and tinned.

- (b) Terminal Strip. A dual-point, barrier type, terminal strip with a solid base and pressure plate type connectors shall be securely attached at both ends to the housing body inside the "Green" section of the signal head. The number of terminal points shall be predicated upon the number of sections in the signal head. Single section, 2 section, 3 section and 4 section heads must have 5 point blocks, while 5 section heads must have 6 point blocks.
- (c) Cable. One 11 foot length of flexible SO electric cord must be furnished with each signal head. The conductors must be No. 16 copper with color coded insulation. and an overall jacket. The number of conductors must include a neutral, a ground, and one leg for each section. Both ends of each cable length must be carefully stripped of 6 inches of jacket and 1 inch of insulation, with each

conductor properly tinned.

**TESTING AND DOCUMENTATION REQUIREMENTS**

- 7. (a) Documentation. The contractor shall provide certified manufacturing and testing documentation to demonstrate that the traffic signals being supplied meet or exceed the specification requirements. All optical units shall be tested by a nationally recognized testing laboratory (NRTL), such as Intertek (ETL division), to demonstrate compliance with the latest ITE VTCSH specification. All LED units shall have the testing laboratory’s label attached.
- (b) Inspection. The signals will be subject to inspection at the request of the Commissioner. Final inspection shall be made at point of delivery. Any signal rejected must be removed, disposed of, and replaced by the contractor at his sole cost.
- (c) Warranty. The manufacturer shall warrant the signals to meet the requirements of this specification, and must warrant all equipment, components, parts and appurtenances against defective design, material and workmanship for a period of 3 years from date of delivery [ date of acceptance for contract construction]. In the event defects and failures occur during the warranty period, the manufacturer must replace such units at no expense to the City. This warranty shall be evidenced by a letter or certificate of warranty submitted to the City at the time delivery is made. The warranty must be signed and dated by an official of the manufacturer who is empowered by the manufacturer to enter into such a warranty.

**PACKAGING**

- 8. (a) Packing. Each traffic signal assembly shall be packed in a suitable carton so secured that the signal will not be damaged during shipment, handling or storage. Each section will include a lamp.
- (b) Marking. Each carton containing a traffic signal shall be clearly marked on the outside in letters not less than 3/8 inch tall with the legend: "TRAFFIC SIGNAL, OPTICALLY PROGRAMMED@, the number of Sections as required, the colors, the name of the manufacturer, the date of manufacture, the pertinent Contract Number and the appropriate City Commodity Code Number.

**THIS SPECIFICATION MUST NOT BE ALTERED**

**ELECTRICAL SPECIFICATION 1545  
DIVISION OF ENGINEERING  
DEPARTMENT OF TRANSPORTATION  
CITY OF CHICAGO  
REVISED FEBRUARY 7, 2014**

**PEDESTRIAN COUNTDOWN TRAFFIC SIGNAL  
LED, 16 INCH WITH SYMBOLIC WALK/DON'T WALK,  
POLYCARBONATE HOUSING**

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**SUBJECT**

1. This specification states the requirements for a single section pedestrian countdown signal with light emitting diode (LED) symbolic messages on a nominal sixteen inch by eighteen inch message surface and enclosed in a polycarbonate housing.

**GENERAL REQUIREMENTS**

2. (a) Sample and Certified Test Reports. One complete pedestrian countdown signal, fully assembled and wired, of the manufacture proposed to be furnished, must be submitted along with the required certified test reports, within 15 business days upon request of the Chief Procurement Officer. The sample must be delivered to the Division of Electrical Operations, 2451 South Ashland Avenue, Chicago, Illinois 60608.
- (b) Standards. Equipment furnished under this specification shall meet the appropriate requirements of the following standards, as required within the body of this specification:  
  
American Association of State Highway and Transportation Officials (AASHTO)  
American Iron and Steel Institute (AISI)  
American Society for Testing and Materials (ASTM)  
Institute of Transportation Engineers (ITE)  
National Electrical Manufacturers Association (NEMA)  
Underwriters Laboratories (UL)
- (c) Approval. Approval will mean approval in writing by the Commissioner or his duly authorized representative.

**MATERIAL AND EQUIPMENT REQUIREMENTS**

- 3. (a) The pedestrian signal heads must conform to ITE Standard "Pedestrian Traffic Control Signal Indications" (PTCSI), in which the most recently published revision will govern.
- (b) Housing Design. The housing must be one piece, ultra violet stabilized polycarbonate resin of the specified color, injection molded complete with integral top, bottom, and sides, having a minimum thickness of 0.1 inches.

The polycarbonate formulation used must provide these physical properties in the housing (Tests may be performed on separately molded specimens).

<b><u>TEST</u></b>	<b><u>REQUIRED</u></b>	<b><u>METHOD</u></b>
Specific gravity	1.17 minimum	ASTM D 792
Vicat Softening temp	310-320° F	ASTM D 1525
Brittleness temp.	-200° F	ASTM D 746
FlammabilitySelf-extinguishing		ASTM D 635
Tensile strength, yield	8,500 PSI	ASTM D 638
Elongation at yield	5.5-8.5%	ASTM D 638
Shear strength, yield	5,500 PSI min.	ASTM D 732
Izod impact strength (notched, .125" thick)	12-16 ft. lbs./in.	ASTM D 256
Fatigue strength (at 2.5 mm cycles)	950 PSI min.	ASTM D 671

- (c) Positioning Device. The top and bottom opening of each housing must have integral serrated bosses that will provide positive positioning of the signal head in 5° increments to eliminate undesirable rotation or misalignment of the signal head between sections. A total of 72 teeth must be provided in the serrated bosses to allow the signal face to be rotated 360° about its axis. The teeth shall be clean and sharp to provide positive positioning with the grooves of the mating section or framework. Each opening must accommodate standard 1.5 inch pipe fittings and brackets.
- (d) Hinges. The housing must have 4 integral hinge lugs, with stainless steel hinge pins (AISI 304), located on the left side for mounting the door. The hinge pins must be straight and not protrude past the outside of the housing lugs. The housing must have 2 integral latching bolt lugs on the right side each with a stainless steel hinge pin to which a latching bolt (AISI 304), washer, and wing nut will be attached. The wing nuts must be captive.
- (e) Door. The door must be a one piece ultraviolet stabilized polycarbonate resin of the specified color, injection molded complete with a minimum thickness of 0.1 inch. Two hinge lugs on the left side and 2 sets of latch screw jaws centered on the right side, as viewed from the front of the signal, must be integrally cast with

the housing door. The door must be hinged to the housing with 2 stainless steel hinge pins, drive fitted. Two stainless steel latch screws and wing nuts and washer assemblies on the latch side of the housing body must provide for opening and closing the door without the use of tools.

The inside of the door must be grooved to accommodate a one piece, air-cored ethylene propylene diene monomer(EPDM) gasket to provide a weatherproof and dust proof seal when the door is closed. The outside of the door must have an integral rim completely encircling the opening to prevent leakage between the door and the LED module. The rim must have equally spaced tabs around the circumference with threaded metal inserts for the visor attachment.

- (f) Gaskets. Wherever necessary to make a completely dust-proof, moisture-proof and weatherproof assembly of the housing and optical system, approved type gaskets of neoprene or silicone rubber shall be provided.

**LED OPTICAL MODULES**

- 4. (a) Light emitting diode (LED) optical modules must consist of an integral unit containing the following components: power leads, housing, integral lens, matrix of light emitting diodes (LEDs) emitting monochromatic light of desired colors, and electronic and electrical components necessary to permit operation at nominal 120 volt, 60 hertz power. All units shall form a neat compact unit within the housing body with no light leakage between the door and the housing body.
- (b) The LED unit shall meet the applicable requirements of ITE’s LED Pedestrian Traffic Control Modules. During the required operating life of LED signal units, the luminance output of the units must not be less than 60% of the values specified in the standard.
- (c) LED module power supply must be constant current regulated and filtered to provide instant on indications, and to prevent momentary signal outages or flicker.
- (d) Modules shall consist of LEDs uniformly distributed to present a homogeneous appearance on the face of the lens from a wide viewing angle.
- (e) LEDs shall be wired so that the loss of a single LED or a string of LEDs will not reduce the luminescence below the minimum requirement.
- (f) For purposes of this specification, failure of a single unit is defined as an occurrence where the luminescence of the signal measured in candela in standard test procedures is less than the required initial luminance or luminance at time points and conditions specified; or where minimum required brightness is achieved, but 2 or more series strings of LEDs or in excess of 20% of LEDs are not operable.

- (g) LED modules must be fully operable over a range of 90 volts to 130 volts at 60 hertz  $\pm$  3 hertz.
- (h) Surge protection. Each unit must be provided with integral surge protection to withstand a transient of 600 volt, 100 microsecond rise and 1 millisecond pulse width. The surge protector shall provide full electrical and physical protection to all unit components.
- (i) Maximum permissible power consumption at ambient conditions (nominal 120 volts, 60 hertz, 70°F.) must be 18 watts at a minimum 90% power factor. Power consumed must not vary by more than 10% from nominal power consumption over a voltage range of 105 volts to 125 volts, and over permissible environmental ranges.
- (j) Modules must be fully operable at temperature ranges of -40°F. (-40°C.) to +165°F. (+74°C.) at up to 100% relative humidity.
- (k) Modules shall be clearly marked on the back surface of the unit in a permanent manner showing information required for warranty and long term performance. Information to be shown must include manufacturer name, date of manufacture, electric power requirements, signal model type, and signal serial number.
- (l) The LED module shall be compatible with all traffic signal controller equipment currently in use by the City of Chicago, and meeting the City's latest specifications for traffic signal control equipment. In particular the LED unit shall be compatible with the NEMA TS-1 and later traffic signal load switches and conflict monitors.
- (m) Modules shall meet applicable sections of Title 47, Sub-Part B, Section 15 of the Federal Communications Commission (FCC) rules as applies to electronic noise limitation and electromagnetic interference.
- (n) Total harmonic distortion (THD) induced into the voltage and current AC power line sine waves must not exceed 20%.
- (o) Burn-in. LED Optical modules must be energized for a minimum 24 hour burn-in at 100% on-time duty cycle.

**DISPLAY**

- 5. (a) The message area shall be approximately 16 inches square and display the double overlay "Don't Walk" and "Walk" symbols immediately adjacent to the countdown digits. The symbols shall be applied in such a manner as to provide an opaque polycarbonate background and illuminated legends.

- (b) Symbolic Messages. Symbols for "Walk" (Man) and "Don't Walk" (Hand) must conform in style and color to those of ITE. The symbols must not be less than 9.5 inches high with proportional width. The "Don't Walk" symbol must be Portland orange, and the "Walk" symbol must be of lunar white, conforming to the specifications of the ITE/PTCSI.
- (c) Countdown Digits. Countdown digits must be Portland orange and not less than 9 inches high with proportional width and shall be compliant with latest ITE standards.
- (d) The module message surface shall be constructed of ultraviolet (UV) stabilized, impact resistant polycarbonate or acrylic. The surface must be anti-glare, smooth texture, and clear.

**WIRING**

- 6. (a) Wire Leads. Each module connector must be furnished with 3 wire leads color coded as follows:

White - Common  
 Red - "Don't Walk" Indication  
 Green - "Walk" Indication

The leads must be No.18 AWG, stranded copper wire rated at 600 volt and 105°C., with thermoplastic insulation. The ends of the leads must be stripped of 0.5 inches of insulation and tinned. The leads must be splice-free and connected to one side of the terminal strip.

- (b) Terminal Strip. A four terminal, eight point, barrier type terminal strip with solid base and pressure plate type connectors must be securely attached at each end to the housing body inside the walk section.
- (c) Cable. One 11 foot length of flexible electric cord, medium duty, type SO, 3-conductor No. 16 AWG stranded copper, with color coded insulation, and an overall jacket, must be furnished with each pedestrian signal. Both ends of each cable length must be carefully stripped of 6 inches of jacket and 1 inch of insulation, and each conductor properly tinned.

**COUNTDOWN FUNCTIONALITY**

- 7. (a) The countdown unit shall be compatible with all traffic signal controller equipment currently in use by the City of Chicago, and meeting the City's latest specifications for traffic signal control equipment.
- (b) The countdown timer must have a micro-processor capable of recording its own time when connected to a traffic controller.

- (c) The countdown timer unit must continuously monitor the traffic controller for any changes to the pedestrian phase time and re-program itself automatically as needed.
- (d) The countdown unit must register the time for the walk and clearance intervals individually and must begin counting down at the beginning of the pedestrian change interval (flashing hand).
- (e) At the end of the pedestrian change interval, the unit must display "0" and then blank out. The display must remain dark until the beginning of the next countdown.
- (f) In the event of a preemption sequence, the countdown unit must skip the preempted clearance time and reach "0" at the end of the pedestrian change interval.
- (g) The countdown must remain synchronized with signal indications and always reach "0" at the end of the pedestrian change interval.
- (h) The countdown must not display an erroneous or conflicting time when subjected to defective load switches.

**TESTING AND DOCUMENTATION REQUIREMENTS**

- 8. (a) Documentation. The contractor shall provide certified manufacturing and testing documentation to demonstrate that the traffic signals being supplied meet or exceed the specification requirements. All LED Optical modules shall be tested by a nationally recognized testing laboratory (NRTL), such as Intertek (ETL division), to demonstrate compliance with the latest ITE VTCSH specification. All LED modules shall have the testing laboratory's label attached.
- (b) Inspection. The signals will be subject to inspection at the discretion of the Commissioner. Final inspection shall be made at point of delivery. Any signal rejected must be removed, disposed of, and replaced by the contractor at his sole cost.
- (c) Warranty. The manufacturer shall warrant the signals to meet the requirements of this specification, and must warrant all equipment, components, parts and appurtenances against defective design, material and workmanship for a period of 3 years from date of delivery [date of acceptance for contract construction]. In addition, LED optical modules must carry a 7 year warranty against failure or loss of color (chromaticity) and signal brightness (luminance) below minimum acceptable PTCSI standard levels from date of delivery [date of acceptance for contract construction]. In the event defects and failures occur in the LED units during the warranty period, the manufacturer must replace such units at no expense to the City. This warranty shall be evidenced by a letter or certificate of warranty submitted to the City at the time delivery is made. The LED warranty



must cover all units delivered in an order or installed by contract, and must include unit serial numbers. The warranty must be signed and dated by an official of the manufacturer who is empowered by the manufacturer to enter into such a warranty.

**PACKAGING**

9. (a) Packing. Each pedestrian signal assembly shall be packed in a suitable carton so secured that the signal will not be damaged during shipment, handling or storage.
- (b) Marking. Each carton containing a pedestrian signal shall be clearly marked on the outside in letters not less than 3/8 inch tall with the legend: "PEDESTRIAN SIGNAL, COUNTDOWN, SIXTEEN-INCH, SYMBOLIC LED WALK-DON'T WALK@", the name of the manufacturer, the date of manufacture, the pertinent Contract Number and the appropriate City Commodity Code Number.

**THIS SPECIFICATION MUST NOT BE ALTERED**

**ELECTRICAL SPECIFICATION 1553  
DIVISION OF ENGINEERING  
DEPARTMENT OF TRANSPORTATION  
CITY OF CHICAGO  
APRIL 13, 2006**

**ACCESSIBLE PEDESTRIAN SIGNAL - PUSH BUTTON STATION**

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**1. GENERAL REQUIREMENTS**

- 1.1 This specification states the requirements for an accessible pedestrian signal push button station (APS) capable of providing audible information to assist pedestrians with visual disabilities in crossing the street at signalized intersections.
- 1.2 Sample and Certified Test Reports. One complete APS unit, fully assembled and wired, of the manufacture proposed to be furnished, must be submitted along with the required certified test reports, within fifteen (15) business days upon request of the Chief Procurement Officer. The sample must be delivered to the Division of Electrical Operations, 2451 South Ashland Avenue, Chicago, Illinois 60608.
- 1.3 Standards. Equipment furnished under this specification must meet the appropriate requirements of the following standards, as required within the body of this specification:
- Manual on Uniform Traffic Control Devices (MUTCD)  
International Organization for Standards (ISO)  
IDOT Special Provision for Accessible Pedestrian Signals
- 1.4 Approval. Approval will mean approval in writing from the Commissioner of Transportation or his/her duly authorized representative.

**2. MATERIAL AND EQUIPMENT REQUIREMENTS**

- 2.1 The APS must conform to the MUTCD, in which the most recently published revisions will govern.
- 2.2 The APS must be compatible with City of Chicago Accessible Pedestrian Signal Controller.
- 2.3 Housing Design. Push button station frame must be made of cast aluminum alloy with a minimum thickness of .125 inch with mounting holes to hold a 5" x 7 3/4" or larger pedestrian sign. Speaker must be recessed and weatherproof.

2.4 Pedestrian Pushbutton.

2.4.1 Pedestrian pushbutton must be at least 50 mm (2 in.) in diameter or width with raised directional arrow on the button. The force required to activate the pushbutton must be no greater than 15.5 N (3.5 lb).

2.4.2 If a pushbutton is depressed for a field-settable extended period of time, a custom verbal message must be given which tells the pedestrian their location or other pertinent information about the intersection.

2.4.3 A red light emitting diode (LED) must be located on or near the pushbutton which, when activated, acknowledges the pedestrian request to cross the street.

2.5 Audible Indications.

2.5.1 A clear, verbal message must be used to communicate the pedestrian walk interval. This message must sound throughout the WALK interval only. The verbal message must be AWALK SIGN IS ON TO CROSS (STREET NAME)@ or such other message as requested by the Commissioner.

2.5.2 Automatic volume adjustments in response to ambient traffic sound level must be provided up to a maximum of 89 dB.

2.5.3 A pushbutton locator tone must sound at each pushbutton. Locator tone and verbal messages should be no more than 5 dB louder than ambient sound.

2.5.4 All sounds for all push button stations on an intersection must be synchronized.

2.6 Electrical Requirements.

2.6.1 Pole unit must be designed for operation over a range of temperatures from -351 F to +1651 F (-371 C to +751 C).

2.6.2 Push button station must require only two wires coming from the traffic control cabinet for each phase/crosswalk.

2.6.3 Unit must operate at 12/24 VDC.

2.6.4 Pushbutton station features must be programmable using handheld infrared device with password security.

**3. TESTING AND DOCUMENTATION REQUIREMENTS**

3.1 Documentation. The contractor must provide certified manufacturing and testing documentation to demonstrate that the APS units being supplied meet or exceed the

specification requirements.

- 3.2 Inspection. The signals must be subject to inspection at the discretion of the Commissioner. Final inspection must be made at point of delivery. Any APS unit rejected must be removed and disposed of by the contractor at his sole cost.
  
- 3.3 Warranty. The manufacturer must warrant the APS units to meet the requirements of this specification, and must warrant all equipment, components, parts and appurtenances against defective design, material and workmanship for a period of three (3) years from date of acceptance. In the event defects or failures occur during the warranty period, the manufacturer must repair and/or replace all defective materials at no expense to the City. This warranty must be evidenced by a letter or certificate of warranty submitted to the City at the time final delivery is made. The warranty must cover all units delivered in an order or installed by contract, and must include unit serial numbers for each APS unit. The warranty must be signed by an official of the manufacturer who is empowered by the manufacturer to enter into such an agreement.

THIS SPECIFICATION MUST NOT BE ALTERED

**ACCESSIBLE PEDESTRIAN SIGNAL - CONTROLLER**

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**1. GENERAL REQUIREMENTS**

- 1.1 This specification states the requirements for a controller unit capable of operating accessible (audible) pedestrian signals.
- 1.2 Sample and Certified Test Reports. One complete controller unit (Unit), fully assembled and wired, of the manufacture proposed to be furnished, must be submitted along with the required certified test reports, within fifteen (15) business days upon request of the Chief Procurement Officer. The sample must be delivered to the Division of Electrical Operations, 2451 South Ashland Avenue, Chicago, Illinois 60608.
- 1.3 Standards. Equipment furnished under this specification must meet the appropriate requirements of the following standards, as required within the body of this specification:
- Manual on Uniform Traffic Control Devices (MUTCD)  
International Organization for Standards (ISO)  
IDOT Special Provision for Accessible Pedestrian Signals  
American Society for Testing and Materials (ASTM)  
National Electrical Manufacturers Association (NEMA)  
Underwriters Laboratories (UL)
- 1.4 Approval. Approval will mean approval in writing by the Commissioner of Transportation or his/her duly authorized representative.

**2. EQUIPMENT AND FUNCTIONALITY REQUIREMENTS**

- 2.1 Unit must be designed for installation in standard City of Chicago traffic controller cabinet.
- 2.2 Unit must be compatible with City of Chicago Accessible Pedestrian Signal Push Button Station.
- 2.3 Unit must be capable of operating with 115 VAC.

- 2.4 Unit will function as the power supply and signaling interface between the traffic signal controller and the accessible pedestrian signal push button stations.
- 2.5 One Unit must be capable of controlling up to 12 push button stations.
- 2.6 The system must be able to perform self-test of push buttons and report any failures to traffic controller.
- 2.7 Unit must be designed for operation over a range of temperatures from -351 F to +1651 F (-371 C to +751 C).

**3. TESTING AND DOCUMENTATION REQUIREMENTS**

- 3.1 Documentation. The contractor must provide certified manufacturing and testing documentation to demonstrate that the controller units being supplied meet or exceed the specification requirements. Testing must be conducted by an independent and certified testing laboratory.
- 3.2 Inspection. The signals must be subject to inspection at the discretion of the Commissioner. Final inspection must be made at point of delivery. Any Unit rejected must be removed and disposed of by the contractor at his sole cost.
- 3.3 Warranty. The manufacturer must warrant the Units to meet the requirements of this specification, and must warrant all equipment, components, parts and appurtenances against defective design, material and workmanship for a period of five (5) years from date of acceptance. In the event defects or failures of Units occur during the warranty period, the manufacturer must repair and/or replace all defective materials at no expense to the City. This warranty must be evidenced by a letter or certificate of warranty submitted to the City at the time final delivery is made. The warranty must cover all Units delivered in an order or installed by contract, and must include serial numbers for all Units. The warranty must be signed by an official of the manufacturer who is empowered by the manufacturer to enter into such an agreement.

**THIS SPECIFICATION MUST NOT BE ALTERED**

**ELECTRICAL SPECIFICATION 1560  
DIVISION OF ENGINEERING  
DEPARTMENT OF TRANSPORTATION  
CITY OF CHICAGO  
REVISED DECEMBER 4, 2014**

**ADVANCED TRANSPORTATION CONTROLLER AND CABINET  
WITH UNINTERRUPTIBLE POWER SUPPLY**

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**1. GENERAL REQUIREMENTS**

1.1 This specification details the requirements for traffic signal control equipment for use in the City of Chicago. This equipment will control traffic signal timing and sequencing at an intersection. The equipment must include a battery back-up system which will maintain power to the signals during a power failure.

1.2 (For contract construction only) If requested by the City, the contractor must provide a sample to the Division of Electrical Operations, 2451 South Ashland Avenue, Chicago, Illinois 60608. The sample must consist of the controller, cabinet, load switches, conflict monitor and all appurtenant wiring and equipment completely assembled as a working unit. This sample will be regarded as a finished production sample and conformance or non-conformance to these specifications will be based on the sample submitted.

(For City commodity contract only) If requested by the Chief Procurement Officer, within forty-five (45) days from the receipt of such request, the bidder must provide a sample to the Division of Electrical Operations, 2451 South Ashland Avenue, Chicago, Illinois 60608. The sample must consist of the controller, cabinet, load switches, conflict monitor and all appurtenant wiring and equipment completely assembled as a working unit. If the sample is acceptable and the bidder is awarded a contract, the sample will become the property of the City of Chicago with a suitable credit issued to the contract.

1.3 All tests as outlined herein must be regarded as minimum requirements. The contractor must submit his testing procedure for approval prior to performing any testing functions. Upon successful completion of all testing, certified test reports must be submitted for each unit. Units not successfully passing these tests or lacking proper documentation will be rejected. The manufacturer, or manufacturer's representative, must be available for shop testing at the City's facilities.

1.4 Standards. Equipment furnished under this specification must meet the appropriate requirements of the following standards, as required within the body of this specification:

American Association of State Highway and Transportation Officials (AASHTO)  
American Society for Testing and Materials (ASTM)  
Institute of Transportation Engineers (ITE)  
Manual on Uniform Traffic Control Devices (MUTCD)  
National Electrical Manufacturers Association (NEMA)  
Occupational Safety and Health Administration (OSHA)  
Underwriters Laboratories (UL)

- 1.5 Standard Drawings. The Electrical Standard Drawing 962 “Load Switch and Conflict Assignment”, Electrical Standard Drawing 964 “Traffic Controller Cabinet Back Panel and Power Supply, 1 of 2”, Electrical Standard Drawing 965 “Traffic Controller Cabinet Back Panel and Power Supply, 2 of 2”, and Electrical Standard Drawing 909 “Fiber Optic Patch Panel” are integral parts of this specification.
- 1.6 Warranty. The manufacturer(s) must warranty the performance and construction of the traffic signal controller and other major components to meet the requirements of this specification, and must warranty all parts, components, and appurtenances against defects in design, material, and workmanship for a period of one (1) year after acceptance by the City. In the event of defects or failures during this period, the manufacturer(s) must repair and/or replace all defective or failed parts or appurtenances at no expense to the City.
- 1.7 Manufacturer. The manufacturer of the controller and the manufacturer of the battery back-up system must demonstrate a knowledge of past production, or have been actively engaged in the sale and/or service of the equipment herein described, as demonstrated by a submitted list of comparable projects. The manufacturer must be a recognizable company that manufactures ATC controllers, such as Econolite, McCain, Siemens, or U.S. Traffic.

**2. CONTROLLER REQUIREMENTS**

- 2.1 ATC. The controller must be an Advanced Transportation Controller (ATC) meeting the requirements of the specification “Advanced Transportation Controller (ATC) Standard Version 5.2b” dated June 26, 2006 and the requirements of NEMA TS2-2003. The referenced specification is a joint effort of AASHTO, NEMA, and ITE. Since each user agency has different controller needs, for the City of Chicago, the controller must meet the programming modifications and options listed in the ATC Matrix as indicated in Table A. All software necessary to make the controller operational must be included.
- 2.2 Power. The controller must operate on 120 volt, 60 cycle ( $\pm 3$  Hertz), single phase, alternating current. The controller must function in the range from 89 to 135 Volts a.c. The power consumed must be under 50VA.



- 2.3 Packing. (For City commodity contracts only) Each controller, with all its component parts, must be suitably packed in a single container in such a manner as to prevent damage to the contents in shipment and handling.
- 2.4 Instructions. One (1) complete set of up to date instructions providing complete information on installation, adjustment, operation and maintenance, including both up to date "Logic Schematics" and "Electronic Circuit" diagrams, of these controllers, must be furnished to the Division of Electrical Operations for approval prior to the first shipment of controllers. All information, including photos and schematics, must reference to the controller being furnished on this contract and must be a high quality, completely legible reproduction. Upon approval, one complete set of data must be furnished with each controller.
- 2.5 Training. (For City commodity contracts only) The contractor must provide training at the City's facilities. The training must be on the actual equipment provided under the contract, and must include, but not be limited to, programming all features, connecting and wiring, and troubleshooting. Training manuals are required (training manuals should include the instructions in a teaching-type format). Training material must be provided for up to thirty (30) personnel. Training must be divided into three (3) one week sessions. The timing of these sessions will be determined after contract award and must take place within the contract period. Each week may contain more than one training class (i.e. 2-3 day classes). Each training class may have up to ten (10) personnel. Classes must be structured for both field personnel and shop personnel. The manufacturer must provide all material and equipment necessary for the classes.
- 2.6 Chassis. The chassis shall be aluminum with a powder coat finish. No plastic chassis or composite chassis will be allowed. The controller must physically fit into existing 'M', 'P', and 'SUPER P' cabinets configured for City of Chicago applications, so that retrofitting will not be a problem. The controller must not exceed the following dimensions: 10.5 inches high, 10.5 inches deep, and 15 inches wide.
- 2.7 Processor / Memory. At a minimum, the processor will be:  
  
Clock speed - 300MHz  
Non-volatile Memory - 32MB Flash  
DRAM - 64MB  
SRAM - 1MB  
(All memory and firmware must be stored in flash memory. No EPROMS will be allowed.)
- 2.8 Display. The display shall be a 16 x 40 backlit LCD using a 6 x 8 character font. Display and keypad must be permanently attached to chassis. Detachable keypads will not be allowed.

- 2.9 Environmental. The controller must operate in the temperature range of -34° Celsius to +74° Celsius. The controller must operate within the relative humidity of 5% to 95%.
- 2.10 All printed circuit boards must be mounted vertically.
- 2.11 Encapsulation of 2 or more discrete components into circuit modules is prohibited except for transient suppression circuits, resistor networks, diode arrays, solid-state switches, optical isolators and transistor arrays. All encapsulated components must be second sourced and must be of such design, fabrication, nomenclature or other identification as to be purchased from a wholesale distributor or from the component’s manufacturer as a standard product. Custom encapsulated components are not allowed.
- 2.12 Obsolete components, components no longer supported by the manufacturer, components not recommended for new designs, components which have been discontinued or which the contractor should have reasonably been expected to know were discontinued, or components which the vendor/manufacturer has announced plans to discontinue at the time of the bid/contract must not be used in the design of any subassemblies provided under this contract.
- 2.13 The controller must meet the functional and environmental requirements of NEMA TS2 2003. The use of 2070s, 170s, BIUs, SIUs, or similar devices is not allowed.
- 2.14 As allowed by ATC v5.2b, Section 8.1.1, the controller will utilize NEMA ‘A’, ‘B’, and ‘C’ I/O connectors, except for the HMC-1000 and LMD40 I/O variants. Pin assignments for NEMA ‘A’, ‘B’, and ‘C’ connectors must follow the NEMA TS2 2003 standards for I/O. Port 2 must be the ATC v5.2b pin-limited version of NEMA TS2 Port 2. Port 4 (C50S) must be a 9-pin connector with only limited signals being required.

**Special function connector for the TS2-2 must follow the CPC style “D” pin outs as follows:**

<b><u>CPC MSD Pin</u></b>	<b><u>Function</u></b>
1	Flash
2	Offset 1
3	Interconnect Common
4	User defined input 6
5	Offset 2
6	Offset 3
7	Time Plan A
8	User defined input 7
9	User defined input 8
10	Call to Free
11	Call to week 10

12	Time Plan B
13	Time Plan C
14	Time Plan D
15	Alt Seq A
16	Alt Seq B
17	Alt Seq C
18	Dimming
19	Monitor status bit C
20	System Input
21	Alt Seq D
22	Monitor status bit A
23	Monitor status bit B
24	Veh Det 13
25	Veh Det 9
26	Veh Det 10
27	Veh Det 11
28	Polarizing Pin
29	Veh Det 12
30	Veh Det 14
31	Veh Det 15
32	Veh Det 16
33	SGO/Conditional Service
34	Preempt input 5
35	Preempt output 1
36	Preempt output 2
37	Interconnect inhibit
38	Time Clock sync
39	Sync inhibit
40	Preempt input 1
41	Preempt input 2
42	Preempt input 3
43	Preempt output 3
44	Polarizing Pin
45	Preempt output 4
46	Preempt output 5
47	System Out
48	Preempt output 6
49	Preempt input 4
50	Clock Ckt 9 (Aux 1)
51	Clock Ckt 10 (Aux 2)
52	Clock Ckt 11 (Aux 3)
53	Clock Ckt 12 (Aux 4)
54	Clock Ckt 13 (System)
55	Clock Ckt 8 (Flash)
56	Clock Ckt 3 (Offset 1)

57	Clock Ckt 4 (Offset 2)
58	Clock Ckt 5 (Offset 3)
59	Clock Ckt 1 (T/P A)
60	Clock Ckt 2 (T/P B)
61	Clock Ckt 6 (T/P C)
62	Clock Ckt 7 (T/P D)
63	Preempt input 6

2.15 Downward compatibility with existing City of Chicago cabinets.

- (1) The controller must be of a modular design allowing for the ability to exchange I/O modules to allow for use in existing City of Chicago HMC-1000, LMD40, and standard NEMA TS2-2 cabinets. This I/O module must be “plug and play”. The controller’s firmware must detect the type of I/O installed (HMC-1000, LMD40 or NEMA TS2) and provide the proper user interface. Adapter harnesses for the HMC-1000, LMD40 and Setcon clock will not be allowed.
- (2) The HMC-1000 I/O module must be pinned as follows:

<b>63 Pin Connector</b>	<b>Function</b>
1	Output 20
2	Output 11
3	Manual Advance
4	Stop Time
5	Output 24
6	Offset 1
7	Offset 3
8	Output 15
9	Preempt 2
10	Advance
11	Output 23
12	Restart
13	Output 32
14	Offset 2
15	Output 16
16	Preempt 1
17	Output 25
18	Output 28
19	Spare 1
20	Spare 2
21	Output 7
22	Output 18
23	Output 21
24	Output 22

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25	Dial 3
26	Dial 2
27	Output 1
28	Output 14
29	Output 4
30	Output 29
31	Output 27
32	Output 17
33	Output 9
34	Output 19
35	Dial 4
36	On-Line
37	Flashing Bus
38	Manual
39	Output 30
40	Output 31
41	Output 12
42	Output 10
43	Output 2
44	Output 3
45	Output 13
46	Output 8
47	Output 26
48	Logic Ground
49	Not Used
50	Not Used
51	Output 5
52	Output 6
53	Logic Ground
54	Logic Ground
55	Not Used
56	Not Used
57	Not Used
58	Not Used
59	24 V.D.C
60	Not Used
61	115 Volts AC
62	AC Neutral
63	Chassis Ground

- (3) The LMD40 I/O module contains 4 I/O connectors, MSA, MSB, MSD, and communications connectors which must be pinned as follows:

<b>LMD40 MSA</b>	<b>Pin</b>	<b>Voltage Level</b>
<b>Actuation 3</b>	A	DC
24 V.D.C	B	DC
Voltage Monitor	C	DC
Actuation 1	D	DC
Actuation 2	E	DC
Preemption 2	F	DC
Preemption 1	G	DC
Interval Advance	H	DC
Stop Time	J	DC
MCE (Manual Control)	K	DC
External C/S/O	L	DC
Signal Plan 2	M	DC
Signal Plan 3	N	DC
System Cont/AZ Reset	P	DC
External Start	R	DC
Remote Flash (AC)	S	120 VAC
Interconnect Common	T	120 VAC
AC – (Common)	U	AC
Chassis Ground	V	Earth Ground
Logic Ground	W	DC Reference
Output 1	X	DC
Output 2	Y	DC
Output 3	Z	DC
Output 4	a	DC
Output 5	b	DC
Output 6	c	DC
Output 7	d	DC
Output 8	e	DC
Output 9	f	DC
Output 10	g	DC
Output 11	h	DC
Output 12	i	DC
Output 13	j	DC
Output 14	k	DC
Output 15	m	DC
Output 16	n	DC
AC+ input	p	120 VAC
Output 17	q	DC
Output 18	r	DC
Output 19	s	DC
Output 20	t	DC
Output 21	u	DC
Spare Output	v	DC
Spare Output	w	DC

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Spare Output	x	DC
Cycle 2 (User Defined )	y	120 VAC
Cycle 3 (User Defined)	z	120 VAC
Split 2	AA	120 VAC
Split 3	BB	120 VAC
Output 22	CC	120 VAC
Output 23	DD	120 VAC
Offset 1	EE	120 VAC
Offset 2	FF	120 VAC
Offset 3 (user def 1)	GG	120 VAC
Output 24	HH	DC

<b><u>LMD40 MSB</u></b>	<b><u>Pin</u></b>	<b><u>Voltage</u></b>
Output 25	A	DC
Output 26	B	DC
Output 27	C	DC
Output 28	D	DC
Output 29	E	DC
Output 30	F	DC
Output 31	G	DC
Output 32	H	DC
Output 33	J	DC
Output 34	K	DC
Output 35	L	DC
Output 36	M	DC
Output 37	N	DC
Output 38	P	DC
Output 39	R	DC
Output 40	S	DC
Actuation 4	T	DC
Hold	U	DC
Force Off	V	DC

<b><u>LMD40 MSD</u></b>	<b><u>Pin</u></b>	<b><u>Voltage</u></b>
Flash Monitor 1	1	120 VAC
Cycle 5	2	120 VAC
PE Clear 1	3	DC
PE Clear 3	4	DC
Flash Monitor 2	5	120 VAC
Spare Input 4	6	120 VAC
System Input	7	120 VAC
AZ Reset (Absolute Zero)	8	DC
PE Clear 2	9	DC

UD 6 Input	10	DC
Call to week 10	11	DC
Signal Plan 6	12	DC
Signal Plan 7	13	DC
Signal Plan 8	14	DC
Actuation 5	15	DC
Actuation 6	16	DC
Actuation 7	17	DC
Spare input 1	18	DC
UD 7 Input	19	DC
Actuation 8	20	DC
Actuation 9	21	DC
Actuation 10	22	DC
Spare input 2	23	DC
UD 8 input	24	DC
Sys Command (Ckt 13)	25	DC
Flash Attained	26	DC
PE Active	27	DC
Polarization	28	DC
System Out	29	DC
Preempt input 3	30	DC
Preempt input 4	31	DC
Preempt input 5	32	DC
Signal Plan 5 in	33	DC
Call to FREE op	34	DC
Output 41	35	DC
Output 42	36	DC
Interconnect Inhibit	37	DC
Spare input 3	38	DC
Sync Inhibit	39	DC
Dimming	40	DC
Added Time inhibit	41	DC
Time Clock Sync	42	DC
Output 43	43	DC
Polarization	44	DC
Output 44	45	DC
Output 45	46	DC
Output 46	47	DC
Output 47	48	DC
Signal Plan 4	49	DC
Aux 1 (Ckt 9)	50	DC
Aux 2 (Ckt 10)	51	DC
Aux 3 (Ckt 11)	52	DC
Aux 4 (Ckt 12)	53	DC
Output 48 (FF Enable)	54	DC



Flash Out (Ckt 8)	55	DC
Offset 1 (Ckt 3)	56	DC
Offset 2 (Ckt 4)	57	DC
Offset 3 (Ckt 5)	58	DC
Cycle 2 (Ckt 1)	59	DC
Cycle 3 (Ckt 2)	60	DC
Split 2 (Ckt 6)	61	DC
Split 3 (Ckt 7)	62	DC
Fast Flash Image	63	DC

<b>LMD40 Communication Connector (15 pin sub-D)</b>	<b><u>PIN</u></b>	<b><u>Voltage</u></b>
System Detector 11	1	DC
System Detector 12	2	DC
System Detector 13	3	DC
System Detector 14	4	DC
System Detector 15	5	DC
System Detector 16	6	DC
System Detector 17	7	DC
System Detector 18	8	DC
Monitor Status bit B	9	DC
Monitor Status bit A	10	DC
Monitor Status bit C	11	DC
DC User Defined in #1	12	DC
Logic Ground	13	DC
DC User Defined in #2	14	DC
DC User Defined in #3	15	DC

- (4) The Setcon I/O connector will be resident on the HMC1000 version of the ASTC I/O.

<b>Setcon Clock Connector</b>	<b><u>PIN</u></b>	<b><u>Voltage</u></b>
Output 1	1	DC
Output 2 (Dial 2)	2	DC
Output 3 (Dial 3)	3	DC
Output 4 (Dial 4)	4	DC
Output 5 (Offset 1)	5	DC
Output 6 (Offset 2)	6	DC
Output 7 (Offset 3)	7	DC
Output 8 (Flash)	8	DC
Sync Output	9	DC
Sync Input	10	DC
Not used	11	N/A
Logic Ground	12	DC

Not Used	13	N/A
Not Used	14	N/A
Not Used	15	N/A
Not Used	16	N/A

2.16 Communication.

- (1) NTCIP (National Transportation Communications for ITS Protocol).
  - a. The controller must be compliant with NTCIP Standards as outlined in NEMA TS2 – 2003 and must be tested and documented for compliance.
  - b. Global objects must be compliant to NTCIP 1201 v2.26 or later.
  - c. Actuated Signal Controller objects must be compliant to NTCIP 1202 v2.19f or later.
- (2) Serial ports, one of which must be set as either RS-232 or RS-485.
- (3) Ability to add an internal GPS module.
- (4) Ethernet. The controller must be equipped with a minimum of two front panel mounted 10/100Mb Ethernet ports.
- (5) A single port USB interface must be provided to facilitate database transfers, re-flashing of operation software and log transfer.
- (6) The unit must be fully compatible with, and fully functional within, the City’s existing MIST system (Management Information System for Transportation). MIST is a product of Telvent-Farradyne. All available functions and capabilities that exist within existing MIST controllers must be available within this unit, as well as compatible with the ATC LMD40 unit and the ATC NEMA unit. Any additional software or hardware necessary to fully integrate the controller into the MIST system must be provided by the bidder/contractor and will be considered as part of the requirements of this specification.
- (7) A Windows based laptop utility software must be provided for data transfers and monitoring of controller operation.
- (8) A fiber-optic modem must be provided, if required. The modem must be compatible with existing City fiber interconnect systems. The modem may be internal or external to the controller.

## 2.17 Software operation.

- (1) The controller must have the ability to re-synch a minimum of 8 cycle lengths to an “absolute zero” reference point. It must be possible to set absolute zero by either global command or individual cycle length.
- (2) In addition to hardwire input, it must be possible to set Absolute Zero via keyboard command or fiber optic communication.
- (3) The controller must have the ability to operate in two modes of operation, selectable by time of day:
  - a. Actuated control per NEMA TS2 – 2003.
  - b. Pre-timed Interval based control per NEMA TS2 – 2003.
- (4) The controller must have the ability to transfer between actuated control and interval based control by time of day schedule.
- (5) The controller will have 32 Pre-timed plans
  - a. Each plan will allow for up to 32 timing intervals
  - b. Each plan will allow for 64 circuit outputs. Each output must be individually programmable per interval.
- (6) The controller must have 100 coordination plans.
- (7) The controller must provide 6 preempts per NEMA TS2-2003.
- (8) The controller must offer security as follows:
  - a. Two 4 digit security codes can be programmed (one for timing data, one for signal plan data), which when activated, allow data changes. These codes must automatically de-activate 10 minutes after the last user keystroke. It will be possible to re-program the security codes if the previous security code is known or has been defeated.
  - b. It must not be possible to read the security code from the controller’s display.
  - c. It must be possible to access the controller in the case of a lost security code through a “back door” which is provided only by the controller manufacturer. This “back door” security code must change based upon the controller’s internal calendar.

**3. CONFLICT MONITOR**

3.1 General. Each controller must be furnished with a NEMA conflict monitor unit for checking for conflicts in the signal output circuits. The conflict monitor must be capable of monitoring a minimum of twelve (12) distinct channels. It must be a self-contained unit with its own power supply and not be located within the timer housing.

3.2 Programming Board. A removable programming board must be supplied with the monitor for programming signal compatibility. The circuits for programming must be composed of soldered jumper wires. Diode or dip switch type programming will not be acceptable. The programming board must contain no circuitry or components other than the wire jumpers and the wire jumper soldering devices.

3.3 Flashing Circuit Energizing. The conflict monitor must be programmed to put the controller in a flashing sequence upon detection of a failure or conflicting signal display. The controller must also be programmed to energize the flash circuit if the conflict monitor is removed or loses its supply voltage. The conflict monitor must have a manual reset button to return the controller to normal operation after conflict circuit operation is no longer necessary.

3.4 Stop Time Circuit. A stop-time control circuit must be supplied from the conflict monitor to force the timer unit to stop timing upon detection of a conflict.

3.5 Indicator. The front panel of the conflict monitor housing must have an indicator which will be activated when a conflict or failure occurs as per Section 6 of NEMA Spec. TS1-1983.

3.6 Latch Circuit. The conflict monitor must have a latch circuit, insuring that if a voltage monitor failure occurs, the intersection remains in conflict until reset.

3.7 Memory. The conflict monitor must have the ability to store, in memory, a minimum of ninety-nine (99) conflict events, including date of conflict and channels conflicting.

3.8 Conflict Monitor Assignments

(1) Conflict monitor channels must be assigned as follows:

Channel 1	Load Switch 1	Phase 1 Vehicle
Channel 2	Load Switch 2	Phase 2 Vehicle
Channel 3	Load Switch 3	Phase 3 Vehicle
Channel 4	Load Switch 4	Phase 4 Vehicle
Channel 5	Load Switch 5	Phase 5 Vehicle
Channel 6	Load Switch 6	Phase 6 Vehicle
Channel 7	Load Switch 7	Phase 7 Vehicle

Channel 8	Load Switch 8	Phase 8 Vehicle
Channel 2W	Load Switch 9	Phase 2 Ped
Channel 4W	Load Switch 10	Phase 4 Ped
Channel 6W	Load Switch 11	Phase 6 Ped
Channel 8W	Load Switch 12	Phase 8 Ped
Channel 9	Load Switch 13	Overlap A
Channel 10	Load Switch 14	Overlap B
Channel 11	Load Switch 15	Overlap C
Channel 12	Load Switch 16	Overlap D

- (2) It must be possible for the user to change conflict assignments without unsoldering any connections.
- (3) All unused channels - vehicle or pedestrian - must be neatly tied or terminal mounted in such a manner that they are readily available in front of the panel. If tied, the harness wires must be labeled. If terminal mounted, the terminations must be labeled.
- (4) A terminal must be provided for the red enable feature.
- (5) A terminal must be provided for the hook up of any unused red channels to AC.
- (6) Controller monitoring must consist of; voltage monitor, 24VDC- I, 24VDC-II.
- (7) The output relay must operate a sixty (60) ampere, normally open, “A” type mercury contactor without the use of an external or “cabinet interface” relay.

**4. SUPER P CABINET**

4.1 Housing. Each controller must be furnished completely housed in a Type 5052-H32 aluminum housing of 0.125 inch thickness. The exterior dimensions of the cabinet must be 57 inches high, 57.625 inches wide, and 26.241 inches deep. The top of the cabinet must be 57.925 inches wide and 28.7 inches deep. The top of the cabinet must have a front to rear slope that will direct rain away from the front cabinet door. Door openings must be double-flanged. The interior of the cabinet will be divided into two compartments. The interior of the main cabinet must be equipped with four (4) “C” mounting channels on both side walls and two (2) “C” mounting channels on the rear wall. The UPS portion of the cabinet must be equipped with two (2) “C” mounting channels on each of the two side walls. All shelves, panels and individual equipment items must be mounted to these channels using 1.0" channel nuts with 1/4-20 bolts. All items mounted on panels must be securely fastened by bolting into drilled and tapped holes. No pop rivet or similar fastening methods will be accepted. The cabinet manufacturer will be Excel, Hubbell, or Southern Manufacturing Company.

4.2 Doors. The cabinet must have a main door hinged with one-quarter inch (1/4") minimum, continuous, removable stainless steel pins. The hinges themselves will be

aluminum secured to the cabinet with stainless steel bolts. The battery compartment door on the side of the cabinet must be similarly hinged. The main cabinet door will be hinged on the right side. The battery compartment door will be hinged on the left side. The doors must be closely fitted to a neoprene gasket making the doors dust, water and weather resistant. The doors must be interchangeable with any other doors from any other controller in this order.

Opening of the main door must provide complete access to the cabinet interior. The door must be embossed, subject to approval, with the legend "CITY OF CHICAGO-TRAFFIC CONTROL" in letters at least one (1) inch high. The main door and the battery compartment door must have stops at 90, 150 and 180 degrees, from the closed position. The door latches must have three (3) point locking with rollers at the ends of the latch rods. The latch handle must be capable of being padlocked. The key lock for the latch mechanism must be a Corbin cylinder lock with keys to match existing City of Chicago controller cabinets. Two (2) keys must be furnished with each cabinet. Both the main door and the battery compartment door will have stainless steel handles with an 8" shank. The handles must be able to be padlocked. The padlocking arrangement must clear the lock and key.

Police Panel Door. The police panel door on the main door must be furnished with a lock for a modified Chicago police key per sample to be furnished to the supplier. This key must have a shaft of at least one and three quarter inches (1-3/4") in length. Two keys must be furnished with each cabinet. The door will have a stainless steel piano hinge and be sealed with a neoprene gasket.

Generator Door. This door will be on the rear of the cabinet. This door will have a stainless steel piano hinge and be sealed with a neoprene gasket. Two keys will be furnished for this door.

4.3 Cabinet Ventilation. The main cabinet compartment must be provided with a mounting assembly to hold the forced air fan system. A fan, having a minimum air movement capacity of 100 CFM, must be mounted in the air baffle in the top of the cabinet with an air outlet built into the roof overhang. The main door must be louvered and equipped with a removable, standard, commercially available aluminum dust filter. The battery compartment must have a similar fan system. The battery compartment door must also have a louvered section with a removable dust filter. The ventilation openings must be equipped with removable covers for summer operation. No external fan housings or air outlets will be allowed. Any other method must be approved.

4.4 Shelves. The cabinet must contain a vertically adjustable shelf large enough to accept the solid state controller and all other shelf mounted devices. The battery compartment must have a minimum of three shelves.

4.5 Bolt Pattern The bolt pattern must be a four (4) point rectangular pattern matching the corresponding foundation. The dimensions will be 40.75" center-to-center and

18.5” center-to-center.

- 4.6 Finish. The exterior surfaces of the cabinet must be smooth. All drilled, tapped, or punched holes on the outer surface must be filled with liquid metal and ground smooth, and slotted screw heads must be ground smooth flush with surface. Bolts extending through cabinet wall must be round head, carriage, square shoulder type and fastened on the inside of the cabinet with an Esna nut and necessary gaskets to insure the weatherproofing integrity of the cabinet. The finished cabinet must be thoroughly degreased in a wash process and dried in a heated chamber. A thermosetting, ultra violet resistant, polyester powder coat must be electrostatically applied to all cleaned and treated surfaces and cured to a hard, mar resistant finish in a heated chamber at a temperature recommended by the powder coat paint manufacturer. Exterior color must conform to Federal Standard 595, and either be City of Chicago green color No. 14110 or gloss black color. Exterior color must be as defined in the contract, and color samples must be submitted for approval prior to acceptance of cabinet. Cabinet interior must be glossy white and may be either baked enamel or thermosetting, polyester powder coat. For either process, the interior must be prepared as described above. If the baked enamel finish is used, it must be preceded by one (1) coat of primer.

**5. POWER SUPPLY**

- 5.1 A sixty (60) ampere main breaker must be inserted in series with the line.
- 5.2 An un-fused terminal bus must be provided for ground side of the power supply and signal conductor commons.
- 5.3 Individual circuit breakers must be supplied for: (a) AC+ lights, 50 amperes; (b) AC+ control, 10 amperes; (c) duplex outlet supply, 15 amperes.
- 5.4 The incoming line must contain lightning protection devices consisting of, but not limited to, a metal oxide varistor and gas type arrestor. The gas type arrestor must be on the line side of the radio interference filter.
- 5.5 Contactors. A sixty (60) ampere, normally open, "A" type mercury contactor must be supplied for opening and closing the AC supply to the signal bus. The contactor must be mounted in such a manner on the power supply panel that accidental contact does not produce a safety hazard.
- 5.6 R.I.S. Filter. A radio interference suppression filter rated at sixty (60) amperes minimum must be installed in line with the main power supply, after the sixty (60) ampere circuit breaker.
- 5.7 Ground. The grounded side of the power supply must be continuous throughout the controller and must be grounded to the controller cabinet in an approved manner

meeting OSHA requirements.

- 5.8 Polarity. The phase conductors of the signal circuits must have the same polarity as the phase side of the power supply, and the common conductor(s) must be of the same polarity as the grounded side of the power supply.

## 6. UNINTERRUPTIBLE POWER SUPPLY

- 6.1 General. The uninterruptible power supply (UPS) will consist of batteries which will recharge through the 120 volt electric service line. In the event of a power disruption, the unit will automatically activate. The transfer from utility power to battery power will not interfere with the normal operations of the traffic controller, conflict monitor, or any other part of the traffic system. A generator port will be provided to accept input from an external generator that can operate the traffic signals. The UPS must be the product of an established manufacturer, and suitable for the service required. The UPS must be manufactured by an established manufacturer who has been in the business for a minimum of five (5) years.

### 6.2 General Operation

- (1) The line power provided by ComEd is nominally 120 volt, single phase, 60 Hertz. The UPS system must take the line power, regulate it, and provide continuous 120 volt, single phase, 60 hertz power to the traffic system. The UPS must regulate the input line voltage within the limits specified herein. The input line voltage must also be transformed and rectified to charge the batteries. Under battery operation, the output from the batteries will go through an inverter to provide the proper A.C. current to provide continuous 120 volt, single cycle, 60 Hertz power to the traffic system. In the event of a power loss, the system must automatically switch to battery operation, without adversely affecting the traffic system. When power is restored, the system must automatically switch back without adversely affecting the traffic system. In the event the UPS system fails, an automatic switch must bypass the UPS and connect unconditioned power from ComEd directly to the traffic system. A manual bypass switch must also be provided. The system must be capable of running off a generator. The UPS will allow the generator to be put in or out of the system without adversely affecting the traffic system.
- (2) The system will be capable of providing power for normal full timing mode, flash mode, or a combination of both. The operation will be field programmable to activate at various times, to change operation due to changing battery capacities, and to track alarm conditions, using the touch pad or remotely using the RS-232 interface. Programmability must be in ASCII formats and must not require any external or proprietary software. The DB-9 connector for the RS-232 interface must be located on the front panel of the UPS. The UPS must provide a minimum of 4 hours of full normal timing for a full LED controlled intersection.



- (3) In the event ComEd line voltage falls outside the high and low limits (95VAC and 130VAC should be the default values) the UPS must transfer the load to battery power. The high and low limits must be programmable.
- (4) The UPS must return to line mode when the ComEd power is restored within the proper limits for a specified period of time. The limits must be programmable. The default values should be 105VAC and 125VAC. This time must be programmable and should range from 3 to 30 seconds.
- (5) The transfer time allowed, from disruption of normal utility line voltage to batteries or from batteries back to line voltage, must be such that the traffic signal system is not disrupted. The maximum transfer time allowed will be 60 milliseconds.

6.3 Specifications

- (1) The UPS capacity will be a minimum of 2000VoltAmps/ 1500 watts.
- (2) The inverter must have a minimum efficiency of 80%.
- (3) The UPS will have an operating range of between -37°C. to +74°C.
- (4) The manual bypass switch must be rated at 240 volts, 40 amps.
- (5) The UPS must have a temperature compensated battery charging system. The charging system must compensate over a range of 2.5mV to 4 mV per degree centigrade per cell. Batteries must not be charged when temperatures exceed 50°C. The temperature sensor must be located in the cabinet near the batteries.
- (6) The charger must be rated at 10 amps at 48 VDC.
- (7) When under battery operation the UPS output voltage must be between 110 VAC and 125VAC, with a sine wave with THD less than 3% at 60 Hertz ( $\pm 3$  Hz).
- (8) The UPS must be equipped to prevent a malfunction feedback to the utility service or to the cabinet per UL 1778, Section 48 "Back-Feed Protection Test". The upstream back-feed voltage from the UPS must be less than 1 volt AC.
- (9) The UPS must have a lightning surge protection in compliance with IEEE/ANSI C.62.41 for 2000 volts AC.
- (10) The UPS must not weigh more than 50 pounds.

- (11) The UPS must have a minimum efficiency of 95%.
- (12) The generator bypass switch must be supplied with a 30 amp, weather-proof locking receptacle and cover plate.

6.4 Computer Control and Display

- (1) The UPS must include an LCD display with programmable keypad, a red LED and a green LED, and an RS-232 interface.
- (2) The UPS processor must be capable of indicating, through the LCD display or the RS-232 interface, the current battery charge status, various input/output voltages, power output, battery temperature, date, time, settings of programmable relays, events, and various other functions.
- (3) The UPS must provide a temperature control for the cabinet fan.
- (4) The UPS must be provided with a resettable inverter event counter and a cumulative inverter timer.
- (5) The UPS must be equipped with an event log for a minimum of 100 events. Each event must have a date and time.
- (6) The UPS must be capable of performing a self-test.
- (7) Password protection must be provided.
- (8) The following LED conditions must be used to indicate current status:  
  
RED FLASHING - Alarm  
RED STEADY - Fault  
GREEN FLASHING - Battery Mode  
GREEN STEADY - Line Mode
- (9) The manual UPS bypass switch will allow the UPS to be maintained or replaced.

6.5 Battery System

- (1) Individual batteries must be 12 volt, and must be commercially available and easily replaced.
- (2) Four 79ah batteries must be supplied.
- (3) The batteries will be connected in series. The wiring harness must be color coded with quick disconnects.

- (4) Batteries must be certified to operate over a temperature range of  $-25^{\circ}\text{C}$ . to  $+74^{\circ}\text{C}$ .
- (5) The batteries must be extreme temperature, deep cycle, sealed prismatic lead-calcium based AGM/VRLA (absorbed glass mat/valve regulated lead acid) .
- (6) Maximum recharge time from protective low cut-off to 80% of full capacity must not exceed 20 hours.
- (7) Thermostat controlled heater strips or pads must be supplied to keep battery operation efficient.

6.6 Relay Contacts

- (1) The UPS must provide 6 sets of panel-mounted, potential free, fully programmable relay contacts rated at 1 amp, 120 volt. The relays must be numbered from C1 to C6.
- (2) Each relay must be programmable to activate under any number of the following conditions:

ON BATTERY, relay activates when UPS switches to battery power.

LOW BATTERY, relay activates when batteries have reached a certain level of remaining capacity. This is adjustable from 0 to 100%.

TIMER, relay activates after battery power is on for a certain amount of time. This is adjustable from 0 to 8 hours.

ALARM, relay activates after a specific alarm is detected. Alarm conditions include line frequency, low output voltage, no temperature reading, overload, batteries not connected, high temperature, and low temperature.

FAULT, relay activates after a specific fault is detected. Fault conditions include short circuitry, low battery voltage, high battery voltage, high internal temperature, and excessive overload.

OFF, relay is not active.

**7. LOAD SWITCH BAY**

- 7.1 General. A panel must be provided for mounting the load switch jacks, flash transfer relay jacks, flasher jack, auxiliary relays, time clock jacks, switches, flash change combination terminals, and terminals for field signal connections under non-interconnected operation. See Electrical Standard Drawings 964 and 965.
- 7.2 Wiring. Panel wiring must be neatly laced and properly terminated individual conductors. They must be insulated and properly sized for their application.
- 7.3 Load Circuits. Each load circuit must be capable of carrying fifteen (15) amperes continuously at a temperature of  $165^{\circ}\text{F}$ . ( $74^{\circ}\text{C}$ ).

7.4 Bus Feeds. Bus feeds must be capable of carrying fifty (50) amperes continuously at a temperature of 165° F. (74° C.).

7.5 Equipment. In addition to the items listed in 2(a), the wiring panel must include, but not be limited to, the following:

(1) Ten (10) ampere fuses with barrier type fuse holders must be installed between the load switch signal output circuits and field terminals for signal light conductors. Each terminal must be the barrier type with sufficiently long screws to accept four (4) #12 AWG solid conductors. The terminals must be located at least two inches (2") above the bottom of the cabinet.

(2) Switching Device. The signal load switching device must be a three (3) circuit, solid state, jack mounted load switch which meets the N.E.M.A. Publication TS-1, Part 5 requirements. Each load switch must be rated for a minimum fifteen (15) ampere continuous resistive load and must mate with an S-2412-SB panel socket. A minimum of twelve (12) and a maximum of sixteen (16) load switches to be provided with each cabinet, as defined in the contract.

(3) User Programmable Interface. Two (2) sets of terminal blocks must be provided between the machine logic output and the input side of the load switches. By terminating all machine logic output on one set of terminals and all load switch input to the other set, an interface is thus created by which the machine logic can be readily connected to any of the load switches by means of a jumper wire. The two (2) sets of terminal blocks must be conveniently located in close proximity to each other and must be arranged such that, initially, each function will be factory wired directly from one set of terminals to the other without the need to criss-cross wires between blocks.

(4) Number of Signal Circuits:

a. Sixteen (16) load bay panel. Each panel must be equipped with sixteen (16) load switch jacks for a minimum of forty-eight (48) signal circuits.

b. All unused signal circuits must be neatly tied or terminated. If tied, the harness wire must be labeled. If terminated, each termination must be identified.

7.6 Identification. All field terminals must be suitably identified, subject to approval.

**8. FLASHING FEATURE**

- 8.1 General. The flasher must be a solid state device, with no contact points or moving parts, producing between 50 and 60 flashes per minute with a 40 to 50 percent duty cycle. The flasher mechanism must be mounted on a type P-406-SB plug which will mate with an S-406-SB socket on the controller panel. The flasher must utilize zero-point switching, with turn-on at the zero voltage point ( $\pm 5$  degrees) of the power line sinusoid.
- 8.2 Flasher Panel. A panel must be provided with one (1) terminal wired to the flasher and marked "FL". The panel must be equipped with terminals to provide or omit flashing of all red and yellow outputs.
- 8.3 Flasher Circuits. Flashers must provide two (2) output circuits to permit alternate flashing of signal phases and must be capable of carrying a minimum of twenty (20) amperes per circuit at 120 volts. The flasher must operate continuously so that flashing power will be available at the field terminal marked "FL". The flasher wiring must divide the loads imposed on the two (2) circuit flasher alternately on each phase.
- 8.4 Manual Flash. A manual flash switch must provide flashing indication for all circuits. The flash change combination terminals must allow the selection of flashing either yellow or red on the main and/or cross streets, or complete omission of the flashing feature if required.

**9. POLICE PANEL**

- 9.1 Auto-Off Flash Switch. Each controller must be provided with an auto-off-flash switch. In the "AUTO" position the signals will be on and the controller timing unit will run normally. In the "OFF" position the signals will be OFF and the controller timing unit will continue to run. In the "FLASH" position the signals will flash and the controller timing unit will continue to run. The auto-off flash switch must be located on the side of the police switch panel that faces outward when the police door is open.
- 9.2 Auto-Hand Switch. Each controller will have an auto-hand switch on the back side of the police switch panel. This switch must be so arranged that the switch can be physically rotated 180 degrees to provide usage after opening the police panel door. It must be so mounted that the act of rotation does not affect the police switch panel. Switch terminals must not be exposed on either position. The auto-hand switch must provide a means of manually timing the signals by use of a separate, momentary contact, hand switch. Operation of the timer by manual control must provide the same color sequence as an automatic operation with no momentary undesirable indications appearing. Manual control must be possible with the door of the cabinet closed. The hand switch required for manual control must only be supplied when specified in the contract. It must be of an approved weatherproof construction with a six (6) foot, retractable, flexible, extension cord to allow connection to the appropriate terminals on the panel of the controller. It must be possible to manually step through a vehicle

clearance interval.

- 9.3 Terminal Block. A two point terminal block must be mounted on the back side of the police switch panel and the hand control circuit terminated on this block. This will be for installation of a hand control cord by others, as required.
- 9.4 Space Requirement. Adequate room must be provided in the police panel section to store the manual switch and retractable cord.

**10. RELAYS**

- 10.1 Transfer Relays. Eight (8) double pole, double throw, flash transfer relays must be furnished with each controller. These relays must be jack mounted into an S-408-SB, or equivalent, socket mounted on the controller panel.
- 10.2 Contact Arm. Each contact arm must have over travel on the front and back contacts and be independent of any other contact arms. No adjustment of contact pressure or wipe must be necessary. Load capability must be a minimum of fifteen (15) amperes per contact continuously and thirty (30) amperes for one (1) minute. Contacts must be of coin or fine silver.
- 10.3 Dust Cover. A suitable dust cover must be furnished for each relay.
- 10.4 Relay Mounting and Endurance. All relays supplied must meet their approved specified requirements and must have contacts which cannot be opened by unusual vibrations, shock, or momentary voltage excursions of up to 30%. All relays other than the flash and bus relay must be mounted on a molded base with eleven (11) or eight (8) pins for jack mounting to their respective panel or sub-base, and must be electrically interchangeable with those presently used by the City of Chicago.

**11. COMMUNICATIONS INTERFACE PANEL**

- 11.1 Where a communications interface has been specified to allow a controller to function as a Master or Secondary controller, then one of the specified options must be provided:
  - (1) Fiber Optic Communications Interfaces must meet the following requirements:
    - a. General. The fiber optic communications components must consist of, but not be limited to, an internal fiber optic modem within the controller or an external fiber optic modem, a fiber optic patch panel to interface the modem to field fiber optic cables, and fiber optic jumpers between the modem and patch panel.
    - b. The modem must either be a multi-directional "star" type or a bi-directional type, as specified in the contract. All modems must be

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Electronic Industries Association (EIA) compatible for RS-232 data communications via fiber optic link. Modems must be multi-mode, operate at 850nm wavelength, and provide full-duplex, frequency modulated, asynchronous transmission at data rates of up to 38.4 kbps.

- c. The fiber optic patch panel must consist of a 14" long by 5-3/4" wide by 3-1/4" high rack constructed in accordance with City of Chicago Electrical Standard Drawing #909. The rack must be designed to mount on the controller cabinet rails. "ST" type terminals, suitably labeled, must be provided for the connection of field fibers and Modem.
  - d. The fiber optic jumpers (i.e., optical patch cords) must consist of a single multi-mode fiber in 900 micron orange jacket, with "ST" type connectors factory installed on each end. The jumpers must be 3' long in Secondary (i.e., local) controller cabinets and 6' long in Master controller cabinets. The jumpers must be connected to the patch panel and supported in such a manner that the minimum bending radius is ten (10) times the diameter of the cable, and the cables exert no strain on the connectors. Each jumper must have a minimum tensile strength of 50 lbs.
- (2) Copper Wire Interconnect Panels (Seven Wire, VAC) must meet the following requirements:
- a. General. The interconnect panel must serve to isolate interconnect VAC from the controller. The panel must consist of, but not be limited to, seven (7) relays. Each relay interconnect circuit must include an M.O.V. properly rated for protection against lightning and switching surges injurious to the controller and a barrier type 3AG fuse receptacle and fuse not to exceed five (5) amperes. Each panel must provide a seven (7) wire interface with the T.B.C. functions described below and must provide barrier type terminals suitably labeled for these functions.
  - b. The secondary interconnect panel must be wired in such a manner that a VAC input activates a relay sending an input from that relay to the controller. It must have a minimum of seven (7) relays for the following functions; Dial 2, Dial 3, Dial 4, Offset 1, Offset 2, Offset 3, M.U.T.C.D. flash.
  - c. The master interconnect panel must provide a means to establish outgoing VAC for a seven (7) wire interconnect system using eight (8) relays. The relays must have 24 VDC coils and be designated as, Dial 2, Dial 3, Dial 4, Sync, Offset 1, Offset 2, Offset 3, M.U.T.C.D. flash. The sync relay must be wired in such a manner that it provides the offset pulse to the contacts of the three (3) Offset relays.
  - d. Each relay must be a double pole type, with one pole designated as field interconnect output, and the other designated as controller input. Relay

coils must be rated for continuous duty. Relay contacts must be rated for a continuous fifteen (15) AMP resistive load.

- e. A terminal strip must be mounted on the top of the master interconnect panel for controller interface.
- f. The master panel must interface with the T.B.C. terminals as described above.
- g. Each output must be fused as outlined above.

**12. RAILROAD INTERCONNECT REQUIREMENTS**

12.1 General. The railroad preemption will meet the requirements of the ICC (Illinois Commerce Commission) and the requirements of IDOT (Illinois Department of Transportation).

12.2 IDOT. The railroad preemption will meet all the requirements of the Illinois Department of Transportation’s Standard Specifications for Road and Bridge Construction, adopted January 1, 2012. It must meet all the requirements of Article 1073.01 (c) (2) and Article 1074.03 (a) (5) e.

12.3 ICC. The railroad preemption will meet all the requirements of the Illinois Commerce Commission, as stated herein.

- (1) The railroad preempt relays and the City traffic cabinet in general must be able to be wired as indicated in IDOT’s Standard 857006-01 “SUPERVISED RAILROAD INTERCONNECT CIRCUIT”. A failure in the interconnection circuit will result in activation of a supervisory failure alarm.
- (2) Remote Flash. The Remote Flash input to the controller must be inverted from normal NEMA logic. Instead of grounding the input to Logic Ground (0 volts DC) to activate, the Remote Flash will be normally grounded and will be activated when the input is in the Logic 1 (+24 volts DC) state. This will preclude the installation of a controller without the proper railroad software and a normal controller with standard (non-railroad) software will not be able to run the traffic signals.
- (3) Critical Components Series Loop. All critical components to railroad preemption such as relays and harnesses must utilize the 24 VOLT DC monitor voltage to form a series loop. Removal of any component will result in the traffic signals entering a flashing red condition. The 24 VOLT latch in the Management Malfunction Unit will be programmed, requiring manual reset if a failure in the series loop occurs.



- (4) Controller Preempt Input Verification. Like the supervisory interconnection circuit monitors the integrity of the interconnect cable, this feature monitors the integrity of the controller railroad preemption input and associated wiring within the traffic controller cabinet. This will utilize 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 a time period of more than one (1) second, the controller will recognize this as an input failure. When a failure occurs, the traffic controller will be configured to provide a track clearance interval followed by a flashing red condition. This occurrence will set a preempt input alarm and also will require a manual reset of the controller.
  
- (5) Track Clearance Green Re-service. Any demand for railroad preemption received at any point in the normal sequence, the emergency vehicle preemption sequence, a bus preemption sequence, or any other form of low priority preemption, or a previously called for railroad preemption sequence will result in the traffic controller providing a track clearance green indication within a “maximum time to track clearance green “ ( usually 8 seconds depending upon site specific criteria) and will provide a full track clearance green time interval after the preemption demand was received. The controller software must have the capability to restart the railroad preemption sequence providing a full track clearance green interval from any point within the railroad preemption sequence from the start of track clear green through the entire dwell/hold interval(s) including any exit yellow and red clearance intervals, if the demand for preemption drops and is reapplied. The number of times the controller is able to react to successive demands for railroad preemption must not be limited. This will be a software based routine that does not require any user programming and must be designed into the software.
  
- (6) Preemption Priority. Preemptor number 1 is typically assigned to a supervisory failure in the interconnection circuit and preemptor 2 is typically assigned to a normal railroad preemption demand. Preemptor 1 must have priority over preemptor 2. Preemptor 2 must have priority over all other forms of preemption.
  
- (7) Delay Time. In order to compensate for noisy or intermittent calls, the controller must have a programmable delay timing parameter for railroad preemptors, programmed at 1 second. Any demands for railroad preemption lasting less than this time will be ignored. This will apply to any subsequent demands for railroad preemption that may occur while the controller is still within the railroad preemption sequence from a prior demand.

- (8) Non-Locking Preemption. The controller must have the capability to configure the railroad preemptors as non-locking calls. If a demand for preemption is placed for a duration of less than 1 second (as programmed in the delay timer), the call will not lock and the controller will not initiate the preemption sequence. Furthermore, if an initial demand for preemption is dropped prematurely while the preemption sequence is still timing, the non-locking feature will allow the controller to re-service another demand for preemption.
- (9) Minimum Green before Preemption. The controller must have a separate minimum green timing parameter, programmed at 1 second, that replaces normal controller phase minimum green times when entering railroad preemption. When a demand for preemption is applied, any active phase(s) must terminate immediately or after they have been active for 1 second if the demand occurs at the start of the phase(s). If any indications that are part of the track clearance green are active when the demand for railroad preemption is placed, those indications will not terminate until after the track clearance green interval is completed.
- (10) Railroad Hold/Dwell Interval. The controller must have the capability to display a programmable phase(s) and rest in that phase(s) until the demand for railroad preemption is released. The controller must also have the option to cycle between a set of programmable phases that don't conflict with the railroad crossing, or rest in an all-red steady state until the demand is released. The necessity for cycling during the hold interval or the use of an all-red steady state is determined by an assessment of the specific site. The controller must have a timing parameter that will provide a minimum hold/dwell time, even if the demand for preemption is dropped prematurely. The controller must be able to re-service any subsequent demands for preemption during this minimum hold/dwell time.
- (11) Railroad Hold/Dwell Extension. The controller must have a timing parameter that will extend the hold/dwell interval for a programmed time after the demand for railroad preemption has been released. The controller must be able to re-service any subsequent demands for preemption during this extension time.
- (12) Pre-signal Timing. When pre-signals are present in advance of a railroad crossing, during normal operation the pre-signal green indications terminate a programmable time (timed overlap) prior to the indications at the intersection. The duration of the timed overlap should not be reduced when leaving normal operation to service other forms of preemption, such as emergency vehicle or bus preemption. If a demand for railroad preemption occurs during the timed overlap portion of the normal sequence, the overlap timer must terminate and the track clear green

interval must begin immediately, after the pre-signal yellow and red vehicle clearance intervals are completed.

- (13) Remote Monitoring and Alarms. Capabilities to remotely monitor the traffic controller must be provided, including the capability to monitor the operation of the controller, upload logs/events, and to verify the integrity of the database. In addition, the controller must have the ability to automatically report alarms, such as preempt 1 activation, preemptor input failure, automatic flash, CRC failure, 24 volt failure, and other defined alarms. The controller must have the ability to prevent the remote download of changes to the critical data protected by the railroad preemption security feature.
- (14) Blank-out Signs. If these signs are used for railroad preemption, they should activate immediately with the activation of the railroad interconnect circuit. They should deactivate immediately with the deactivation of the interconnect circuit, not after the controller exits the railroad preemption sequence. Whenever the traffic signals are in flashing red operation, cabinet circuitry must be such that the signs will remain operational if the interconnect circuit activates due to railroad warning device activation.

12.4 CRC. A CRC module with all connections, a USB memory device, software, and any other firmware necessary to make the CRC fully functional will be provided if so designated.

- (1) Hardware. A 16 bit CRC (cyclical redundancy check) module must be provided. The module will connect to the ATC controller using unused I/O pins. Reassignment of unused inputs on the NEMA 'A', 'B', and 'C' connector I/O pins or connection to a proprietary 'D' module's input pins will be acceptable. The final CRC value for the specific intersection requirements will be set on the module for that intersection. Removing the CRC module during normal operation of the intersection, or mismatching the values in the database and the CRC, will result in a fault condition and put the intersection in flash mode.
- (2) Software. The controller software/firmware will provide the logic and control facilities to fully implement CRC error detection. All the data elements (objects) required for the implementation will be contained in a proprietary data block. The software will provide a mechanism to "display" the final CRC value to be set on the CRC module.

A USB memory device will be utilized to 'lock' or 'unlock' the database. When the USB device is inserted into the controller, the controller will display a menu that will include a utility to 'unlock' the database. The USB device will contain a file structure that will allow access to the

protected areas of the database. Once ‘unlocked’, the database can be edited through normal user interfaces. While the database is ‘unlocked’, the controller will drop the voltage/fault monitor signal to the conflict monitor to keep the intersection in flash. The CRC comparison check will be disabled during this period.

After all the changes to the database are completed, the user will use a utility on the USB to ‘lock’ the database. After the database is ‘locked’, another utility will allow the calculated CRC to be displayed. This can be used to configure the CRC module. After the CRC is connected and the USB is removed from the controller, the voltage/fault monitor signal to the conflict monitor will be enabled. A restart will be required to restart the controller.

Once the CRC module has been set (programmed), and the database has been locked, the controller can resume normal operation. The controller firmware will validate the stored CRC against the CRC module’s value at least once per second.

**13. WIRING**

13.1 General. All electrical conductors must be stranded copper, with a minimum of nineteen (19) strands per conductor, and a concentrically applied 90° C. insulation with a 600 VAC rating. Wiring from the fuse block to the first distribution point, and to the controller bus, must be No. 10 AWG. Signal circuit wire must be No. 14 AWG. The wires must be provided with lugs or other approved terminal fittings for attachment to binding posts. All wiring between various parts of the controller must be neatly cabled. All wiring and terminal blocks must be tested for possible short circuits and resistance to ground by a high voltage dielectric test at 1,200 VAC. A wiring harness of adequate length must be provided to the timing device to allow the timer to be placed on top of the cabinet when required.

13.2 All VAC connections to load switches, flasher, and flash transfer relays must be soldered. All VAC connections on back of terminals must be soldered.

13.3 All VDC connections on back of terminals, and load switches must be soldered or connected with pre-approved terminations. All VDC connections to load switches are to be soldered or connected in a manner pre-approved by the City of Chicago's Division of Electrical Operations.

**14. TESTING REQUIREMENTS**

14.1 General. The testing on the controllers must be done as described herein. Environmental testing must be done at the manufacturer’s facilities or at an independent laboratory, and must be certified by the manufacturer or the independent laboratory. Functional testing will be done at the City’s facilities. All controllers

provided under the contract must be tested as stipulated under “Functional Burn-In Testing” and “Physical Inspection” at the manufacturer’s facilities. If a controller is ordered for a specific location, the manufacturer shall program and test the controller at the factory and certify the test results.

- 14.2 N.E.M.A. Environmental Test. One controller, unless approved previously, must be tested, at the manufacturer's expense, in accordance with Part 2 of NEMA Standards Publication TS1-1983. All of the tests listed must be performed with all data properly recorded and certified. If the manufacturer changes the design, fabrication or components of a previously tested and approved controller, then a sample of the controller containing the new design, fabrication or components must be retested at the manufacturer's expense. Any N.E.M.A. environmental test references to minimum recall must include but not be limited to: All sixty-four (64) output circuits must be programmed in a sequence to simulate the normal functioning of the entire controller cabinet assembly; the conflict monitor must have a test board with the allowable channel jumpers installed to simulate normal operation; All thirty-two (32) intervals must be programmed with a minimum of two (2) seconds per interval.
  
- 14.3 Functional "Burn In" Testing. The manufacturer of the controller must perform, at his manufacturing facilities, a one hundred (100) hour burn-in test on every controller, conflict monitor, and appurtenant devices. This test period must be certified by the manufacturer with supportive documentation and must include the device serial number, dates and times of test periods, and results. Any failed, or nonconforming components, must be replaced at this time. After each of the components has passed the burn-in test, they may be used in the assembly of the complete controller unit. Each completed unit must be subjected to the seventy-two (72) hour function test as described in this specification. The "burn in" requirement must include a test that uses all sixty-four (64) output circuits in "solid" burn as well as 1 pps and 5 pps for each circuit. All thirty-two (32) intervals must be programmed with a minimum of two (2) seconds per interval. The documentation for a test program to simulate the normal functioning of the controller phasing must be supplied. A copy of the test program must be approved by the City of Chicago, Division of Electrical Operations prior to testing. Certification of these tests must be attached to the outside of the shipping container. This certification is in addition to any other documentation and/or testing required by these specifications.
  
- 14.4 Testing Requirements. In addition to the NEMA environmental test and the "burn-in" requirements stated above, satisfactory performance of the traffic signal cabinet and its equipment must be demonstrated. The manufacturer must submit five (5) copies of his proposed "Test Procedure Document" for approval with the sample requested above. The test procedure must consist of two (2) sections; physical inspection and functional testing. If the test procedure is judged by the Commissioner or his duly authorized representative to be incomplete, inadequate or otherwise deficient, the contractor must revise and resubmit his "test procedure document" until it is approved. No controller will be accepted until the "test procedure document" has been approved. Functional testing must include, but not be limited to, phasing for

multiple legged intersections, bridge and railroad pre-empts, flash operation, actuation, and any combinations of these features. Controllers designed to function without railroad pre-empts must be shown to function without the presence of a railroad interconnect. Options for downward compatibility when replacing either HMC1000 controllers or LMD40 controllers must also be demonstrated. In addition, it should be demonstrated that the controller functions within the MIST system. Any failure must be addressed by the manufacturer within the time frame allotted.

- 14.5 UPS. Testing of the equipment must verify that the operation meets the requirements of this specification. All equipment must be shown to operate correctly, including the rectifier, charger, inverter, batteries, and control unit. The UPS must be connected to a dummy load at the factory and tested for performance under various conditions of line voltage and frequency, varying loads, temperature range, and humidity range. The automatic switching must be successfully demonstrated; losing line power and restoration of line power must not adversely affect the operation of the traffic signals. Use of the manual bypass switch must be successfully demonstrated. A generator must be connected to the unit and successfully operate the system without interruption. The batteries must be shown to be able to operate the traffic signals for the specified time. The batteries must be shown to be able to be recharged in the specified time between failures. The control unit, including the LCD display and the RS-232 interface, must be shown to function according to this specification. All reports and event monitoring must be successfully demonstrated. Programming functions must also be shown to work properly.
- 14.6 Physical Inspection. The "physical inspection" portion of the test procedure document must require the manufacturer to perform a physical inspection of workmanship and specification compliance for each traffic signal controller assembly. The inspection must be done using a detailed check list defining items to be inspected and criteria for acceptance. The inspection must include, but not be limited to, the following items:
- (1) Hardware installation.
  - (2) Assembly mounting.
  - (3) Dimensions.
  - (4) Presence of specified devices and materials.
  - (5) Presence of required documents.
  - (6) Labeling and required serial numbers.
  - (7) Wiring including routing, covering, gauge, length, and soldering of terminations.
  - (8) Arrangement of equipment for safety and ease of calibration reprogramming troubleshooting and maintenance.
  - (9) Condition of cabinet body and finish.
  - (10) Condition and installation of doors, panels, gaskets and ventilation.
  - (11) High voltage test of insulation resistance to ground, with wires installed in cabinet and equipment disconnected.

14.7 Functional Testing. The "functional testing" portion of the Test Procedure must require the manufacturer to perform a complete room-temperature functional test of each complete traffic signal controller assembly for a minimum of seventy-two (72) hours. This test must be designed to concurrently check integrated hardware systems e.g., from simulated input to load switch output including conflict monitor and time base coordinator. All interface/controller interconnections must be tested. All load switch and interconnect relay positions must be tested, regardless of the number of load switches and interconnect relays being purchased. The functions tested must include, but not be limited to, the following:

- (1) Flash logic and operation (color, phases).
- (2) Conflict monitor logic and operation.
- (3) Police panel switch operation.
- (4) Auxiliary panel switches (including fans).
- (5) Interface panel.
- (6) Time switch operation.
- (7) Load switches (with a continuous ten (10) ampere load on each signal circuit).
- (8) Outputs.
- (9) Power interruptions of less than 500 ms.
- (10) Power interruptions of more than 1.0 sec.
- (11) Generator Hook-up.

**15. SHIPMENT AND DELIVERY (Only applies to City commodity contracts)**

15.1 Packaging. The cabinets must be shipped on individual pallets. Each cabinet must be individually wrapped and protected so that it can be handled without damage to the cabinet or its finish. The UPS and cabinet must be wrapped to give protection from the elements, as well as from shipping. If subassemblies or parts are ordered they must be suitably packaged to prevent damage during shipping and handling. All packages should be clearly labeled indicating the contents.

15.2 Delivery. The assembled cabinets, or subassemblies and parts, must be delivered to the Division of Electrical Operations at 2451 S. Ashland Avenue, unless otherwise directed. Assembled cabinets, or subassemblies and parts, must be available for testing and shipping within six weeks of the placement of an order.

**SPECIFICATION 1560**

Since the ATC standard specifies a “family” of controllers, the following options have been selected from the ATC standard to meet the City’s needs.

Functional Requirement	ATC Clause #	Status	Details
Shelf Mounted	2.2.1 4.3.2.1	Required	(Shelf mount only)
Use of ATC Engine Board	2.2.2 4.3.2.2 5.1.1 5.1.2 5.3.2 5.3.4 5.3.5 5.3.5.1 5.4.2 5.4.3 5.4.4 5.4.5	Required	
Use of ATC Engine Board	5.2.1	Required	<ul style="list-style-type: none"> <li>Allowed component height below Engine Board PCB provided that the overall envelope remains unchanged, the clearance between the Host Board and Engine Board remains as specified, and the Engine Board still fits into a compliant Host Board</li> </ul>
Use of ATC Engine Board	5.2.2 5.4.5	Required	<p>In order to show the Ethernet communications to the Engine Board, the following “Reserved” pins can assume the following legacy functions:</p> <ul style="list-style-type: none"> <li>P1-34: ENET2 Speed</li> <li>P1-35: ENET2 Link/Activity</li> <li>P1-36: ENET1 Speed</li> <li>P1-37: ENET1 Link/Activity</li> </ul>
Use of ATC Engine Board	5.3.1	Required	Minimum CPU capability of 500 MIPS
Use of ATC Engine Board	5.3.3	Required	Additionally, must provide a minimum of 16 MB of Flash total to accommodate future applications.
Use of ATC Engine Board	5.4.1	Required	<ul style="list-style-type: none"> <li>Engine Board shall not draw more than 4W of power from VPRIMARY (due to battery backup in Chicago)</li> <li>Engine <b>may</b> supplement VSTANDBY_5 with on-board storage for its standby power.</li> </ul>



**SPECIFICATION 1560**

Use of ATC Engine Board	5.4.3	Required	<ul style="list-style-type: none"> <li>All optional baud rates shall be supported</li> </ul>
Parallel I/O	2.2.4	Required	<ul style="list-style-type: none"> <li>No support required for TS2 Type 1 or ITS cabinets</li> <li>Must provide parallel I/O for TS2 Type 2 cabinets and legacy parallel I/O interfaces via interchangeable modules</li> </ul>
Linux O/S and ATC BSP	2.2.5 4.3.1 4.3.3	Required	
Linux O/S and ATC BSP	2.2.5 4.3.1 4.3.3	Required	
Linux Kernel	Annex A	Required	
Parallel I/O	3.4	Required	Not required to support ITS Cabinet standard (NEMA cabinets are used)
Manage Clock/Calendar functions and synchronize with external source	3.5.1.3	Required	Must also support synchronization with absolute zero.
Manage Clock / Calendar functions and synchronize with External Source	4.1.3	Required	<ul style="list-style-type: none"> <li>BSP RTC driver shall automatically update the RTC with the OST time once per second with an accuracy of 0.1 seconds</li> <li>Successive interruptions (e.g. on for 5 minutes, off for 3 minutes over a period of 8 hours) shall not introduce cumulative error</li> </ul>
Configure and Verify Parameters	3.5.1.4 4.1.4	Required	
Upload/Download blocks of data	3.5.1.5 4.1.5	Required	
Monitor & Verify Application Status	3.5.1.6 4.1.6	Required	
Operator Control of Application Execution	3.5.1.7	Required	<u>Only</u> a local operator is allowed to manage the starting, stopping and scheduling of one or more applications on the ATC.
Operator Control of Application Execution	4.1.7	Required	
Long Term Storage of Log Data, etc	3.5.1.8 4.1.8	Required	

**SPECIFICATION 1560**

Support Diagnostics	3.5.3.3 4.3.4	Required	
Modes of Operation	3.7	Required	(Must support Standalone, Direct, and Distributed modes of operation)
Manage/Control a Variety of External Devices	4.2.1	Required	<ul style="list-style-type: none"> <li>• Fixed Ports on the front panel shall be specified by the City</li> <li>• Only SP1 and SP2 are required to be supported on the modem slot</li> <li>• The dedicated synchronous serial port (SP5) is to be used exclusively for supporting a parallel I/O module (NEMA TS2 or legacy interface)</li> </ul>
Monitor the Status of External Devices	4.2.2	Required	<ul style="list-style-type: none"> <li>• Fixed Ports on the front panel shall be specified by the City</li> <li>• Only SP1 and SP2 and required to be supported on the modem slot</li> <li>• The dedicated synchronous serial port (SP5) is to be used exclusively for supporting a parallel I/O module (NEMA TS2 or legacy interface)</li> </ul>
Support future Hardware Upgrades	4.3.2	Required	
Environmental Requirements	5.2.3	Required	
Front Panel Serial Ports	6.2.3.1 6.1.3 6.3.2.1	Required	One serial port on the front panel shall satisfy this section as an EIA-574 (25-pin) and be labeled "Port 2".
Front Panel Serial Ports	6.2.3.1 6.3.2.1	Required	One serial port shall satisfy this section as an EIA-574 (9-pin) with a reduced pin-out (TXD, RXD, and DC Reference at a minimum) and be labeled "Port 4". C50_ENABLE shall not be supported. A second serial port shall fully satisfy this section as an EIA-574 (25-pin) and be labeled "Port 5."
Front Panel Serial Ports	6.2.3.2 6.1.3 6.3.2.2	Required	One serial port shall satisfy this section as an EIA-485 (15-pin) with the TS2 Type 1 Port 1 pin-out and be labeled "Port 1".
Front Panel Ethernet Ports	6.2.3.9 6.3.2.9 7.1.4.4	Required	There shall be a minimum of two Ethernet ports on the Front Panel (one for ENET1, one for ENET2)
User Interface	7.1 7.1.1.2 7.1.4.4 7.1.4.5 7.1.4.7	Required	

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User Interface	7.1.1	Required	Must meet City's Minimum requirements
User Interface	7.1.1.1 7.1.2.1 7.1.3 7.1.4.1 7.1.5	Required	<ul style="list-style-type: none"> <li>• Data key is not required</li> <li>• Front Panel Interface is to be integral to the controller (i.e. not removable, no SP6 connector)</li> <li>• "Option 1" to be selected but AUX switch is optional</li> <li>• Keypad shall have a minimum of 24 keys</li> <li>• LCD Display shall be graphical with a minimum resolution of 128 rows x 240 columns (up to 16 lines x 40 characters).</li> <li>• LCD pixel size shall be a minimum of 0.32mm x 0.32mm with a minimum pitch of 0.325mm with character size defined as 6 pixels wide x 8 pixels high</li> <li>• Refresh rate is a minimum of 10 times per second (due to larger display requirements)</li> <li>• LCD heater is mandatory to ensure sub-second LCD display response over full temperature range. Heater shall only be active when needed and User is interacting with the controller locally (due to battery backup requirements).</li> <li>• Heater Power shall be up to 15V at 1A current maximum</li> </ul>
Power Supply	7.2 7.2.2 7.2.3 7.2.4 7.2.5 7.2.5.1 7.2.5.2 7.2.6.1 7.2.6.2 7.2.6.3 7.2.6.4 7.2.6.6	Required	<p>12 V not required</p> <p>As applicable for NEMA cabinets only</p>
Mechanical/Chassis	7.3.1.3 7.3.1.4	Required	<ul style="list-style-type: none"> <li>• Only Shelf mounted units are acceptable</li> </ul>

**SPECIFICATION 1560**

			<ul style="list-style-type: none"> <li>Only components / connectors specified by the City shall be located on either the Front or Rear panels. No C1 Type Connectors allowed.</li> </ul>
I/O Interfaces	8.1.1 8.2.2 8.2.2.1 8.2.2.2 8.2.2.3	Required	<ul style="list-style-type: none"> <li>Support for TS2 Type 2 and TS1 Interfaces</li> </ul>
I/O Interfaces	8.1.2 8.2.2.5	Required	<ul style="list-style-type: none"> <li>Support is only required for NEMA TS2 Type 2, TS1, and other similar legacy interfaces</li> <li>NEMA TS2 Port 1 shall also be provided (for detectors only)</li> </ul>
I/O Interfaces	8.2.3	Required	Port 1 Connector shall be provided as specified within this section (only used for detectors)
I/O Interfaces	8.2.1.13	Required	Legacy I/O interfaces shall respond as required.
I/O Interfaces not required	8.2.1	Required	<ul style="list-style-type: none"> <li>No support for Model 332 Cabinets or ITS Cabinets &amp; devices is to be provided</li> </ul>
Environmental & Test Procedures	9	Required	All subsections are required
Performance & Material Requirements	10	Required	All subsections are required
Performance & Material Requirements	10.1.15	Required	All PCBs and similar construction mechanisms shall be mounted vertically (i.e. no horizontal PCBs are allowed).
Quality Control	11	Required	All subsections are required

THIS SPECIFICATION SHALL NOT BE ALTERED

**ELECTRICAL SPECIFICATION 1590  
DIVISION OF ENGINEERING  
DEPARTMENT OF TRANSPORTATION  
CITY OF CHICAGO  
JUNE 4, 2013**

**METERED RECEPTACLE CONTROLLER**

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**SUBJECT**

1. This specification states the requirements for a receptacle controller and aluminum cabinet for use in controlling receptacles on arterial streets, as well as irrigation systems, clocks, etcetera. These circuits will be metered. The cabinet shall be mounted on top of a ballast base housing, which will be affixed to a concrete foundation. A meter cabinet will be affixed to the outside of the controller cabinet.

**GENERAL**

2. (a) Specifications. The controller shall conform in detail to the requirements herein stated, to the Federal Standard cited by number, and to the specifications and methods of test of the American Society for Testing and Materials, cited by ASTM Designation Number, in which the most recently published revision will govern. Cabinets must meet or exceed the requirements of a NEMA rating 3R and must be U.L. listed.
- (b) Acceptance. Controllers and cabinets not conforming to this specification will not be accepted.
- (c) Drawings. The drawings mentioned herein are drawings of the Department of Transportation, Division of Electrical Operations, and must be interpreted as part of these specifications cooperating to state necessary requirements.
- (d) Sample. One complete controller in cabinet of the manufacture intended to be furnished must be submitted upon request of the Chief Procurement Officer within fifteen (15) business days after receipt of such a request. The sample must be delivered to the attention of the Division of Electrical Operations, 2451 South Ashland Avenue, Chicago, Illinois 60608.
- (e) Warranty. The manufacturer shall warranty the controller and cabinet against flaws in material or workmanship for a period of two (2) years from the date of delivery. Any controller or cabinet developing flaws within this period must be replaced by the manufacturer, including shipment, at no cost to the City.

**DRAWINGS**

3. (a) The controller cabinet must conform in detail to requirements shown on Drawing 973.
- (b) All electrical components and wiring must be as shown on Drawing 974.

**CONTROLLER CABINET REQUIREMENTS**

4. (a) Material. The cabinet and the door assembly must be constructed of 5052-H32 sheet aluminum alloy, with a minimum thickness of .125 inches. The base plate must be sheet aluminum of .250 inch thickness.
- (b) Dimensions. The overall outside dimensions of the control cabinet must be 36 inches in height by 20 inches in width by 15 inches in depth. Cabinets must have sloped tops to shed water.
- (c) Cabinet. The cabinet must be sized as shown on Drawing 973. The cabinet door opening must be double flanged on all four (4) sides. A door restraint must be provided to prevent the door from moving in windy conditions.
- (d) Door. The door size must be a minimum of 80% of the front surface area. The door must be hinged on the right side when facing the cabinet. The door must have a gasket that meets the requirements found in U.L.508 Table 21.1. The gasket must form a weather-tight seal between the cabinet and the door. The door, when closed, must be flush with the cabinet.
- (e) Hinges. Hinges must be continuous and bolted to the cabinet and door with 1/4-20 stainless steel carriage bolts and nylock nuts. Hinges must be made of .093 inch thick aluminum. The hinge leaves must not be exposed externally when the door is closed. Only the hinge knuckles must be visible upon closing the door. The hinge pin must be .250 inch diameter stainless steel and must be capped top and bottom by weld to render it tamper-proof.
- (f) Latching. The latching mechanism must be a three-point draw roller type. The pushrods must be aluminum. The rollers must be nylon with a minimum diameter of .875 inches. The center catch must be .187 inch aluminum, minimum.
- (g) Handle. The handle must be stainless steel with a .750 inch diameter shank. The handle must have provision for a padlock. The lock must be keyed dead bolt #200725, or as directed. Two (2) keys must be provided for each cabinet.
- (h) Ventilation. Louvered vents must be provided in the door. Louvers must satisfy the NEMA rod entry test for 3R enclosures. A removable filter must cover the louvers from inside the door. The filter must be held firmly in place with top and bottom brackets and a springloaded clamp. Exhaust air must be vented out

between the top of the cabinet and the door. The exhaust area must be screened with openings of .12 inch by 1.0 inch.

- (i) Equipment Mounts. The cabinet must be equipped with two (2) adjustable C channels on both side walls and on the back wall. The internal dimensions of the channels must be 1.075 inches high by .625 inches wide. All mounting hardware must be furnished.
- (j) Workmanship. All control cabinets must be free of flaws, and must have neat, smooth exterior surfaces. All holes must be accurately located and drilled. All welds must be neatly formed and free of cracks, blow holes, or other irregularities. All inside and outside edges must be free of burrs.
- (k) Painting. The cabinet, door and other parts must be treated by an iron phosphate conversion technique. After which, all the parts must be baked dry. A polyester powder coat must then be applied. The inside of the cabinet and door must be white. The outside of the cabinet and door must be green meeting No. 14110 of Federal standard Number 595, or a gloss black, or another color as specified. A paint chip must be provided upon request.

**PANEL**

- 5. (a) The panel must be composed of phenolic plastic ½ inch in thickness. It must be securely bolted to the cabinet using stainless steel hardware.
- (b) The panel shall be sized for the specific application. All holes for attaching components shall be pre-drilled. All components shall be surface mounted.

**ELECTRICAL COMPONENTS**

- 6. (a) All components will be as indicated on Drawing 974. Circuit breakers must have thermal magnetic trips. Each breaker must be enclosed in a hard insulated housing. All breakers must be UL listed. The photo-cell relay, if required, must meet City specifications.
- (b) All wiring shall be accomplished so that all circuits in the cabinet are metered.
- (c) Wiring will be as indicated on the appropriate drawing. All wire will have stranded copper conductors, unless indicated otherwise. All wires must be insulated with an approved 125° Centigrade insulation.
- (d) The main breaker will be a 2-pole rated for 100 amp service. Incoming power will be 240 volt. All secondary breakers will be 1-pole rated for 20 amp service, 120 volt. All breakers for receptacles will be photo-cell controlled through an automatic electronic switch. All circuits for irrigation, clocks, etcetera will be wired ahead of the automatic electronic switch for continuous power.

**METER SOCKET AND ENCLOSURE**

7. (a) The meter cabinet shall be attached to the controller cabinet in the position as shown on drawing 973. The cabinet shall be bolted to the controller cabinet with at least four bolts. Appropriate holes shall be drilled in the controller cabinet for the power cable to enter and leave the meter fitting.
- (b) The enclosure shall be rated NEMA Type 3R. The enclosure shall be lockable. A lock and two keys shall be provided. The lock shall meet the requirements of Commonwealth Edison.
- (c) The meter socket shall be single position four terminal. It shall be rated 125 amp and 600 VAC. It shall be ringless. The socket shall meet the applicable requirements of ANSI C12.7. Meter fitting must be CECHA approved, and labeled as such.

**THIS SPECIFICATION MUST NOT BE ALTERED**



**SPECIFICATION 1606  
DIVISION OF ELECTRICAL OPERATIONS  
DEPARTMENT OF TRANSPORTATION  
CITY OF CHICAGO  
OCTOBER 10, 2017**

**ARTERIAL STREET LIGHTING CONTROLLER**

---

**SUBJECT**

1. This specification states the requirements for an arterial street lighting controller and aluminum cabinet for use in controlling arterial street lighting circuits. The cabinet shall be mounted on top of a ballast base housing, which will be affixed to a concrete foundation.

**GENERAL**

2. (a) Specifications. The controller shall conform in detail to the requirements herein stated, to the Federal Standard cited by number, and to the specifications and methods of test of the American Society for Testing and Materials, cited by ASTM Designation Number, in which the most recently published revision will govern. Cabinets must meet or exceed the requirements of a NEMA rating 3R and must be U.L. listed.
  - (b) Acceptance. Controllers and cabinets not conforming to this specification will not be accepted.
  - (c) Drawings. The drawings mentioned herein are drawings of the Department of Transportation, Division of Electrical Operations, and must be interpreted as part of these specifications cooperating to state necessary requirements.
  - (d) Sample. One complete controller in cabinet of the manufacture intended to be furnished must be submitted upon request of the Chief Procurement Officer within fifteen (15) business days after receipt of such a request. The sample must be delivered to the attention of the Engineer of Electricity, Division of Electrical Operations, 2451 South Ashland Avenue, Chicago, Illinois 60608.
  - (e) Warranty. The manufacturer shall warranty the controller and cabinet against flaws in material or workmanship for a period of two (2) years from the date of delivery. Any controller or cabinet developing flaws within this period must be replaced by the manufacturer, including shipment, at no cost to the City.

**DESIGN**

3. (a) Drawings. The control cabinet must conform in detail to requirements shown on Drawing 876 for a 100 Amp application and to Drawing 880 for a 200 Amp application.
- (b) Material. The cabinet and the door assembly must be constructed of 5052- H32 sheet aluminum alloy, with a minimum thickness of .125 inches. The base plate must be sheet aluminum of .250 inch thickness. All electrical components and wiring must be as shown on the appropriate drawings.
- (c) Dimensions. The overall outside dimensions of the 100 amp control cabinet must be 36 inches in height by 20 inches in width by 15 inches in depth. The overall outside dimensions of the 200 amp control cabinet must be 41 inches in height by 25 inches in width by 16 inches in depth. Cabinets must have sloped tops to shed water.

**CABINET REQUIREMENTS**

4. (a) Cabinet. The cabinet must be sized as shown on either Drawing 876 or Drawing 880, depending on the controller amp rating. The cabinet door opening must be double flanged on all four (4) sides. A door restraint must be provided to prevent the door from moving in windy conditions.
- (b) Door. The door size must be a minimum of 80% of the front surface area. The door must be hinged on the right side when facing the cabinet. The door must have a gasket that meets the requirements found in U.L.508 Table 21.1. The gasket must form a weather-tight seal between the cabinet and the door. The door, when closed, must be flush with the cabinet.
- (c) Hinges. Hinges must be continuous and bolted to the cabinet and door with 1/4-20 stainless steel carriage bolts and nylock nuts. Hinges must be made of .093 inch thick aluminum. The hinge leaves must not be exposed externally when the door is closed. Only the hinge knuckles must be visible upon closing the door. The hinge pin must be .250 inch diameter stainless steel and must be capped top and bottom by weld to render it tamper-proof.
- (d) Latching. The latching mechanism must be a three-point draw roller type. The pushrods must be aluminum. The rollers must be nylon with a minimum diameter of .875 inches. The center catch must be .187 inch aluminum, minimum.
- (e) Handle. The handle must be stainless steel with a .750 inch diameter shank. The handle must have provision for a padlock. The lock must be keyed dead bolt #200725, or as directed. Two (2) keys must be provided for each cabinet.

- (f) Ventilation. Louvered vents must be provided in the door. Louvers must satisfy the NEMA rod entry test for 3R enclosures. A removable filter must cover the louvers from inside the door. The filter must be held firmly in place with top and bottom brackets and a spring-loaded clamp. Exhaust air must be vented out between the top of the cabinet and the door. The exhaust area must be screened with openings of .12 inch by 1.0 inch.
- (g) Equipment Mounts. The cabinet must be equipped with two (2) adjustable AC@ channels on both side walls and on the back wall. The internal dimensions of the channels must be 1.075 inches high by .625 inches wide. All mounting hardware must be furnished.
- (h) Workmanship. All control cabinets must be free of flaws, and must have neat, smooth exterior surfaces. All holes must be accurately located and drilled. All welds must be neatly formed and free of cracks, blow holes, or other irregularities. All inside and outside edges must be free of burrs.
- (i) Painting. The cabinet, door and other parts must be treated by an iron phosphate conversion technique. After which, all the parts must be baked dry. A polyester powder coat must then be applied. The inside of the cabinet and door must be white. The outside of the cabinet and door must be green meeting No. 14110 of Federal standard Number 595, or a gloss black, or another color as specified. A paint chip must be provided upon request.

**PANEL**

- 5. (a) The panel must be composed of phenolic plastic ½ inch in thickness. It must be securely bolted to the cabinet using stainless steel hardware.
- (b) The panel will be sized, cut, and drilled as shown on the appropriate standard drawing. For a 100 amp and 200 amp – 2 pole controller, the panel must comply with Drawing 984. For a 100 amp and 200 amp – 3 pole controller, the panel must comply with Drawing 984. If alternate components are proposed, the panels must be sized accordingly.

**ELECTRICAL COMPONENTS**

- 6. (a) All components will be as indicated on the appropriate drawing. Circuit breakers must have thermal magnetic trips. Each breaker must be enclosed in a hard insulated housing. All breakers must be UL listed. The photo-cell relay, if required, must meet City specifications.
- (b) Wiring will be as indicated on the appropriate drawing. All wire will have stranded copper conductors, unless indicated otherwise. All wires must be insulated with an approved 125° Centigrade insulation.

## **SPECIFICATION 1606**

- (c) For a 3-wire, 1-phase, 240 volt ComEd input, components and wiring will be as indicated on Standard Drawing 983 (for either 100 amp or 200 amp service). For a 4-wire, 3-phase, 120/208 volt ComEd input, components and wiring will be as indicated on Standard Drawing 983 (for either 100 amp or 200 amp service).

THIS SPECIFICATION SHALL NOT BE ALTERED

**ELECTRICAL SPECIFICATION 1608  
DIVISION OF ENGINEERING  
DEPARTMENT OF TRANSPORTATION  
CITY OF CHICAGO  
REVISED OCTOBER 11, 2017**

**CONTROL: SMART LIGHTING, FOR ROADWAY LIGHTING,  
INTERNAL AND TWIST LOCK TYPE**

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**SUBJECT**

1. This specification states the requirements for smart lighting control node, consisting essentially of a control module compatible with Silver Springs Network, photocell, relay, and a surge arrester, all enclosed in an approved housing, to control the operation of roadway luminaire. The internal node is to be used for acorns, globes, gas light & teardrop luminaires. The external twist-lock node is to be used for cobra-head luminaires.

**GENERAL**

2. (a) Information Required. Each bidder shall submit with his proposal the following information relative to the photoelectric control he proposes to furnish.
  - (1) Outline drawing.
  - (2) Complete environmental, electrical, physical, and operating data on the control unit.
  - (3) Data by the control node manufacturer including sensitivity, operating temperature and load rating.
  - (4) Manufacturer's name and catalogue designation.
- (b) Assembly. Each control node must be delivered completely assembled, wired, and ready for installation.
- (c) Size and Weight.
  - (1) Internal Node - the unit must not be more than 2.5" high, 4.25" length and 3.5" width with a maximum weight of eleven (11) ounces.
  - (2) External Twist Lock Node - the unit must not be more than 5" high or 3.5" in diameter with a maximum weight of nine (9) ounces.
- (d) Smart Lighting control modules must meet or exceed all requirements of ANSI Standard C136-10-2010 for Twist Lock Controls & ANSI C136.41.2013 Dimming Control between an External Locking Type Control and Ballast or Driver. The external node must be SEL External CMS Module Part No. 8S570101-001002-1-CHI. The internal node must be SEL Internal CMS Module Part No. 8S87138-001002-1-CHI.

- (e) Warranty. The manufacturer shall warrant every node against any defects due to design, workmanship or materials developing within a period of five (5) years after the control has been delivered. This will be interpreted particularly to mean failure of any component impairing the proper operation or protection of the unit. Any control, or part thereof, developing defects within this period must be replaced by the manufacturer at his sole expense and without cost to the City.
- (f) Sample. A sample node of the manufacture intended to be furnished must be submitted within fifteen (15) business days upon receipt of a request from the Chief Procurement Officer.
- (g) Compliance with Specifications. The node must conform in detail to the requirements herein stated, and to other standards and specifications, as cited, of which the most recently published revision will govern. Certified test results must be submitted to the Commissioner as indicated below, prior to shipping of nodes. All shipments not meeting specification requirements will not be accepted.
- (h) Approved. Wherever "approved" is specified herein, it will be construed to mean approved by the Commissioner or the Commissioner's authorized representative.

### **CONSTRUCTION**

3. (a) Photoconductive Cell. The photocell shall consist of a suitable substrate, a chemically inert electrode material and a thin layer of photosensitive cadmium sulfide or other acceptable photosensitive material. It must be hermetically sealed in a glass to metal package to prevent moisture and contamination damage. Plastic cased cells are not acceptable. Filtered silicon sensors in clear epoxy cases are also acceptable. Cell dissipation over a 24 hour period must not exceed the recommended allowable levels specified by the cell manufacturer. If the cell operates on D.C. an affidavit must be submitted giving the cell manufacturer's certification that such operation will not adversely affect the sensitivity, stability, or the life of the cell. The cell must not be subject to overloading due to the demand of the design circuit nor the ambient temperatures surrounding the cell. Color response of the cell or silicon sensor must be such that maximum sensitivity is in the blue-green portion of the color spectrum.
- (b) Switching Relay. The ON-OFF switching operations shall be accomplished by normally closed contacts which must be opened by means of a rugged, properly rated, magnetic relay, subject to approval. The switching shall be positive and free of chatter and/or sticking of contacts. The contractor must provide test data verifying that contact chatter does not exceed 5 milliseconds when operated under loads as herein specified. The relay must have contacts of silver alloy, tungsten, or other specifically approved material.
- (c) Surge Arrestor. Over voltage protection shall be provided for the control components and the load circuit by means of a metal oxide varistor (MOV) or other specifically approved type arrestor. It must limit high voltage surges to a value at least 20% below the basic impulse insulation level (BIL in accordance with EEI-NEMA) of the

control. For the button control, the MOV must be rated for a minimum of 100 joules wired line to neutral. For the twist lock control the MOV must be rated for minimum of 160 joules wired line to neutral; a secondary MOV or zener diode of at least 6 joules must be provided to protect the electronic circuit. In both the button and twist lock controls, the MOV must be mounted internally of the control housing.

- (d) Printed Circuit Boards. A conformal coating shall be applied to all printed circuit boards for environmental protection.
- (e) Housing. The housing shall be molded of an approved, impact resistant, UV resistant weatherproof material such as acrylic, butyrate or polycarbonate, pigmented to an approved color. The housing is required to be impact resistance greater than 1.0 ft-lbs at -40° C. Year and manufacturer must be molded in cover.
- (f) Fail-Safe. Relay contacts must be normally closed so that when circuit failure occurs the lights are turned on, or remain on.
- (g) Dating. A weatherproof, permanent label must be attached to each unit indicating manufacturer's name, month and year of manufacture, model and serial numbers, voltage and load ratings, and, on twist lock control, provision for marking installation and removal dates.
- (h) Lead Wires.
  - (1) Internal Node - lead wires must be #18 AWG (Min); rated for 105°C; and 12" long. They must be color coded as follows:
    - Red - Load
    - White - Neutral (on 120 volt controls) Black - Line
    - Yellow - Common (on 240 volt controls)
 240 volt internal node must have a permanent black on orange label 0.5"x2.0" in size that reads "240 VOLT".
  - (2) External Node - the base must provide an integral, 5-pin or 7-pin NEMA Twist-Lock in accordance with ANSI C136.41. A neoprene or other approved gasket must be attached to the base to effectively seal the connections against weather, insects and dust.

**CHARACTERISTICS**

- 4. (a) Electrical. The node must be stable and reliable over the range of 105 to 305 volts A.C., at 60 cycles. The external node twist lock control's direct load rating must be 1000 watts tungsten, 1800 VA ballast; the internal node control must be rated for 1000 VA ballast. Current inrush rating of the control must be not less than 100 amperes. Control nodes must turn on/off roadway luminaires and provide 0-10V dimming for roadway luminaires capable of dimming

capable of dimming used by the City of Chicago.

- (b) Environmental. The control must be stable and reliable over an operating temperature range of  $-40^{\circ}\text{C}$  ( $-40^{\circ}\text{F}$ ) to  $+70^{\circ}\text{C}$  ( $+158^{\circ}\text{F}$ ).
- (c) Operating Levels. Each control furnished must be pre-aged in intense light for a period of not less than 10 hours, after which it must be calibrated using a photometer whose accuracy is traceable to the N.I.S.T. 100% quality control inspection must be performed after calibration and final assembly.
  - (1) The internal node control must be calibrated at 120 VAC for a "turn-on" setting of  $.50 \pm 0.1$  horizontal foot candles of natural illumination with a 7-15 second turn OFF delay. The "turn-off" setting must be adjusted to one and one half (1.5) times the "turn-on" setting. Internal node controls must have a 7-15 second turn ON delay.
  - (2) The external node control must be calibrated at 120 VAC for a "turn-on" setting of  $1.50 \pm 0.30$  horizontal foot candles of natural illumination with a 2- 5 second turn OFF delay. The "turn-off" setting must be adjusted to one and one half (1.5) times the "turn-on" setting. The external node control must have a 1-2 second turn ON delay.
- (d) Network. The control nodes must operate on an open standards secure (WiSun) IEEE 802.15.4g wireless mesh IPv6 based multi-application network compatible with Silver Springs Network. The control nodes shall support Frequency- Hopping Spread Spectrum up to 300kb/s mesh networking as well as automatic data routing with self-configuration, auto-healing & redundant uplinks. The device must be FCC compliant.

The control nodes must have full application and link-layer security with full PKI, AES-128 and -256, and embedded firewall which includes integrated multi-layer security with end-to-end encryption and capability to prohibit unauthorized access.

Internal Nodes must be able to communicate with network even when installed inside a metal housing of the luminaire.

## **TESTS**

- 5. (a) Procedures. Test procedures must conform to these specifications, and to ANSI Standards C136-10-2010, except as otherwise herein indicated.
- (b) Performance Test. The control shall be subject to an accelerated performance test which will consist of cycling ON (30 seconds) and OFF (30 seconds) sixty times per hour at rated load for 2000 cycles. The node must not exceed the limits indicated for the nominal or rated operating levels, and relay contact points must



not stick or show high resistance due to excessive pitting and/or erosion.

- (c) Dielectric Strength Test. The control unit complete with enclosure shall be subject to a D.C. hypot test for dielectric strength. It must successfully withstand a 5.0 KV test for one (1) minute dry.
- (d) Drop Test. The control must be capable of withstanding a drop of 3 feet to a concrete floor without causing damage to the housing or changing electrical operation.
- (e) Surge Protection Test. The control shall be subject to a test for surge protection in accordance with UL 1449 and ANSI C62. By means of a surge generator, a 6.0 KV, 1.2 x 50 microsecond voltage wave impulse test must be made. The surge test must have a short circuit current average of at least 3 KA for 8.0 x 20 microseconds. The control must withstand the impulse testing, and change in calibration levels must not exceed the limits indicated for the nominal or rated operating levels.
- (f) Temperature and Humidity Tests. The control will be subject to specified calibration tests immediately following conditioning of the control at extremes of temperature and humidity, as indicated below:
  - (1) Condition the control for a period of 24 hours at 98% relative humidity and 70° C temperature.
  - (2) Condition the control for a period of 10 hours at -40° C (-40° F).
- (g) Calibration Test. After completion of all specified testing, the control unit must be recalibrated and must be within the operating parameters of this specification. During this test, the manufacturer must demonstrate that there is no cycling during either "turn-on" or "turn-off."
- (h) Testing. One (1) unit from each lot of 500 nodes, with a minimum of 2 nodes per contract, will be subject to test. In the event any node fails to meet test requirements, the entire lot will be subject to rejection, except that the manufacturer, may subject a minimum of five (5) additional nodes in the lot to test and if all fulfill the requirements, the lot will be accepted. Should any of the additional five (5) nodes fail, then the entire lot will be rejected. Certified test reports must be submitted to the Commissioner for approval prior to shipment of material. All units subjected to test will remain the property of the Contractor and may not be included as part of this contract.

**PACKAGING**

- 6. (a) Carton. Each smart lighting control node must be individually packed in a carton of adequate strength and properly secured and protected to prevent damage to the unit during shipment, handling and storage.

## SPECIFICATION 1608

- (b) Marking. Each carton into which a number of individually packed photoelectric units are packed must be clearly marked on the outside in letters not less than one-quarter (1/4) inch tall with the legend "SMART LIGHTING INTERNAL CONTROL NODE" or "SMART LIGHTING EXTERNAL CONTROL NODE" (as appropriate), preceded by the number of units in the carton in numbers of the same height as the letters: volt-ampere lamp load rating, voltage, manufacturer's name and catalogue number, contract or order number, and shipping date

THIS SPECIFICATION SHALL NOT BE ALTERED

**ELECTRICAL SPECIFICATION NO. 1611  
CITY OF CHICAGO  
DEPARTMENT OF TRANSPORTATION  
DIVISION OF ENGINEERING  
DECEMBER 5, 2017**

**OUTDOOR LED LUMINAIRE SPECIFICATION:  
ORNAMENTAL ARTERIAL STREETS (Chicago 2000 Tear Drop)**

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**I. SUBJECT**

- A. This specification states the requirements for an ornamental Tear Drop LED street light luminaire. The luminaire shall be for arterial street lighting. The overall shape of the luminaire shall be historic teardrop. The LED luminaires will be integrated into a centralized lighting management system. The luminaire must include a fitter and must be fabricated for attachment to a 2" O.D. steel mast arm on a Chicago 2000 light pole system. The luminaire shall be mounted at 30 feet above grade.

**II. GENERAL**

A. References

American National Standards Institute (ANSI)

- ANSI C78.377-2015, "American National Standard for Electric Lamps—Specifications for the Chromaticity of Solid State Lighting (SSL) Products"
- ANSI C82.77-10-2014, "American National Standard for Lighting Equipment—Harmonic Emission Limits—Related Power Quality Requirements"
- ANSI C136.2-2015, "American National Standard for Roadway and Area Lighting Equipment—Dielectric Withstand and Electrical Transient Immunity Requirements"
- ANSI C136.10-2010, "American National Standard for Roadway and Area Lighting Equipment—Locking-Type Control Devices and Mating Receptacles—Physical and Electrical Interchangeability and Testing"
- ANSI C136.15-2015, "American National Standard for Roadway and Area Lighting Equipment—Luminaire Field Identification"
- ANSI C136.22-2004 (R2009, R2014), "American National Standard for Roadway and Area Lighting Equipment—Internal Labeling of Luminaires"
- ANSI C136.25-2013, "American National Standard for Roadway and Area Lighting Equipment—Ingress Protection (Resistance to Dust, Solid Objects and Moisture) for Luminaire Enclosures"

- ANSI C136.31-2015, “American National Standard for Roadway and Area Lighting Equipment—Luminaire Vibration”
- ANSI C136.37-2011, “American National Standard for Solid State Light Sources Used in Roadway and Area Lighting”
- ANSI C136.41-2013, “American National Standard for Roadway and Area Lighting Equipment—Dimming Control Between an External Locking Type Control and Ballast or Driver”
- ASTM B85/B85M-14, “Standard Specification for Aluminum-Alloy Die Castings”
- ASTM B117-16, “Standard Practice for Operating Salt Spray (Fog) Apparatus”
- ASTM D523-14, “Standard Test Method for Specular Gloss”
- ASTM D1654-08, “Standard Test Method for Evaluation of Painted or Coated Specimens Subjected to Corrosive Environments”
- ASTM G154-12a, “Standard Practice for Operating Fluorescent Ultraviolet (UV) Lamp Apparatus for Exposure of Nonmetallic Materials”

Illuminating Engineering Society of North America (IES)

- ANSI/IES LM-63-02, “Standard File Format for Electronic Transfer of Photometric Data”
- IES LM-79-08, “Approved Method: Electrical and Photometric Measurements of Solid-State Lighting Products”
- ANSI/IES LM-80-15, “IES Approved Method: Measuring Luminous Flux and Color Maintenance of LED Packages, Arrays and Modules”
- ANSI/IES RP-8-14, “Roadway Lighting”
- IES TM-21-11 (with Addendum B), “Projecting Long Term Lumen Maintenance of LED Light Sources”

Institute of Electrical and Electronics Engineers (IEEE)

- IEEE Std 1789-2015, “IEEE Recommended Practices for Modulating Current in High-Brightness LEDs for Mitigating Health Risks to Viewers”

International Electrotechnical Commission (IEC)

- IEC 60929:2011 (with Amendment 1), “AC and/or DC-supplied electronic control gear for tubular fluorescent lamps - Performance requirements”

Underwriters Laboratories (UL)

- ANSI/UL 1598 (3rd Edition), "Luminaires”

## B. Submittal Requirements:

The Contractor must submit the following information pertaining to each specified luminaire type within fifteen (15) days of request:

## A. Completed ATTACHMENT B – Submittal Form

## B. Product Data Sheets.

a) Luminaire data sheets – including summary product description, dimensioned outline drawings, and nominal characteristics including but not limited to: initial luminous flux (lumens), input power (watts), input voltage range (volts), LED drive current (milliamperes), correlated color temperature (kelvins), color rendering index, effective projected area (square feet) and weight (pounds).

b) LED Driver data sheet – including information described in LED Driver Requirements Section III-D-3.

c) LED light source data sheet

d) Surge protection device data sheet - if applicable

## C. Photometric Performance Data

The manufacturer must provide photometric calculations, as part of each luminaire's submittal package, that demonstrate the luminaire's photometric performance will meet or exceed the photometric requirements listed in this specification. The submitted lighting calculations must include point-by-point illuminance, luminance and veiling luminance data, as well as listings of all indicated averages and ratios. Photometric reports must include the following information and be in accordance with the standards listed below:

a) IES LM-79-08 photometric report that includes measured values for initial luminous flux, input power, correlated color temperature, and color rendering index.

b) ANSI/IES LM-63-02 electronic format photometric file that corresponds to the LM-79 report.

c) LM-63 photometric calculations that demonstrate compliance with the illumination requirements specified herein using the LM-63 file. Calculation grids and observer locations not specified herein must be in accordance with ANSI/IES RP-8-14.

d) IES TM-21-11 calculations that derive the lumen maintenance (lamp lumen depreciation or LLD) factor applied to photometric calculations specified herein.

- ANSI/IES LM-80-15 and in-situ temperature measurement testing

(ISTMT) reports containing data used in TM-21 calculations must also be submitted.

- TM-21 calculations must apply to the maximum LED case temperature from ISTMT, shall not extrapolate beyond six times the duration of available LM-80 test data, and must be submitted in the spreadsheet format of the ENERGY STAR TM-21 calculator ([https://www.energystar.gov/products/spec/luminaires\\_specification\\_version\\_2\\_0\\_pd](https://www.energystar.gov/products/spec/luminaires_specification_version_2_0_pd)).

LM-79, ISTMT, and LM-80 reports must correspond directly to submitted luminaires, and must be produced by test laboratories that satisfy the Testing Laboratory Requirements of the Design Lights Consortium ([www.designlights.org/content/QPL/ProductSubmit/LabTesting](http://www.designlights.org/content/QPL/ProductSubmit/LabTesting)).

ISTMT must be conducted in accordance with the Design Lights Consortium Manufacturer's Guide (<https://www.designlights.org/content/qpl/productssubmit>).

ISTMT shall be conducted in an ambient temperature of  $25 \pm 5$  °C. Ambient temperature variations above or below 25 °C shall be respectively subtracted from or added to temperatures recorded at points on the luminaire.

- D. Safety Certification - file number indicating compliance with UL 1598. Applicable testing bodies are determined by the US Occupational Safety Health Administration (OSHA) as Nationally Recognized Testing Laboratories (NRTL) and include: CSA (Canadian Standards Association), ETL (Edison Testing Laboratory), and UL (Underwriters Laboratory).
- E. Vibration Testing - the luminaire must comply with ANSI C136.31 at Vibration Test Level 1 (1.5 G).
- F. Product Sample - a sample of the luminaire that the contractor proposes to use must be submitted to the City. Sample must be representative production units and be supplied at no cost to the City.
- G. Assembly.  
Luminaire must be delivered completely assembled, wired, and ready for installation.
- H. Warranty.  
The luminaire manufacturer must warrant the performance and construction of luminaires to meet the requirements of this specification, and must warrant all parts, components and appurtenances against defects

due to design, workmanship or material developing within a period of ten (10) years from the date of acceptance by the City.

- The inability of a luminaire to be dimmed will constitute a luminaire failure.
- Failure of 10% or more of the LED light sources (packages or arrays/modules) in a luminaire will constitute a luminaire failure.
- The warranty must apply for application on all of the City's existing electrical systems, both grounded and ungrounded.
- During the warranty period the City may, from time to time, test a random sampling of 10-20 luminaires for verification of light output per IES LM-79 and to test dimming functionality for a given luminaire population. The percentage of luminaires not performing as required in the random sampling will be applied to the total population quantity to determine the number of new luminaire replacements that must be delivered to the City by the manufacturer, without expense to the City.

I. Manufacturing Experience and Capacity

The manufacturer must demonstrate at least a five year history of manufacturing LED roadway and outside area luminaires by providing a list of prior projects with project description, date, location, quantities and reference contact information. The manufacturer must also demonstrate the capacity to supply the quantities required for the contract in a timely manner.

**III. CONSTRUCTION**

A. Cast Housing and Fitter

1. Material

- a) Each housing and fitter must be cast aluminum, ASTM Grade 356, conforming to the Aluminum Association Standards for Aluminum Sand and Permanent Mold Castings, Washington, D.C., March 1980.
- b) The housing and fitter must conform in detail and dimensions to the applicable portions of Electrical Standard Drawing 931.
- c) Each casting must be die cast or made by the permanent mold process; sand castings will not be acceptable.
- d) Minimum thickness will be 3/16", excluding the fitter attachment to the pole, and will be uniform within each casting and throughout all castings in an entire order. Inconsistencies in casting thickness will be cause for rejection of the entire lot.

2. Appearance

- a) Castings will have smooth external surfaces free from protuberances,

dents, cracks, or other imperfections marring their appearance. Welding or plugging of casting defects is prohibited. The housing shall have the appearance of Standard Drawing 931, and shall be manufactured by Lumec, Spring City, Sternberg or Hadco.

Similar designs must be approved by the Commissioner. The Commissioner's decision of what constitutes a similar design will be final.

3. Housing

- a) The housing must enclose the LED array, electronic driver, terminal block, with provision for proper mounting of these parts.
- b) The housing must be of such size and surface area, or must have "heat sink" characteristics, such that all enclosed components will operate within their designed operating temperatures under expected service conditions.

4. Fitter

- a) The fitter must be suitable for attachment over the end of a two inch (2") steel mast arm inserted against a built-in pipe stop. The slip-fitter must be designed to permit adjustment of not less than three (3) degrees above and below the axis of the mounting bracket to compensate for slight misalignment. The fitter attachment to the pole mast arm must provide the structural integrity to hold the luminaire firmly in place during the vibrations anticipated due to wind loading, passing elevated trains and heavily loaded vehicles. Two 3/8-16, stainless steel (type 304) U-shape bolts must be used to secure the fitter to the pole mast arm. A minimum of 3/4" thickness of metal will be provided where the U-bolts are inserted to minimize the possibility of stripping the threads when the hardware is tightened into place. The hardware must include 3/8" x 16 threaded, stainless steel bolts and nuts; four sets of nuts and washers must be provided where the cobra-head style leveling device and fitter attaches to mast arm. The U-bolts must be properly installed and torqued in accordance with the manufacturer's written installation instructions. The fitter must be securely threaded into the cast housing such that it will remain an integral part of the luminaire during the vibrations described above. The slip-fitter will contain an approved shield around the pipe entrance to block entry of birds.

B. Cast Housing and Fitter Painting

1. Oil and Grease Removal

- a) All metal surfaces must be washed with an alkaline detergent to remove any oils or grease.



2. Chemical Pretreatment
    - a) The cleaned metal surfaces must be rinsed with de-ionized water
    - b) Treated with a hot, pressurized phosphate wash and sealer
    - c) Rinsed again with de-ionized water, and then dried by convection heat.
  3. Exterior and Interior Coat
    - a) A thermosetting, weathering, polyester powder coat must be applied electrostatically to all cleaned and treated surfaces to a uniform four mil thickness in a one coat application.
    - b) This powder coat must be cured in a convection oven at a minimum 400°F to form a high molecular weight fusion bonded finish.
  4. Alternate Methods
    - a) Alternate coating methods may be reviewed and tested on a case-by-case basis. However, no coating method will be accepted unless the Commissioner judges such alternate to be equal to the coating herein specified
  5. Durability
    - a) Both the exterior and interior coats must be capable of passing 1,000 hours of salt spray exposure as per ASTM B117 in a 5% Na Cl (by weight) solution at 95°F and 95% relative humidity without blistering.
    - b) Before test, the panel must be scribed with an "X" down to bare metal.
  6. Coating Measurement
    - a) Measurement of coating thickness must be done in accordance with SSPC-Pa 2-73T, "Measurement of Dry Paint Thickness with Magnetic Gauges", except that the lowest "single spot measurement" must not be less than 3.0 mils.
  7. Color
    - a) Preferred color will be gloss black. A 4" square color chip sample must be submitted for approval prior to fabrication.
    - b) The chip sample must be of the same material as the capital, and must include the manufacturer's name and the manufacturer's color name as well.
    - c) The sample must also include any other information which will be required to purchase the same color for the poles and split pedestal bases.
- C. Optical Assembly
1. Refractor

- a) The refractor shall be pressed crystal clear, heat-resistant, borosilicate glass, well annealed, homogeneous, and free from imperfections and striations.
- b) It must contain prisms pressed on the inside surface and where necessary on the outside surface, and must be optically designed to redirect by refraction the light from the array and reflector to produce the desired light pattern.
- c) The refractor must conform to that shown on the Electrical Standard Drawing 931.
- d) The holder-door must be a precision, aluminum ASTM Grade 356 permanent mold casting which must be hinged to the luminaire housing and must open downward approximately 90 degrees to allow servicing.
- e) The hinging arrangement must be of rugged construction with corrosion resistant hinge fittings.
- f) The hinge must prevent the holder-door from disengaging and dropping in case it should swing open.
- g) The door must also be connected to the housing with a stainless steel cable. The refractor must be securely held in the holder-door. The entire assembly should be easily disconnected for replacement. When closed, the holder-door must lock the assembly in precise optical alignment with the housing.
- h) A sturdy, positive-acting, spring loaded latch will permit single-glove-handed release, and on closing, the holder-door must provide a definite snap action or visual indication that it is locked.
- i) A silicone rubber, EPDM (ethylene propylene diene monomer), or EPR (ethylene propylene rubber) gasket must be fixed in place to seal the refractor door to the main housing.
- j) A “breathing” filter of Fiberglass or other approved material must be incorporated in the reflector for sealed optical units. It must effectively filter out dirt and particle size contaminants.

**D. Electrical Components**

**1. LED Optical Array.**

- a) The LED arrays shall be optimized for the required roadway photometrics. The arrays must be properly secured at the factory and must not require field adjustment for optimum photometric performance.

- b) The optical assembly shall consist of the LED array, the refractor, the refractor holder-door, gasketing, and all associated items.
  - c) The LED optical assembly shall be rated IP66 for ingress protection for dust and water.
  - d) The optical unit as a whole must provide as similar as an IES Medium Cut-off Type II/III distribution.
2. Terminal Block
- a) A terminal block of high grade molded plastic of the barrier or safety type must be mounted within the housing in a readily accessible location.
  - b) Terminal block wiring; all necessary terminals, pre-wired to all luminaire components, must be provided.
  - c) Terminal block terminals must have copper plated or brass plated, clamp-type pressure connectors of an approved type for "line" connections, to accommodate wire sizes from #12 to #8 A.W.G.
  - d) Terminal block terminals for internal component connections must be either the screw-clamp or quick disconnect type.
3. LED Driver:
- a) Voltage.
    - The electronic driver must operate at an input voltage range of between 120 and 277 volts, 60 Hertz.
    - It must automatically sense the input voltage and adjust the output accordingly.
    - The City uses nominal input voltages of 120, 208, and 240 for street lighting.
    - When operated at any supply voltage between 80 percent and 110 percent of its rated supply voltage and at rated input frequency, a driver shall provide current and/or voltage regulation that equals or exceeds the values specified by the manufacturer.
  - b) Electrical Safety. Luminaires must operate at or below the Low-Risk Level, as defined in Figure 18 of IEEE 1789-2015. This requirement must be satisfied across the dimming range.
  - c) Power Factor (PF). The power factor of the driver over the design range of input voltages specified above must be in accordance to ANSI C82.77-2014. PF must be  $\geq 0.9$ .

- d) Total Harmonic Distortion (THD). The driver input current must have specified THD in accordance to ANSI C82.77-2014. THD must be  $\leq 32\%$ .
- e) Thermal Protection. The driver must be thermally protected to shut off when operating temperatures reach unacceptable levels.
- f) Electromagnetic Interference. Luminaire must comply with the FCC radiation emission limits for Class B digital devices given at 47 CFR 15.109.
- g) Electrical Transient Immunity:
  - Dielectric Withstand Testing - luminaire must meet the performance requirements specified in ANSI C136.2-2015 for dielectric withstand, using the DC test level and configuration.
  - Electrical Transient Immunity - luminaire must meet the performance requirements specified in ANSI C136.2-2015 for electrical transient immunity, using the Enhanced (10 kV / 5 kA) combination wave test level.
  - Transient Immunity Testing Requirements:
    - During electrical transient immunity testing, the device under test (DUT) must: be connected to the power source through a series coupler/decoupler network (CDN), using a two-wire (hot or hot/neutral) connection between both the power supply and CDN input and the CDN output and DUT.
    - If AC mains is used to power the DUT, the input waveform must be characterized and documented both before and after electrical transient immunity testing, with the DUT operating at rated full output.
    - For Pre-Test DUT Characterization, the diagnostic measurements shall, at a minimum, include the following: real power, input current (RMS; Root-Means-Square), power factor, and current distortion factor (THD-I Total Harmonic Distortion) when operating at rated full output.
    - Manufacturer must indicate on submittal form whether failure of the electrical transient immunity system can possibly result in disconnect of power to luminaire.
- h) Dimming Capability. The driver must be capable of dimming. The dimming range must be 10% to 100% of full output. The digital lighting interface used for dimming must be DALI (Digital Addressable Lighting Interface) as per the requirements of IEC 62386. There must be a minimum of 100 dimming steps between the top and

bottom of the dimming range.

4. Wiring.
  - a) All components must be completely factory wired with non-fading, color coded leads. These leads must be insulated with an approved class of insulation and must be #16 AWG conductor at a minimum.
  - b) All wires within a single circuit path must be of the same size.
  - c) No wire-nut splicing will be allowed.
  - d) No unnecessary splices will be allowed.
  - e) Quick disconnects must be provided for all components.
  - f) All wires must be properly terminated.
5. Control Device Receptacle and Cap.
  - a) Twist-lock Receptacle for a control device that meets ANSI C136.41 must be mounted in the top of the housing or appropriate location with provision for proper positioning of the control device.
  - b) 7-pin Receptacle. The luminaire control receptacle must be fully prewired and compliant with ANSI C136.41.
  - c) 3-prong Shorting Cap that meets ANSI C136.10 must be provided.
  - d) Receptacle Wire Leads must all be properly terminated.
  - e) Receptacle repositioning. The receptacle must be able to be repositioned without the use of tools.
  - f) Control Devices Not Included in LED Specifications. Whereas specifications for control receptacles are included, specifications for control devices are not. The control device performance requirements are part of the lighting management system specifications in the Smart Lighting Project Technology specifications
6. Component Mounting. All electrical components must be securely mounted in such manner that individual components can be easily maintained or replaced. Permanent straps or tie-wraps will not be permitted. The entire assembly should be easily disconnected and removed for replacement.

#### **IV. PHOTOMETRIC REQUIREMENTS**

##### **A. Light Pollution.**

To limit light pollution, the submitted luminaires must not emit any light above the horizon (0 lumens at angles  $\geq 90^\circ$  from luminaire nadir).

**B. Lumen Maintenance.**

1. LED arrays must deliver a minimum of 90% of initial lumen output at 36,000 hours of operation.
2. Light Loss Factor (LLF) < 1.0. Calculations for maintained values, i.e.  $LLF = LLD \times LDD \times LAT$ .
  - a) Lamp Lumen Depreciation (LLD) calculated at 60,000 hours as per Section II-B-3-d above,
  - b) Luminaire Dirt Depreciation (LDD)  $\leq 0.90$ , and
  - c) Luminaire Ambient Temperature (LAT)  $\leq 0.96$

Luminaires with less than 10,000 hours of available LM-80 test data may be submitted for consideration but must be clearly indicated as such.

**C. Color Attributes**

1. Color Rendering Index (CRI) shall be no less than 65.
2. Nominal Correlated Color Temperature (CCT) shall be 3000K as defined by ANSI C78.377 and described below:

Manufacturer-Rated Nominal CCT (K)	Allowable IES LM-79 Chromaticity Values	
	Measured CCT (K)	Measured Duv
3000	2870 to 3220	-0.006 to 0.006

**A. City of Chicago Typical Ornamental Lighting Contexts**

ATTACHMENT A (below) lists the photometric performance requirements for luminaires used in the following typical municipal outdoor arterial ornamental lighting applications:

- Arterial Streets – two-sided opposite pole spacing
- Arterial Streets – two-sided staggered pole spacing

**ATTACHMENT A – Photometric Performance Requirements**

TYPICAL LIGHTING CONTEXT	ARTERIAL		
	OPPOSITE	STAGGERED	
POLE CONFIGURATION*	OPPOSITE	STAGGERED	
RIGHT OF WAY (Width)	100 ft.	80 ft.	66 ft.
IES PAVEMENT CLASS	R3	R3	R3
STREET WIDTH (Curb to Curb)	80 ft.	60 ft.	48 ft.
LANES (Incl. Parking & Median)	7	6	4
PARKWAY (Width)	4 ft.	4 ft.	N/A
SIDEWALK (Width)	6 ft.	6 ft.	9 ft.
HEIGHT TO LUMINAIRE	33 ft.	33 ft.	33 ft.
MAST ARM LENGTH	12 ft.	12 ft.	8 ft.
POLE SETBACK (From Curb to Center of Pole)	3 ft.	3 ft.	3 ft.
IN-LINE POLE SPACING	210 ft.	210 ft.	210 ft.
LUMINAIRE REQUIREMENTS	OPPOSITE	STAGGERED	
Max Input Power - Default /Normal Luminance (Watts)	180	180	180
Default/Normal AVG. Luminance (cd/m <sup>2</sup> )	≥1.7	≥1.7	≥1.7
AVG/MIN Uniformity Ratio	≤ 3:1	≤ 3:1	≤ 3:1
MAX/MIN Uniformity Ratio	≤ 5:1	≤ 5:1	≤ 5:1
MAX Veiling Luminance Ratio	≤ 0.3	≤ 0.3	≤ 0.3
AVG. Boosted Luminance (cd/m <sup>2</sup> ) [Add-Alternate]	≥2.5	≥2.5	≥2.5
SIDEWALK			
Default AVG. Horizontal Illuminance (fc)	≥0.50	≥0.50	≥0.50
AVG. MIN Uniformity Ratio (Horizontal Illuminance)	≤ 4:1	≤ 4:1	≤ 4:1
LIGHT TRESPASS RESTRICTIONS - (as measured in a vertical plane 10' beyond ROW ≤3' height)			
MAX Vertical Illuminance	≤ 0.3	≤ 0.30	≤ 0.30

## ATTACHMENT B - Product Submittal Form

Lighting Context	e.g. Arterial Ornamental Wide		
<i>Product Information Description</i>	<i>Product Data (Summary)</i>		<i>Submittal Reference Document</i>
Luminaire Designation			
Luminaire Manufacturer			
Luminaire Model Number			
Luminous Flux – initial	lumens		
Luminaire input power—initial	watts		
Luminaire input power—maintained	watts		
Luminaire input voltage- nominal range	volts		
LED drive current - initial	milliamps		
LED drive current - maintained	milliamps		
CCT (correlated color temperature)	kelvin		
CRI (color rendering index)			
EPA (effective projected area) - nominal	sq. ft.		
Luminaire Weight - nominal	lbs.		
Control Interface	<input type="checkbox"/> ANSI C136.41, 7-pin		
LED Driver – dimming capability	<input type="checkbox"/> Dimmable, 0-10V   <input type="checkbox"/> Dimmable, DALI		
LED driver- rated life	years		
Electrical transient immunity ANSI C136.2 combination wave test level	<input type="checkbox"/> Basic (6kV/3kA)	<input type="checkbox"/> Enhanced (10kV / 5kA)	<input type="checkbox"/> Elevated (20kV/10kA)
Vibration Test-ANSI C136.31	<input type="checkbox"/> Level 2		
Luminaire warranty period	years		
IES LM-80 test duration	hours		IES LM-80-15 report
LED lumen maintenance at 36,000 hours	%		TM-21 calculator
Max. LED case temperature	degrees Celsius		ISTMT report



**ELECTRICAL SPECIFICATION NO. 1612  
CITY OF CHICAGO  
DEPARTMENT OF TRANSPORTATION  
DIVISION OF ENGINEERING  
DECEMBER 7, 2017**

**OUTDOOR LED LUMINAIRE SPECIFICATION:  
ORNAMENTAL ARTERIAL STREETS (Acorn)**

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**I. SUBJECT**

- A. This specification states the requirements for an ornamental Acorn LED street light luminaire. The luminaire shall be for arterial street lighting. The overall shape of the luminaire shall be historic acorn. The LED luminaires will be integrated into a centralized lighting management system. The luminaire shall be mounted on a tenon at a mounting height of 14, 16 or 23 feet above grade and be as similar as an IES Type II/III medium non-cutoff distribution. The luminaire will be used to provide roadway lighting for arterial streets.

**II. GENERAL**

A. References

American National Standards Institute (ANSI)

1. ANSI C78.377-2015, “American National Standard for Electric Lamps—Specifications for the Chromaticity of Solid State Lighting (SSL) Products”
2. ANSI C82.77-10-2014, “American National Standard for Lighting Equipment—Harmonic Emission Limits—Related Power Quality Requirements”
3. ANSI C136.2-2015, “American National Standard for Roadway and Area Lighting Equipment—Dielectric Withstand and Electrical Transient Immunity Requirements”
4. ANSI C136.10-2010, “American National Standard for Roadway and Area Lighting Equipment—Locking-Type Control Devices and Mating Receptacles—Physical and Electrical Interchangeability and Testing”
5. ANSI C136.15-2015, “American National Standard for Roadway and Area Lighting Equipment—Luminaire Field Identification”
6. ANSI C136.22-2004 (R2009, R2014), “American National Standard for Roadway and Area Lighting Equipment—Internal Labeling of Luminaires”
7. ANSI C136.25-2013, “American National Standard for Roadway and Area Lighting Equipment—Ingress Protection (Resistance to Dust, Solid Objects and Moisture) for Luminaire Enclosures”

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8. ANSI C136.31-2015, “American National Standard for Roadway and Area Lighting Equipment—Luminaire Vibration”
9. ANSI C136.37-2011, “American National Standard for Solid State Light Sources Used in Roadway and Area Lighting”
10. ANSI C136.41-2013, “American National Standard for Roadway and Area Lighting Equipment—Dimming Control Between an External Locking Type Control and Ballast or Driver”
11. ASTM B85/B85M-14, “Standard Specification for Aluminum-Alloy Die Castings”
12. ASTM B117-16, “Standard Practice for Operating Salt Spray (Fog) Apparatus”
13. ASTM D523-14, “Standard Test Method for Specular Gloss”
14. ASTM D1654-08, “Standard Test Method for Evaluation of Painted or Coated Specimens Subjected to Corrosive Environments”
15. ASTM G154-12a, “Standard Practice for Operating Fluorescent Ultraviolet (UV) Lamp Apparatus for Exposure of Nonmetallic Materials”

### Illuminating Engineering Society of North America (IES)

16. ANSI/IES LM-63-02, “Standard File Format for Electronic Transfer of Photometric Data”
17. IES LM-79-08, “Approved Method: Electrical and Photometric Measurements of Solid-State Lighting Products”
18. ANSI/IES LM-80-15, “IES Approved Method: Measuring Luminous Flux and Color Maintenance of LED Packages, Arrays and Modules”
19. ANSI/IES RP-8-14, “Roadway Lighting”
20. IES TM-21-11 (with Addendum B), “Projecting Long Term Lumen Maintenance of LED Light Sources”

### Institute of Electrical and Electronics Engineers (IEEE)

21. IEEE Std 1789-2015, “IEEE Recommended Practices for Modulating Current in High-Brightness LEDs for Mitigating Health Risks to Viewers”

### International Electrotechnical Commission (IEC)

22. IEC 60929:2011 (with Amendment 1), “AC and/or DC-supplied electronic control gear for tubular fluorescent lamps - Performance requirements”

### Underwriters Laboratories (UL)

23. ANSI/UL 1598 (3rd Edition), "Luminaires”

#### B. Submittal Requirements:

The Contractor must submit the following information pertaining to each specified luminaire type within fifteen (15) days of request:

- A. Completed ATTACHMENT B – Submittal Form

**B. Product Data Sheets.**

- a) Luminaire data sheets – including summary product description, dimensioned outline drawings, and nominal characteristics including but not limited to: initial luminous flux (lumens), input power (watts), input voltage range (volts), LED drive current (milliamps), correlated color temperature (kelvins), color rendering index, effective projected area (square feet) and weight (pounds).
- b) LED Driver data sheet – including information described in LED Driver Requirements Section III-D-3.
- c) LED light source data sheet
- d) Surge protection device data sheet - if applicable

**C. Photometric Performance Data**

The manufacturer must provide photometric calculations, as part of each luminaire’s submittal package, that demonstrate the luminaire’s photometric performance will meet or exceed the photometric requirements listed in this specification. The submitted lighting calculations must include point-by-point illuminance, luminance and veiling luminance data, as well as listings of all indicated averages and ratios. Photometric reports must include the following information and be in accordance with the standards listed below:

- a) IES LM-79-08 photometric report that includes measured values for initial luminous flux, input power, correlated color temperature, and color rendering index.
- b) ANSI/IES LM-63-02 electronic format photometric file that corresponds to the LM-79 report.
- c) LM-63 photometric calculations that demonstrate compliance with the illumination requirements specified herein using the LM-63 file. Calculation grids and observer locations not specified herein must be in accordance with ANSI/IES RP-8-14.
- d) IES TM-21-11 calculations that derive the lumen maintenance (lamp lumen depreciation or LLD) factor applied to photometric calculations specified herein.
  - ANSI/IES LM-80-15 and in-situ temperature measurement testing (ISTMT) reports containing data used in TM-21 calculations must also be submitted.
  - TM-21 calculations must apply to the maximum LED case temperature from ISTMT, shall not extrapolate beyond six times the duration of available LM-80 test data, and must be submitted in the spreadsheet format of the ENERGY STAR TM-21 calculator  
[https://www.energystar.gov/products/spec/luminaires\\_specificat](https://www.energystar.gov/products/spec/luminaires_specificat)

[io n version 2 0 pd](#)).

LM-79, ISTMT, and LM-80 reports must correspond directly to submitted luminaires, and must be produced by test laboratories that satisfy the Testing Laboratory Requirements of the Design Lights Consortium ([www.designlights.org/content/QPL/ProductSubmit/LabTesting](http://www.designlights.org/content/QPL/ProductSubmit/LabTesting)).

ISTMT must be conducted in accordance with the Design Lights Consortium Manufacturer’s Guide (<https://www.designlights.org/content/qpl/productssubmit>).

ISTMT shall be conducted in an ambient temperature of  $25 \pm 5$  °C. Ambient temperature variations above or below 25 °C shall be respectively subtracted from or added to temperatures recorded at points on the luminaire.

- D. Safety Certification - file number indicating compliance with UL 1598. Applicable testing bodies are determined by the US Occupational Safety Health Administration (OSHA) as Nationally Recognized Testing Laboratories (NRTL) and include: CSA (Canadian Standards Association), ETL (Edison Testing Laboratory), and UL (Underwriters Laboratory).
- E. Vibration Testing - the luminaire must comply with ANSI C136.31 at Vibration Test Level 1 (1.5 G).
- F. Product Sample - a sample of the luminaire that the contractor proposes to use must be submitted to the City. Sample must be representative production units and be supplied at no cost to the City.
- G. Assembly.  
Luminaire must be delivered completely assembled, wired, and ready for installation.
- H. Warranty.  
The luminaire manufacturer must warrant the performance and construction of luminaires to meet the requirements of this specification, and must warrant all parts, components and appurtenances against defects due to design, workmanship or material developing within a period of ten (10) years from the date of acceptance by the City.
  - The inability of a luminaire to be dimmed will constitute a luminaire failure.
  - Failure of 10% or more of the LED light sources (packages or arrays/modules) in a luminaire will constitute a luminaire failure.
  - The warranty must apply for application on all of the City’s existing electrical systems, both grounded and ungrounded.
  - During the warranty period the City may, from time to time, test a

random sampling of 10-20 luminaires for verification of light output per IES LM- 79 and to test dimming functionality for a given luminaire population. The percentage of luminaires not performing as required in the random sampling will be applied to the total population quantity to determine the number of new luminaire replacements that must be delivered to the City by the manufacturer, without expense to the City.

I. Manufacturing Experience and Capacity

The manufacturer must demonstrate at least a five year history of manufacturing LED roadway and outside area luminaires by providing a list of prior projects with project description, date, location, quantities and reference contact information. The manufacturer must also demonstrate the capacity to supply the quantities required for the contract in a timely manner.

**III. CONSTRUCTION**

A. Capital and Finial

1. Material

- a) Each capital and finial shall be cast aluminum conforming to American Die casting Standard ADC-1-C9-83 grade 380.
- b) The capital shall fit over a 3" high by 3" O.D. tenon.
- c) The capital attachment to the tenon shall provide the structural integrity to hold the luminaire firmly in place during the vibrations anticipated due to passing heavily loaded vehicles, wind loading, and inclement weather.
- d) A minimum of 3/16" thickness of metal must be provided where the set screws are inserted to minimize the possibility of stripping the threads when the set screws are tightened into place.
- e) The set screws must be 5/16-18 stainless steel hex head screws. A minimum of three (3) set screws must be provided, evenly spaced at 120° apart.
- f) The finial shall be securely attached to the acorn globe such that it will remain in place during the vibrations described above.
- g) The Casting must have smooth external surfaces free from protuberances, dents, cracks or other imperfections marring their appearance. Welding or plugging of casting defects is prohibited.
- h) Each casting must be die cast or made by the permanent mold process; sand castings will not be acceptable.
- i) Minimum thickness will be 3/16", and will be uniform within each casting and throughout all castings in an entire order. Inconsistencies in casting

thickness will be cause for rejection of the entire lot.

2. Appearance
  - a) The housing will be of a similar design as manufactured by Spring City, or Sternberg. Similar designs must be approved by the Commissioner. The Commissioner's decision of what constitutes a similar design will be final.
  - b) The capital shall conform in appearance to that shown on Electrical Standard Drawing Number 912.

**B. Cast Housing and Fitter Painting**

1. Oil and Grease Removal
  - a) All metal surfaces must be washed with an alkaline detergent to remove any oils or grease.
2. Chemical Pretreatment
  - a) The cleaned metal surfaces must be rinsed with de-ionized water
  - b) Treated with a hot, pressurized phosphate wash and sealer
  - c) Rinsed again with de-ionized water, and then dried by convection heat.
3. Exterior and Interior Coat
  - a) A thermosetting, weathering, polyester powder coat must be applied electrostatically to all cleaned and treated surfaces to a uniform four mil thickness in a one coat application.
  - b) This powder coat must be cured in a convection oven at a minimum 400°F to form a high molecular weight fusion bonded finish.
4. Alternate Methods
  - a) Alternate coating methods may be reviewed and tested on a case-by-case basis. However, no coating method will be accepted unless the Commissioner judges such alternate to be equal to the coating herein specified
5. Durability
  - a) Both the exterior and interior coats must be capable of passing 1,000 hours of salt spray exposure as per ASTM B117 in a 5% Na Cl (by weight) solution at 95°F and 95% relative humidity without blistering.
  - b) Before test, the panel must be scribed with an "X" down to bare metal.

6. Coating Measurement
  - a) Measurement of coating thickness must be done in accordance with SSPC-Pa 2-73T, "Measurement of Dry Paint Thickness with Magnetic Gauges", except that the lowest "single spot measurement" must not be less than 3.0 mils.
7. Color
  - a) Measurement of coating thickness must be done in accordance with SSPC-Pa 2-73T, "Measurement of Dry Paint Thickness with Magnetic Gauges", except that the lowest "single spot measurement" must not be less than 3.0 mils.
  - b) The chip sample must be of the same material as the capital, and must include the manufacturer's name and the manufacturer's color name as well.
  - c) The sample must also include any other information which will be required to purchase the same color for the masts, mast arms and split pedestal bases.

C. Optical Assembly

1. Acorn Globe and Reflector
  - a) The Globe shall be constructed of clear, V825 HID acrylic utilizing a slip-fit 1/2" overlap, two piece which eliminates a "butt-glue" seam appearance.
  - b) The Globe must conform to that shown on Electrical Standard Drawing 912.
  - c) The bottom optical section of the globe must have a neck opening of 7-1/4" at the smallest diameter and an outside dimension of 8" at the bottom; be a minimum of 12-3/4" in height and 16 1/2" in width at the top.
  - d) The top section of the globe must be "Victorian" in appearance; a minimum of 13" in height and 16.313" in width with 100 horizontal prisms to evenly diffuse light. If so requested, a full top reflector of the same diameter as the globe shall be installed between the halves and secured to the globe. The top and bottom sections shall be secured in a slip-fit overlap design using four #10 -24 x 5/8 stainless steel pan head screws with four aluminum nutserts providing a mechanical lock. In addition, a sealant must be applied to the two halves to provide a dust-proof seal.
  - e) The globe shall be mounted with four 5/16-18 hex head, stainless steel bolts with stop nuts mounted into the die cast fixture housing.
  - f) They must securely contact an aluminum globe neck ring connected to the

acorn globe. The globe must be clearly marked and keyed so that it will be properly installed to provide the required house side/street side photometrics. The mounting must afford the rigidity necessary to prevent the globe from twisting or rattling when subjected to the vibrating forces of passing elevated trains or heavily loaded vehicles. The mounting must not preclude any globe from being mutually interchangeable with any other globe intended for this function.

- g) A top reflector and a house-side reflector shall be provided.
- h) These reflectors shall be mounted to a removable bracket.
- i) The small dome shaped top reflector, approximately 6.5 inches in diameter and 3 inches deep shall be mounted on the bracket and attached by a spring clamp, or other suitable means, to the lamp socket or lamp socket holder.
- j) The side reflector shall be mounted to the same bracket. The reflectors shall be constructed of aluminum and polished to a high specular finish. Reflectance of the reflecting surfaces shall not be less than 75%. Measurements shall be made with a reflectometer using the fiber-optic method.
- k) If so ordered in the line item of a contract, a full top reflector will be provided as part of the globe. This reflector will be inserted between the two halves of the globe and permanently sealed to the globe halves. This reflector will not allow any light from the lamp to enter the top half of the globe.

**D. Electrical Components**

- 1. LED Optical Array.
  - a) The LED arrays shall be optimized for the required roadway photometrics. The arrays must be properly secured at the factory and must not require field adjustment for optimum photometric performance.
  - b) The optical assembly shall consist of the LED array, the refractor, the refractor holder-door, gasketing, and all associated items.
  - c) The LED optical assembly shall be rated IP66 for ingress protection for dust and water.
  - d) The optical unit as a whole must provide as similar as an IES Medium Cut-off Type II/III distribution.
- 2. Terminal Block
  - a) A terminal block of high grade board of molded phenolic plastic shall be



mounted to the capital in a readily accessible location.

- b) Terminal block wiring; all necessary terminals, pre-wired to all luminaire components, must be provided.
  - c) Terminal block terminals must have copper plated or brass plated, clamp-type pressure connectors of an approved type for "line" connections, to accommodate wire sizes from #12 to #8 A.W.G.
  - d) Terminal block terminals for internal component connections must be either the screw-clamp or quick disconnect type.
3. LED Driver:
- a) Voltage.
    - The electronic driver must operate at an input voltage range of between 120 and 277 volts, 60 Hertz.
    - It must automatically sense the input voltage and adjust the output accordingly.
    - The City uses nominal input voltages of 120, 208, and 240 for street lighting.
    - When operated at any supply voltage between 80 percent and 110 percent of its rated supply voltage and at rated input frequency, a driver shall provide current and/or voltage regulation that equals or exceeds the values specified by the manufacturer.
  - b) Electrical Safety. Luminaires must operate at or below the Low-Risk Level, as defined in Figure 18 of IEEE 1789-2015. This requirement must be satisfied across the dimming range.
  - c) Power Factor (PF). The power factor of the driver over the design range of input voltages specified above must be in accordance to ANSI C82.77-2014. PF must be  $\geq 0.9$ .
  - d) Total Harmonic Distortion (THD). The driver input current must have specified THD in accordance to ANSI C82.77-2014. THD must be  $\leq 32\%$ .
  - e) Thermal Protection. The driver must be thermally protected to shut off when operating temperatures reach unacceptable levels.
  - f) Electromagnetic Interference. Luminaire must comply with the FCC radiation emission limits for Class B digital devices given at 47 CFR 15.109.
  - g) Electrical Transient Immunity:
    - Dielectric Withstand Testing - luminaire must meet the performance requirements specified in ANSI C136.2-2015 for dielectric withstand, using the DC test level and configuration.

- Electrical Transient Immunity - luminaire must meet the performance requirements specified in ANSI C136.2-2015 for electrical transient immunity, using the Enhanced (10 kV / 5 kA) combination wave test level.
- Transient Immunity Testing Requirements:
  - During electrical transient immunity testing, the device under test (DUT) must: be connected to the power source through a series coupler/decoupler network (CDN), using a two-wire (hot or hot/neutral) connection between both the power supply and CDN input and the CDN output and DUT.
  - If AC mains is used to power the DUT, the input waveform must be characterized and documented both before and after electrical transient immunity testing, with the DUT operating at rated full output.
  - For Pre-Test DUT Characterization, the diagnostic measurements shall, at a minimum, include the following: real power, input current (RMS; Root-Means-Square), power factor, and current distortion factor (THD-I Total Harmonic Distortion) when operating at rated full output.
  - Manufacturer must indicate on submittal form whether failure of the electrical transient immunity system can possibly result in disconnect of power to luminaire.
- h) Dimming Capability. The driver must be capable of dimming. The dimming range must be 10% to 100% of full output. The digital lighting interface used for dimming must be DALI (Digital Addressable Lighting Interface) as per the requirements of IEC 62386. There must be a minimum of 100 dimming steps between the top and bottom of the dimming range.
- 4. Wiring.
  - a) All components must be completely factory wired with non-fading, color coded leads. These leads must be insulated with an approved class of insulation and must be #16 AWG conductor at a minimum.
  - b) All wires within a single circuit path must be of the same size.
  - c) No wire-nut splicing will be allowed.
  - d) No unnecessary splices will be allowed.
  - e) Quick disconnects must be provided for all components.
  - f) All wires must be properly terminated.

5. Control Device Receptacle and Cap.
  - a) Twist-lock Receptacle for a control device that meets ANSI C136.41 must be mounted in the top of the housing or appropriate location with provision for proper positioning of the control device.
  - b) 7-pin Receptacle. The luminaire control receptacle must be fully prewired and compliant with ANSI C136.41.
  - c) 3-prong Shorting Cap that meets ANSI C136.10 must be provided.
  - d) Receptacle Wire Leads must all be properly terminated.
  - e) Receptacle repositioning. The receptacle must be able to be repositioned without the use of tools.
  - f) Control Devices Not Included in LED Specifications. Whereas specifications for control receptacles are included, specifications for control devices are not. The control device performance requirements are part of the lighting management system specifications in the Smart Lighting Project Technology specifications
6. Component Mounting.
 

All electrical components must be securely mounted in such manner that individual components can be easily maintained or replaced. Permanent straps or tie-wraps will not be permitted. The entire assembly should be easily disconnected and removed for replacement.

#### **IV. PHOTOMETRIC REQUIREMENTS**

##### **A. Light Pollution.**

To limit light pollution, the submitted luminaires must not emit any light above the horizon (0 lumens at angles  $\geq 90^\circ$  from luminaire nadir).

##### **B. Lumen Maintenance.**

1. LED arrays must deliver a minimum of 90% of initial lumen output at 36,000 hours of operation.
2. Light Loss Factor (LLF) < 1.0. Calculations for maintained values, i.e.  $LLF = LLD \times LDD \times LAT$ .
  - a) Lamp Lumen Depreciation (LLD) calculated at 60,000 hours as per Section II-B-3-d above,
  - b) Luminaire Dirt Depreciation (LDD)  $\leq 0.90$ , and
  - c) Luminaire Ambient Temperature (LAT)  $\leq 0.96$

Luminaires with less than 10,000 hours of available LM-80 test data may be submitted for consideration but must be clearly indicated as such.

C. Color Attributes

1. Color Rendering Index (CRI) shall be no less than 65.
2. Nominal Correlated Color Temperature (CCT) shall be 3000K as defined by ANSI C78.377 and described below:

Manufacturer-Rated Nominal CCT (K)	Allowable IES LM-79 Chromaticity Values	
	Measured CCT (K)	Measured Duv
3000	2870 to 3220	-0.006 to 0.006

## SPECIFICATION 1612

- A. City of Chicago Typical Ornamental Lighting Contexts  
ATTACHMENT A (below) lists the photometric performance requirements for luminaires used in the following typical municipal outdoor arterial ornamental lighting applications:
- Arterial Streets – two-sided opposite pole spacing
  - Arterial Streets – two-sided staggered pole spacing

**ATTACHMENT A – Photometric Performance Requirements**

TYPICAL LIGHTING CONTEXT	ARTERIAL		
	POLE CONFIGURATION*	OPPOSITE	STAGGERED
RIGHT OF WAY (Width)	80 ft.	66 ft.	66 ft.
IES PAVEMENT CLASS	R3	R3	R3
STREET WIDTH (Curb to Curb)	60 ft.	48 ft.	48 ft.
LANES (Incl. Parking & Median)	6	4	4
PARKWAY (Width)	4 ft.	N/A	N/A
SIDEWALK (Width)	6 ft.	9 ft.	9 ft.
HEIGHT TO LUMINAIRE	23 ft.	23 ft.	16 ft.
MAST ARM LENGTH	1ft.	1ft.	1ft.
POLE SETBACK (From Curb to Center of Pole)	4ft.	4ft.	4ft.
IN-LINE POLE SPACING	125 ft.	200 ft.	X?x ft.
LUMINAIRE REQUIREMENTS	OPPOSITE	STAGGERED	
Max Input Power - Default /Normal Luminance (Watts)	180	180	180
Default/Normal AVG. Luminance (cd/m <sup>2</sup> )	≥1.7	≥1.7	≥1.7
AVG/MIN Uniformity Ratio	≤ 3:1	≤ 3.5:1	≤ 3.5:1
MAX/MIN Uniformity Ratio	≤ 5:1	≤ 6:1	≤ 6:1
MAX Veiling Luminance Ratio	≤ 0.5	≤ 0.5	≤ 0.5
AVG. Boosted Luminance (cd/m <sup>2</sup> ) [Add-Alternate]	≥2.5	≥2.5	≥2.5
SIDEWALK			
Default AVG. Horizontal Illuminance (fc)	≥0.50	≥0.50	≥0.50
AVG.MIN Uniformity Ratio (Horizontal Illuminance)	≤ 4:1	≤ 4:1	≤ 4:1
LIGHT TRESPASS RESTRICTIONS - (as measured in a vertical plane 10' beyond ROW ≤3' height)			
MAX Vertical Illuminance	≤ 0.3	≤ 0.30	≤ 0.30

**ATTACHMENT B - Product Submittal Form**

Lighting Context	e.g. Arterial Ornamental Wide		
<i>Product Information Description</i>	<i>Product Data (Summary)</i>		<i>Submittal Reference Document</i>
Luminaire Designation			
Luminaire Manufacturer			
Luminaire Model Number			
Luminous Flux – initial	lumens		
Luminaire input power—initial	watts		
Luminaire input power—maintained	watts		
Luminaire input voltage- nominal range	volts		
LED drive current - initial	milliamps		
LED drive current - maintained	milliamps		
CCT (correlated color temperature)	kelvin		
CRI (color rendering index)			
EPA (effective projected area) - nominal	sq. ft.		
Luminaire Weight - nominal	lbs.		
Control Interface	<input type="checkbox"/> ANSI C136.41, 7-pin		
LED Driver – dimming capability	<input type="checkbox"/> Dimmable, 0-10V	<input type="checkbox"/> Dimmable, DALI	
LED driver- rated life	years		
Electrical transient immunity ANSI C136.2 combination wave test level	<input type="checkbox"/> Basic (6kV/3kA)	<input type="checkbox"/> Enhanced (10kV / 5kA)	<input type="checkbox"/> Elevated (20kV/10kA)
Vibration Test-ANSI C136.31	<input type="checkbox"/> Level 2		
Luminaire warranty period	years		
IES LM-80 test duration	hours		IES LM-80-15 report
LED lumen maintenance at 36,000 hours	%		TM-21 calculator
Max. LED case temperature	degrees Celsius		ISTMT report

**ELECTRICAL SPECIFICATION NO. 1613  
CITY OF CHICAGO  
DEPARTMENT OF TRANSPORTATION  
DIVISION OF ENGINEERING  
Revised July 18, 2018**

**OUTDOOR LED LUMINAIRE SPECIFICATIONS:  
RESIDENTIAL STREETS, ALLEYS, & ARTERIAL STREETS (Cobra Head)**

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**SUBJECT**

1. This specification states the requirements for non-ornamental Light Emitting Diode (LED) outdoor lighting luminaires. The specified LED luminaires will be used to replace existing High Pressure Sodium (HPS) and Ceramic Metal Halide (CMH) luminaires on Chicago residential streets, arterial streets, and alleys. The LED luminaires will be integrated into a centralized lighting management system.

**GENERAL**

A. References

American National Standards Institute (ANSI)

- ANSI C78.377-2015, “American National Standard for Electric Lamps—Specifications for the Chromaticity of Solid State Lighting (SSL) Products”
- ANSI C82.77-10-2014, “American National Standard for Lighting Equipment—Harmonic Emission Limits—Related Power Quality Requirements”
- ANSI C136.2-2015, “American National Standard for Roadway and Area Lighting Equipment—Dielectric Withstand and Electrical Transient Immunity Requirements”
- ANSI C136.10-2010, “American National Standard for Roadway and Area Lighting Equipment—Locking-Type Control Devices and Mating Receptacles—Physical and Electrical Interchangeability and Testing”
- ANSI C136.15-2015, “American National Standard for Roadway and Area Lighting Equipment—Luminaire Field Identification”
- ANSI C136.22-2004 (R2009, R2014), “American National Standard for Roadway and Area Lighting Equipment—Internal Labeling of Luminaires”
- ANSI C136.25-2013, “American National Standard for Roadway and Area Lighting Equipment—Ingress Protection (Resistance to Dust, Solid Objects and Moisture) for Luminaire Enclosures”
- ANSI C136.30-2015, “American National Standard for Roadway and Area Lighting Equipment—Pole Vibration”



- ANSI C136.31-2015, “American National Standard for Roadway and Area Lighting Equipment—Luminaire Vibration”
- ANSI C136.37-2011, “American National Standard for Solid State Light Sources Used in Roadway and Area Lighting”
- ANSI C136.41-2013, “American National Standard for Roadway and Area Lighting Equipment—Dimming Control Between an External Locking Type Control and Ballast or Driver”
- ASTM B85/B85M-14, “Standard Specification for Aluminum-Alloy Die Castings”
- ASTM B117-16, “Standard Practice for Operating Salt Spray (Fog) Apparatus”
- ASTM D523-14, “Standard Test Method for Specular Gloss”
- ASTM D1654-08, “Standard Test Method for Evaluation of Painted or Coated Specimens Subjected to Corrosive Environments”
- ASTM G154-12a, “Standard Practice for Operating Fluorescent Ultraviolet (UV) Lamp Apparatus for Exposure of Nonmetallic Materials”

Illuminating Engineering Society of North America (IES)

- ANSI/IES LM-63-02, “Standard File Format for Electronic Transfer of Photometric Data”
- IES LM-79-08, “Approved Method: Electrical and Photometric Measurements of Solid-State Lighting Products”
- ANSI/IES LM-80-15, “IES Approved Method: Measuring Luminous Flux and Color Maintenance of LED Packages, Arrays and Modules”
- ANSI/IES RP-8-14, “Roadway Lighting”
- IES TM-21-11 (with Addendum B), “Projecting Long Term Lumen Maintenance of LED Light Sources”

Institute of Electrical and Electronics Engineers (IEEE)

- IEEE Std 1789-2015, “IEEE Recommended Practices for Modulating Current in High-Brightness LEDs for Mitigating Health Risks to Viewers”

International Electrotechnical Commission (IEC)

- IEC 60929:2011 (with Amendment 1), “AC and/or DC-supplied electronic control gear for tubular fluorescent lamps - Performance requirements”

Underwriters Laboratories (UL)

- ANSI/UL 1598 (3rd Edition), “Luminaires”

**B. Submittal Requirements:**

The Contractor must submit the following information pertaining to each specified luminaire type within fifteen (15) days of request:

1. Completed ATTACHMENT G – Submittal Form
2. Product Data Sheets.
  - a) Luminaire data sheets – including summary product description, dimensioned outline drawings, and nominal characteristics including but not limited to: initial luminous flux (lumens), input power (watts), input voltage range (volts), LED drive current (milliamps), correlated color temperature (kelvins), color rendering index, effective projected area (square feet) and weight (pounds).
  - b) LED Driver data sheet – including information described in LED Driver Requirements Section III-I-3.
  - c) LED light source data sheet
  - d) Surge protection device data sheet - if applicable
3. Photometric Performance Data

The manufacturer must provide photometric calculations, as part of each luminaire’s submittal package, that demonstrate the luminaire’s photometric performance will meet or exceed the photometric requirements listed in this specification. The submitted lighting calculations must include point-by-point illuminance, luminance and veiling luminance data, as well as listings of all indicated averages and ratios. Photometric reports must include the following information and be in accordance with the standards listed below:

- a) IES LM-79-08 photometric report that includes measured values for initial luminous flux, input power, correlated color temperature, and color rendering index.
- b) ANSI/IES LM-63-02 electronic format photometric file that corresponds to the LM-79 report.
- c) LM-63 photometric calculations that demonstrate compliance with the illumination requirements specified herein using the LM-63 file. Calculation grids and observer locations not specified herein must be in accordance with ANSI/IES RP-8-14.
- d) IES TM-21-11 calculations that derive the lumen maintenance (lamp lumen depreciation or LLD) factor applied to photometric calculations specified herein.
  - ANSI/IES LM-80-15 and in-situ temperature measurement testing (ISTMT) reports containing data used in TM-21 calculations must also be submitted.

- TM-21 calculations must apply to the maximum LED case temperature from ISTMT, shall not extrapolate beyond six times the duration of available LM-80 test data, and must be submitted in the spreadsheet format of the ENERGY STAR TM-21 calculator ([https://www.energystar.gov/products/spec/luminaires\\_specification\\_version\\_2\\_0\\_pd](https://www.energystar.gov/products/spec/luminaires_specification_version_2_0_pd)).

LM-79, ISTMT, and LM-80 reports must correspond directly to submitted luminaires, and must be produced by test laboratories that satisfy the Testing Laboratory Requirements of the DesignLights Consortium ([www.designlights.org/content/QPL/ProductSubmit/LabTesting](http://www.designlights.org/content/QPL/ProductSubmit/LabTesting)).

ISTMT must be conducted in accordance with the DesignLights Consortium Manufacturer's Guide (<https://www.designlights.org/content/qpl/productssubmit>).

ISTMT shall be conducted in an ambient temperature of  $25 \pm 5$  °C. Ambient temperature variations above or below 25 °C shall be respectively subtracted from or added to temperatures recorded at points on the luminaire.

4. Safety Certification - file number indicating compliance with UL 1598. Applicable testing bodies are determined by the US Occupational Safety Health Administration (OSHA) as Nationally Recognized Testing Laboratories (NRTL) and include: CSA (Canadian Standards Association), ETL (Edison Testing Laboratory), and UL (Underwriters Laboratory).
  5. Vibration Testing - the luminaire must comply with ANSI C136.31 at Vibration Test Level 2 (3.0 G).
  6. Product Samples - at least two samples of each luminaire that the contractor proposes to use must be submitted to the City. All samples must be representative production units and be supplied at no cost to the City.
- C. Assembly.

Each luminaire must be delivered completely assembled, wired, and ready for installation.

D. Warranty.

The luminaire manufacturer must warrant the performance and construction of luminaires to meet the requirements of this specification, and must warrant all parts, components and appurtenances against defects due to design, workmanship or material developing within a period of ten (10) years from the date of acceptance by the City.

- The inability of a luminaire to be dimmed will constitute a luminaire failure.
- Failure of 10% or more of the LED light sources (packages or arrays/modules) in a luminaire will constitute a luminaire failure.

- The warranty must apply for application on all of the City’s existing electrical systems, both grounded and ungrounded.
- During the warranty period the City may, from time to time, test a random sampling of 10-20 luminaires for verification of light output per IES LM-79 and to test dimming functionality for a given luminaire population. The percentage of luminaires not performing as required in the random sampling will be applied to the total population quantity to determine the number of new luminaire replacements that must be delivered to the City by the manufacturer, without expense to the City.

E. Manufacturing Experience and Capacity

The manufacturer must demonstrate at least a five year history of manufacturing LED roadway and outside area luminaires by providing a list of prior projects with project description, date, location, quantities and reference contact information. The manufacturer must also demonstrate the capacity to supply the quantities required for the contract in a timely manner.

**CONSTRUCTION**

A. Weight

The net weight of these luminaires must not be more than 30 pounds.

B. Housing.

The preferred luminaire housing material is die-cast aluminum alloy meeting ASTM Specification A380. Alternate materials may be considered. The housing must enclose the mounting hardware, LED arrays, control receptacle, terminal board, and electronic driver. The housing must include a surface to facilitate leveling with a spirit level. The housing must have integral heat sink characteristics, such that all enclosed components will operate within their designed operating temperatures under expected service conditions. No external or removable heat shields or heat sinks; are permitted. The housing must be designed to encourage water shedding. The housing must be designed to minimize dirt and bug accumulation on the optic surface.

C. Mounting Provisions.

The luminaire must include a heavy gauge slip fitter clamping assembly suitable for secure attachment over the end of a two (2) inch 2” IP (2.375” OD) steel pipe with an approved means of clamping it firmly in mounting bracket. The slip fitter mounting clamp must contain an approved shield around the pipe entrance to block the entry of birds.

**D. Access Door-Panel.**

An access door panel allowing access to the terminal strip and LED driver must be provided. A die-cast aluminum door-panel composed of aluminum alloy A380 is preferred; alternate materials may be considered. The door-panel must be hinged to the luminaire housing and suitably latched and fastened at the closing end. It must be made to be removed easily. The hinge and fastening devices must be captive parts which will not become disengaged from the door panel.

**E. Hardware.**

All machine screws, locknuts, pins and set screws necessary to make a firm assembly, and for its secure attachment to the mast arm, must be furnished in place. All hardware must be of stainless steel, zinc plated steel, copper silicon alloy or other non-corrosive metal, and where necessary must be suitably plated to prevent electrolytic action by contact with dissimilar metals.

**F. Finish.**

The luminaire must have a polyester powder coat with a minimum 2.0 mil thickness. Surface texture and paint quality will be subject to approval. Color must be as specified in the order. A paint chip must be submitted as a sample upon request. The finish must exceed a rating of six per ASTM D1654 after 1000 hours of testing per ASTM B117. The coating must exhibit no greater than 30% reduction of gloss per ASTM D523 after 500 hours of QUV testing at ASTM G154 Cycle 6.

**Ingress Protection.**

1. The luminaire electric compartment housing must have an ingress protection rating of IP54 or better as described in ANSI C136.25-2013). The optical system must have a minimum rating of IP 66.
2. The luminaire must be listed for wet locations by a U.S. Occupational Safety Health Administration (OSHA) Nationally Recognized Laboratory (NRTL) and have a safety certification and file number indicating compliance with UL 1598.

**G. General Luminaire Requirements**

1. The luminaire must be rated to operate between -40° to +50° Celsius.
2. The luminaire must have the option of adding a house side shield. The shield should be designed to be easily installed in the field. The house side shield must be composed of a sturdy material capable of withstanding vibrations and weather conditions. The shield must cut off light trespass at approximately one mounting height behind the pole.
3. The luminaire must meet the requirements of ANSI C136.22 for internal labeling. A bar code with pertinent information for warranty and maintenance must be attached to the inside of the housing. A separate bar code label must be on the driver

4. The luminaire must be able to provide pertinent product information, for warranty and maintenance purposes, in a digital format that is compliant with the 0-10 VDC Node as per Section III-I-h) . This information will be transmitted through the networked Lighting Management control system.

H. Electrical Components

1. LED Optical Arrays

- a) The LED arrays must be properly secured at the factory and must not require field adjustment for optimum photometric performance.

2. Terminal Block

- a) A terminal block of high grade molded plastic of the barrier or safety type must be mounted within the housing in a readily accessible location.
- b) Terminal block wiring; all necessary terminals, pre-wired to all luminaire components, must be provided.
- c) Terminal block terminals must have copper plated or brass plated, clamp-type pressure connectors of an approved type for "line" connections, to accommodate wire sizes from #12 to #8 A.W.G.
- d) Terminal block terminals for internal component connections must be either the screw-clamp or quick disconnect type.

3. LED Driver:

- a) Voltage. The electronic driver must operate at an input voltage range of between 120 and 277 volts, 60 Hertz. It must automatically sense the input voltage and adjust the output accordingly. The City uses nominal input voltages of 120, 208, and 240 for street lighting. When operated at any supply voltage between 80 percent and 110 percent of its rated supply voltage and at rated input frequency, a driver shall provide current and/or voltage regulation that equals or exceeds the values specified by the manufacturer.
- b) Electrical Safety. Luminaires must operate at or below the Low-Risk Level, as defined in Figure 18 of IEEE 1789-2015. This requirement must be satisfied across the dimming range.
- c) Power Factor (PF). The power factor of the driver over the design range of input voltages specified above must be in accordance to ANSI C82.77-2014. PF must be  $\geq 0.9$ .
- d) Total Harmonic Distortion (THD). The driver input current must have specified THD in accordance to ANSI C82.77-2014. THD must be  $\leq 20\%$ .
- e) Thermal Protection. The driver must be thermally protected to shut off when operating temperatures reach unacceptable levels.

- f) Electromagnetic Interference. Luminaire must comply with the FCC radiation emission limits for Class B digital devices given at 47 CFR 15.109.
- g) Electrical Transient Immunity.
- Dielectric Withstand Testing - luminaire must meet the performance requirements specified in ANSI C136.2-2015 for dielectric withstand, using the DC test level and configuration.
  - Electrical Transient Immunity - luminaire must meet the performance requirements specified in ANSI C136.2-2015 for electrical transient immunity, using the Enhanced (10 kV / 5 kA) combination wave test level.
  - Transient Immunity Testing Requirements
    - During electrical transient immunity testing, the device under test (DUT) must: be connected to the power source through a series coupler/decoupler network (CDN), using a two-wire (hot or hot/neutral) connection between both the power supply and CDN input and the CDN output and DUT.
    - If AC mains is used to power the DUT, the input waveform must be characterized and documented both before and after electrical transient immunity testing, with the DUT operating at rated full output.
    - For Pre-Test DUT Characterization, the diagnostic measurements shall, at a minimum, include the following: real power, input current (RMS; Root-Means-Square), power factor, and current distortion factor (THD-I Total Harmonic Distortion) when operating at rated full output.
    - Manufacturer must indicate on submittal form whether failure of the electrical transient immunity system can possibly result in disconnect of power to luminaire.
- h) Dimming Capability. The driver must be capable of dimming. The dimming range must be 10% to 100% of full output. The digital lighting interface used for dimming must be 0-10 VDC as per the requirements of ANSI C136.41-2013. There must be a minimum of 100 dimming steps between the top and bottom of the dimming range.

4. Wiring.

- a) All components must be completely factory wired with non-fading, color coded leads. These leads must be insulated with an approved class of insulation and must be #16 AWG conductor at a minimum.
- b) All wires within a single circuit path must be of the same size.
- c) No wire-nut splicing will be allowed.
- d) No unnecessary splices will be allowed.
- e) Quick disconnects must be provided for all components.
- f) All wires must be properly terminated.

□

5. Control Device Receptacle and Cap.

- a) Twist-lock Receptacle for a control device that meets ANSI C136.41 must be mounted in the top of the housing with provision for proper positioning of the control device.
- b) 5-pin Receptacle. The luminaire control receptacle must be fully prewired and compliant with ANSI C136.41-2013.
- c) 3-prong Shorting Cap that meets ANSI C136.10 must be provided.
- d) Receptacle Wire Leads must all be properly terminated.
- e) Receptacle repositioning. The receptacle must be able to be repositioned without the use of tools.
- f) Control Devices Not Included in LED Specifications. Whereas specifications for control receptacles are included, specifications for control devices are not. The control device performance requirements are part of the lighting management system specifications in the Smart Lighting Project Technology specifications.

6. Component Mounting.

All electrical components must be securely mounted in such manner that individual components can be easily maintained or replaced. Permanent straps or tie-wraps will not be permitted. The entire assembly should be easily disconnected and removed for replacement.

**PHOTOMETRIC REQUIREMENTS**

1. Light Pollution.

To limit light pollution, the submitted luminaires must not emit any light above the horizon (0 lumens at angles  $\geq 90^\circ$  from luminaire nadir).

2. Lumen Maintenance.



- a) LED arrays must deliver a minimum of 90% of initial lumen output at 36,000 hours of operation.
- b) Light Loss Factor (LLF) < 1.0. Calculations for maintained values, i.e.  $LLF = LLD \times LDD \times LAT$ .
  - (1) Lamp Lumen Depreciation (LLD) calculated at 60,000 hours as per Section II-B-3-d above,
  - (2) Luminaire Dirt Depreciation (LDD)  $\leq 0.90$ , and
  - (3) Luminaire Ambient Temperature (LAT)  $\leq 0.96$

Luminaires with less than 10,000 hours of available LM-80 test data may be submitted for consideration but must be clearly indicated as such.

3. Color Attributes

- a) Color Rendering Index (CRI) shall be no less than 65.
- b) Nominal Correlated Color Temperature (CCT) shall be 3000K as defined by ANSI C78.377 and described below:

Manufacturer-Rated Nominal CCT (K)	Allowable IES LM-79 Chromaticity Values Measured CCT (K)	Measured Duv
3000	2870 to 3220	-0.006 to 0.006

4. City of Chicago Typical Lighting Contexts

ATTACHMENT A (below) lists the photometric performance requirements for luminaires used in the following typical municipal outdoor lighting applications:

- Alleys.
- Modern Residential Streets - staggered poles on both sides.
- Legacy Residential Streets - one-sided pole spacing.
- Legacy Residential Intersections and Alley Entrances.
- Arterial Streets – two-sided opposite pole spacing
- Arterial Streets – two-sided staggered pole spacing
- Arterial Streets – one-side pole spacing

See ATTACHMENTS B, C, & C-1 for residential street layouts.

Note: The layout for (i) the intersection of two Legacy Residential Streets, (ii) an alley entrance intersecting with a Legacy Residential Street, and (iii) a typical alley layout is found in ATTACHMENT C-1. Luminaires for both alley entrance lighting and intersection lighting are oriented 45° from the curb line. All other luminaires are oriented 90° from (i.e., perpendicular to) the curb line.

See ATTACHMENTS D, E, & F for arterial layouts.

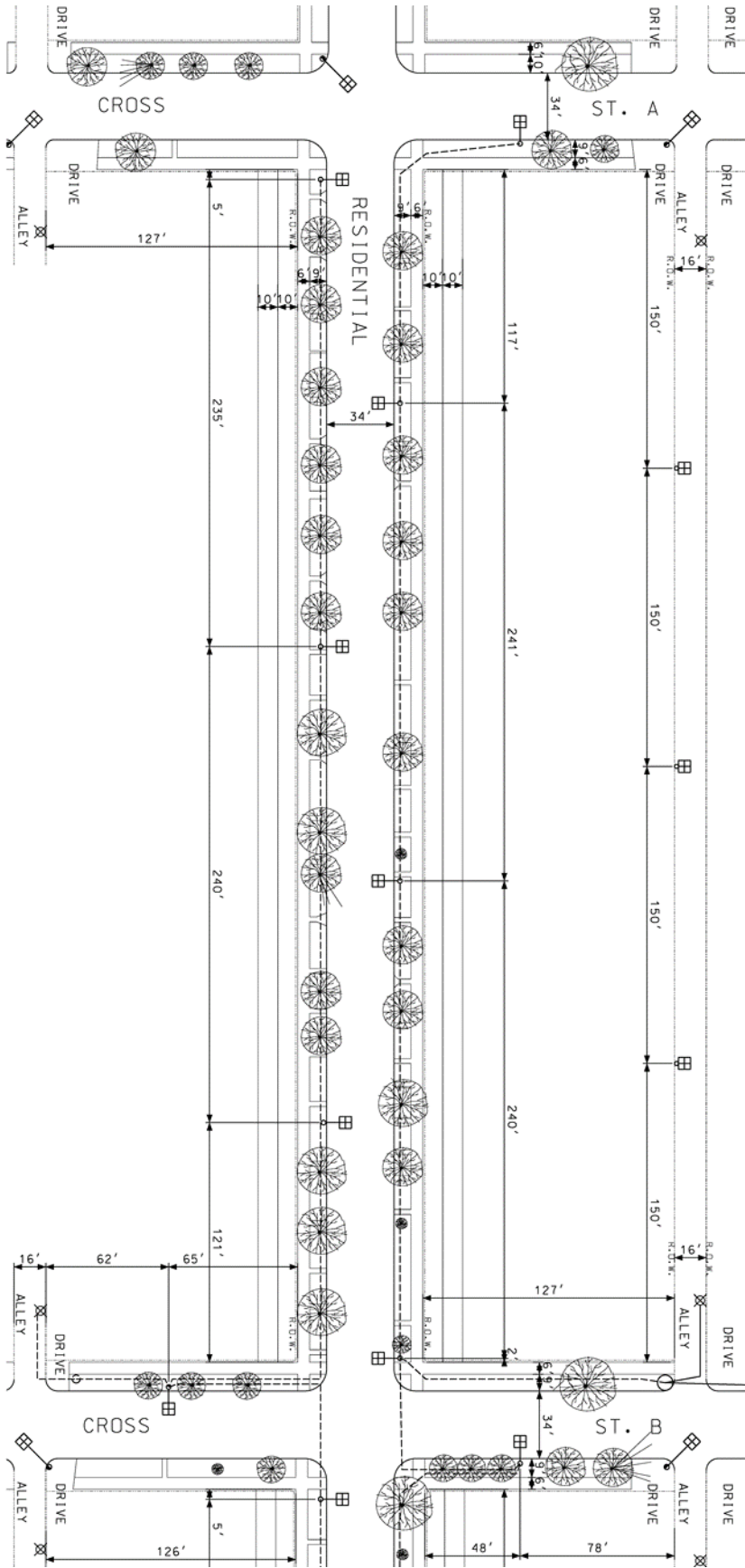
**ATTACHMENT A – Photometric Performance Requirements**

<b>STREET PARAMETERS</b>							
<b>TYPICAL LIGHTING CONTEXT</b>	<b>RESIDENTIAL*</b>			<b>ALLEY</b>	<b>ARTERIAL</b>		
<b>POLE CONFIGURATION*</b>	<b>STAGGERED</b>	<b>ONE-SIDE D</b>	<b>INT R-R and R-A</b>	<b>ONE-SIDED</b>	<b>OPPOSITE</b>	<b>STAGGERED</b>	<b>ONE-SIDED</b>
RIGHT OF WAY (Width)	66 ft.	66 ft.	66 ft.	16 ft.	100 ft.	80 ft.	66 ft.
IES PAVEMENT CLASS	R3	R3	R3	R3	R3	R3	R3
STREET WIDTH (Curb to Curb)	34 ft.	34 ft.	34 ft.	16 ft.	80 ft.	60 ft.	48 ft.
LANES (Incl Prking &Median)	4	4	4	2	7	6	4
PARKWAY (Width)	10 ft.	10 ft.	10 ft.	N/A	4 ft.	4'	N/A
SIDEWALK (Width)	6 ft.	6 ft.	6 ft.	N/A	6 ft.	6 ft.	9 ft.
HEIGHT TO LUMINAIRE	18 ft.	22 ft.	22 ft.	18 ft.	33 ft.	33 ft.	33 ft.
MAST ARM LENGTH	8 ft.	15 ft.	15 ft.	1 ft.	12 ft.	12 ft.	8 ft.
POLE SETBACK (From Curb to Center of Pole)	3 ft.	2 ft.	2 ft.	N/A	3 ft.	3 ft.	3 ft.
IN-LINE POLE SPACING	See Site Plan Attachments B thru F for pole spacing assumptions for each Pole Configuration context						
<b>MAINTAINED PERFORMANCE REQUIREMENTS</b>							
<b>LUMINAIRE REQUIREMENTS</b>	<b>STAGGERED</b>	<b>ONE-SIDE D</b>	<b>INT R-R and R-A</b>	<b>ONE-SIDED</b>	<b>OPPOSITE</b>	<b>STAGGERED</b>	<b>ONE-SIDED</b>
Max Input Power - Default /Normal Luminance (Watts)	120	130	130	80	180	180	180
Default/Normal AVG. Luminance (cd/m <sup>2</sup> )	≥1.5	≥1.5	≥1.5	≥.95	≥1.7	≥1.7	≥1.7
AVG/MIN Uniformity Ratio	≤ 6:1	≤ 6:1	≤ 6:1	≤ 6:1	≤ 3:1	≤ 3:1	≤ 3:1
MAX/MIN Uniformity Ratio	≤10:1	≤10:1	≤10:1	≤ 10:1	≤ 5:1	≤ 5:1	≤ 5:1
MAX Veiling Luminance Ratio	≤ 0.4	≤ 0.4	≤ 0.4	≤ 0.4	≤ 0.3	≤ 0.3	≤ 0.3
AVG. Boosted Luminance (cd/m <sup>2</sup> ) [Add-Alternate]	≥2.25	≥2.25	≥2.25	≥1.5	≥2.5	≥2.5	≥2.5
<b>SIDEWALK</b>							

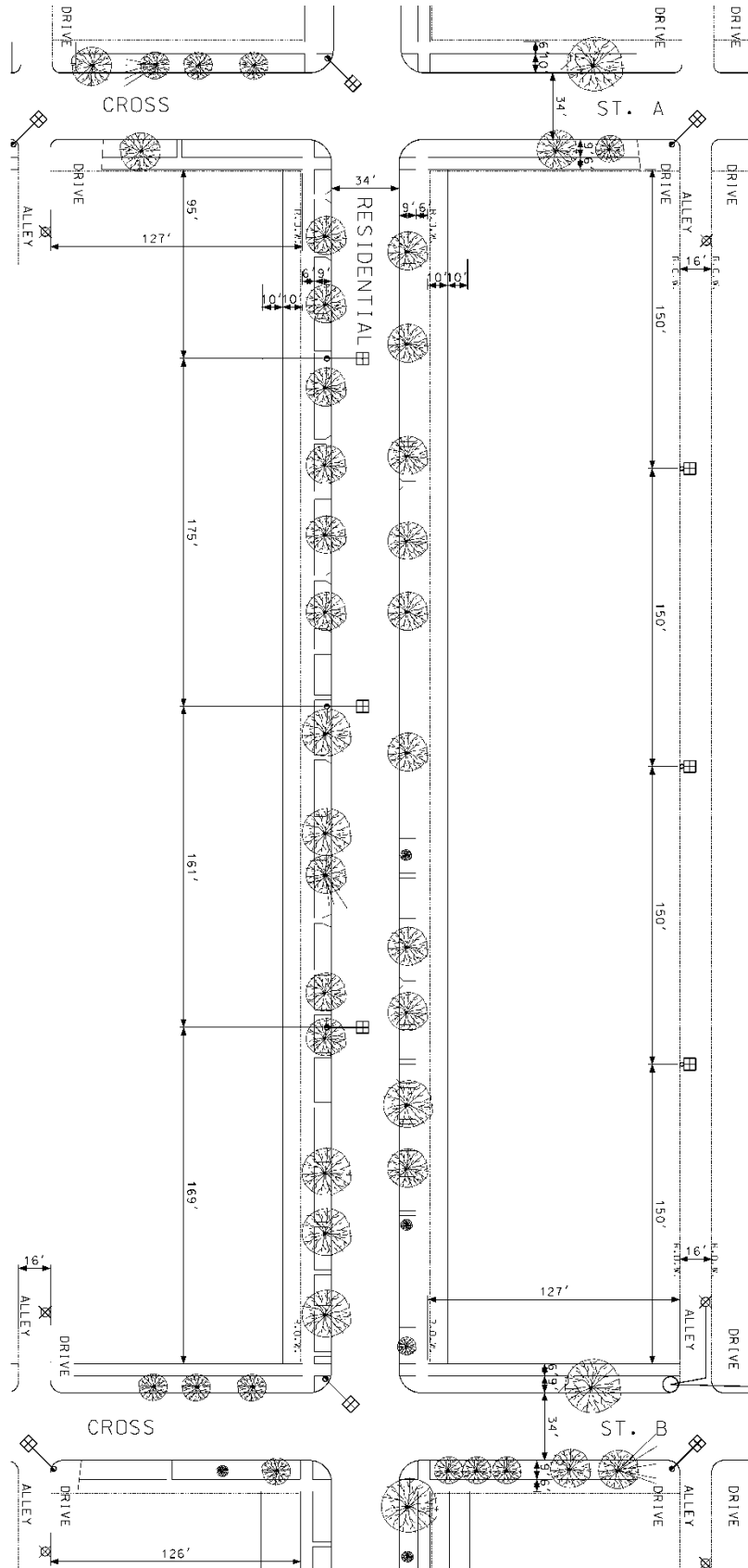
**SPECIFICATION 1613**

Default AVG. Horizontal Illuminance (fc)	≥0.50	≥0.50	≥0.50	N/A	≥0.50	≥0.50	≥0.50
AVG.MIN Uniformity Ratio (Horizontal Illuminance)	≤ 4:1	≤ 4:1	≤ 4:1	N/A	≤ 4:1	≤ 4:1	≤ 4:1
LIGHT TRESPASS LIMITS - (as measured in a vertical plane 20' beyond ROW ≤3' height)							
Vertical Illuminance **	$0.1 \leq X \leq 0.5$	$\frac{0.1 \leq X \leq 0.5}{5}$	≤0.30	$\frac{0.05 \leq X \leq 0.5}{.5}$	≤0.30	$0.1 \leq X \leq 0.5$	$\frac{0.1 \leq X \leq 0.5}{5}$
<p>*Residential Pole Configuration Contexts: See Attachments B, C, &amp; C-1            Staggered = Residential street with Modern poles; (aluminum davit poles staggered on both sides of street) Attachment B.            One-Sided = Residential street with Legacy poles; (steel poles on one side of street) Attachment C            INT R-R = intersection of two Legacy residential streets, illuminated by one luminaire oriented diagonally (45°), Attachment C-1.            INT R-A = intersection of Legacy residential street with alley, illuminated by one luminaire oriented diagonally (45°), Attachment C-1.            **Trespass Limits for the following contexts: Residential Legacy One sided, Alley, Arterial Staggered &amp; Arterial One-sided</p>							

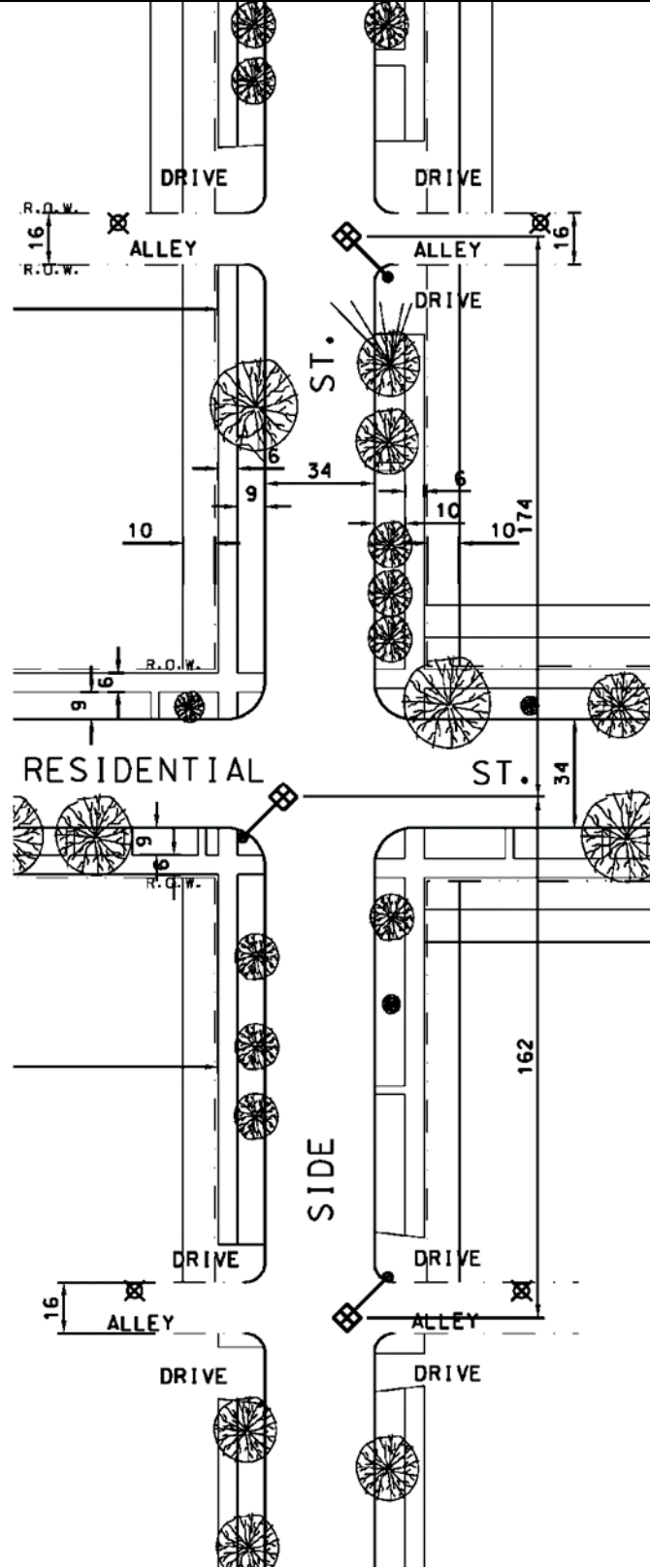
**ATTACHMENT B – Residential Modern Street (Staggered) & Alley**



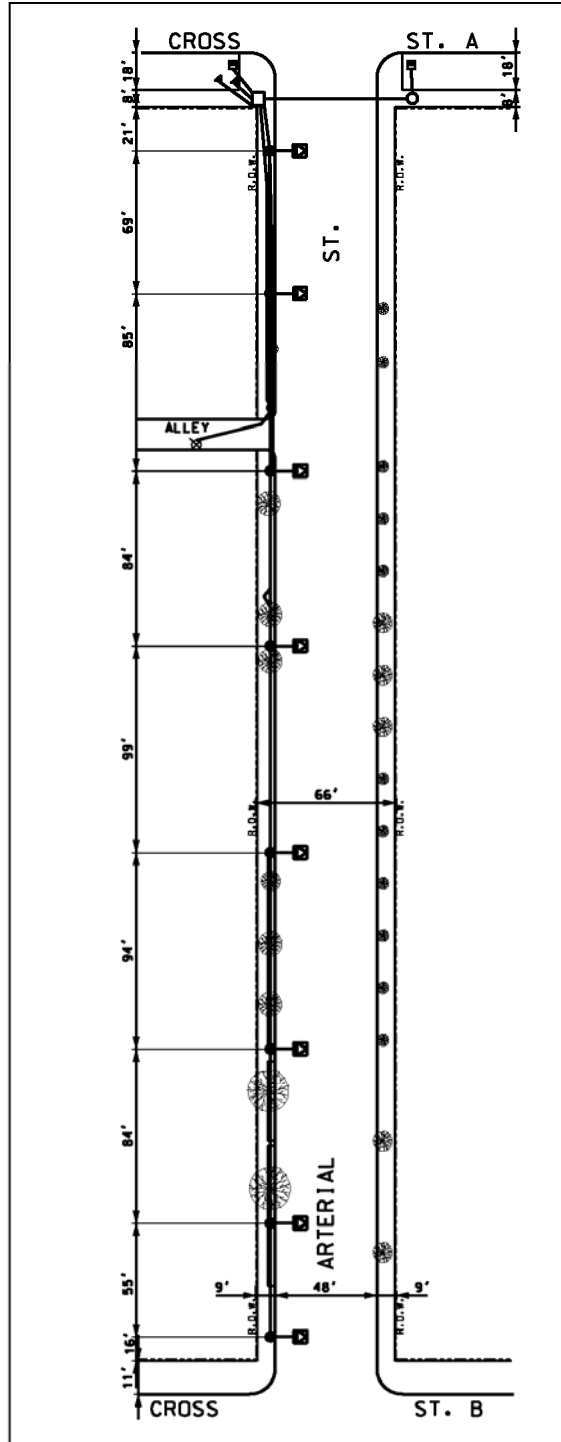
**ATTACHMENT C – Residential Legacy Street (One-sided) & Alley**



**ATTACHMENT C-1-Intersections-Legacy Residential Streets & Alley**

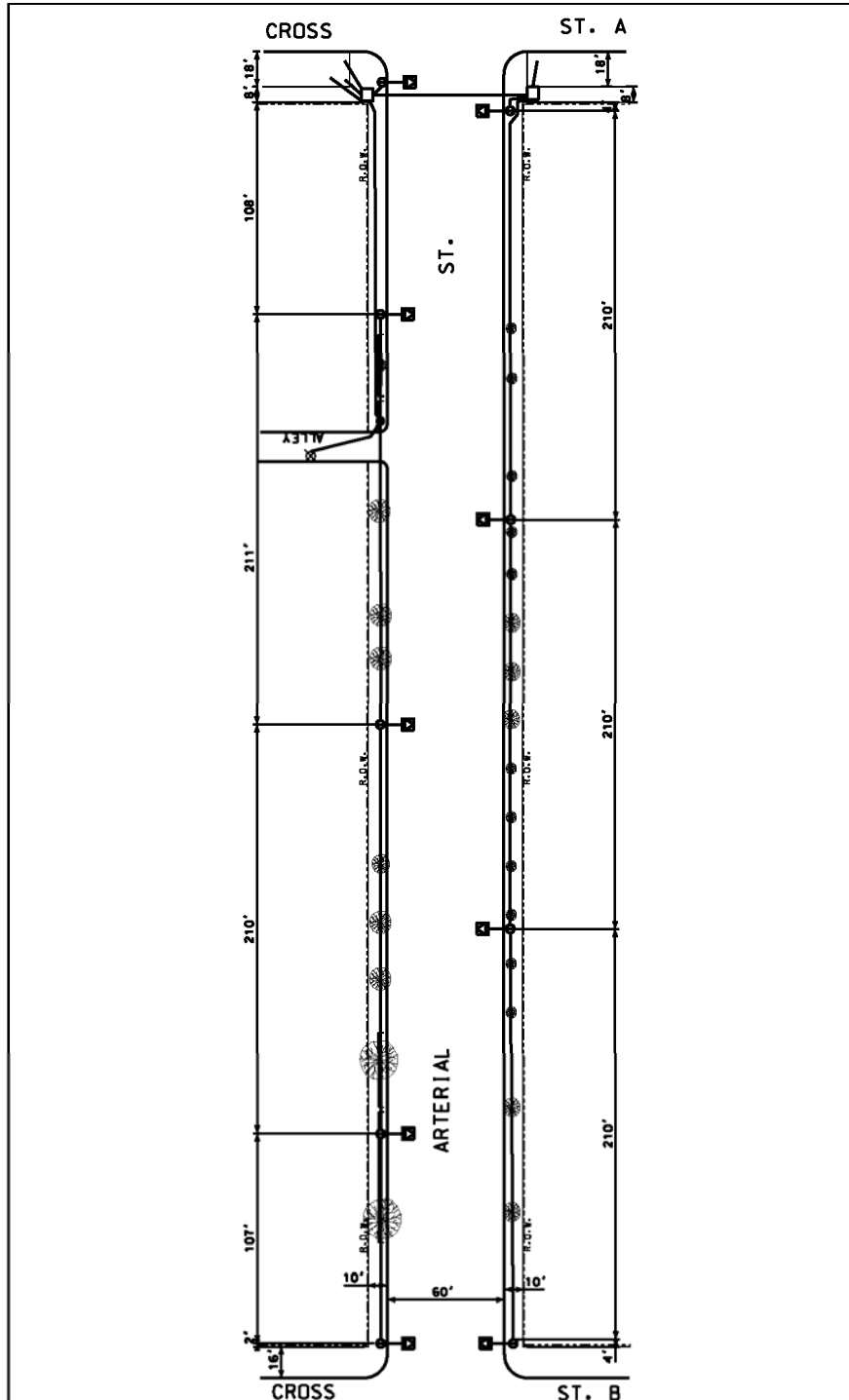


ATTACHMENT D – Arterial Street Single-Sided Poles

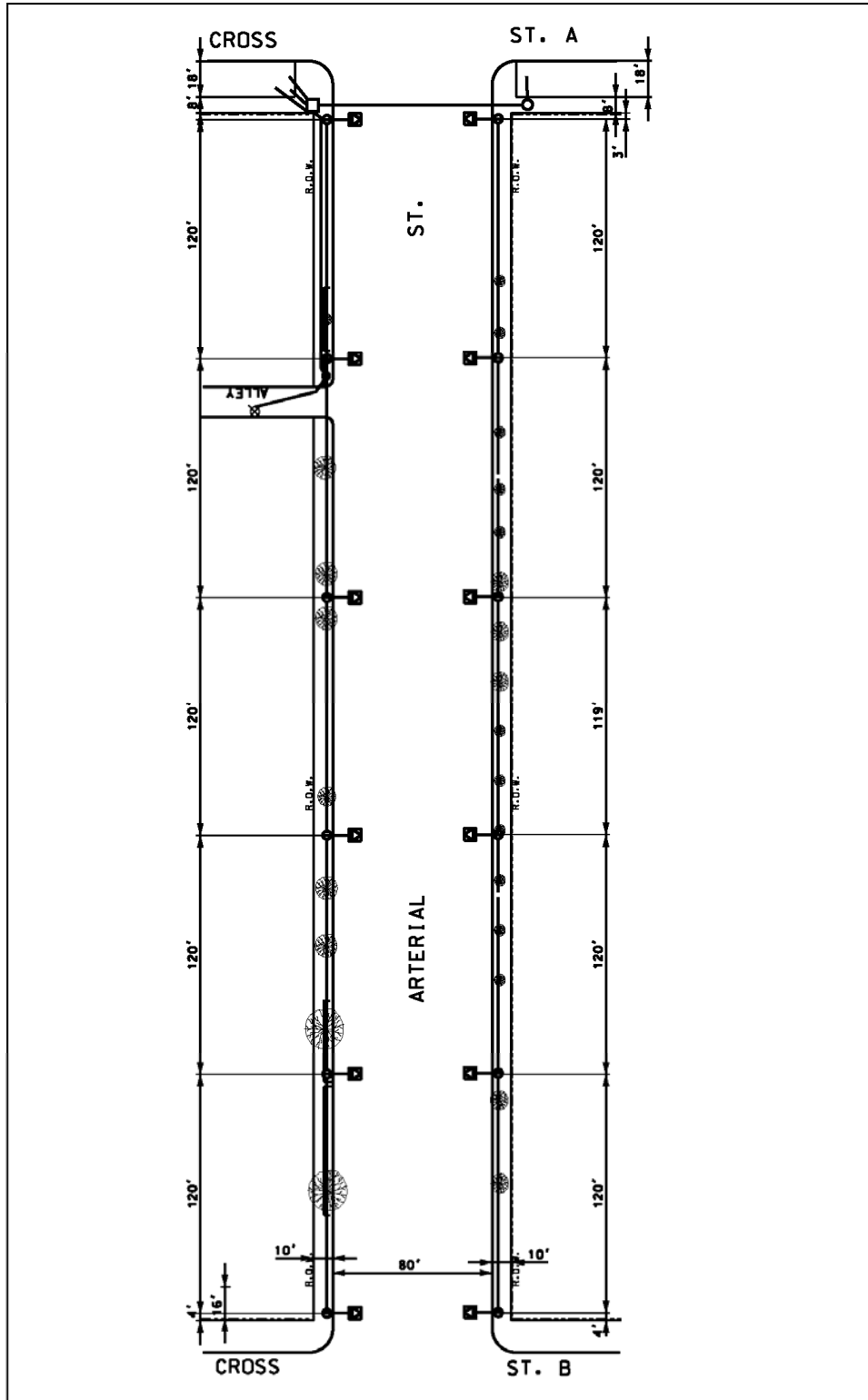




ATTACHMENT E – Arterial Street - Staggered Poles



**ATTACHMENT F – Arterial Street Opposite Poles**



**ATTACHMENT G - Product Submittal Form**

**Lighting Context**

e.g. Alleys

<i>Product Information Description</i>	<i>Product Data (Summary)</i>	<i>Submittal Reference Document</i>
Luminaire Designation		
Luminaire Manufacturer		
Luminaire Model Number		
Luminous Flux – initial		lumens
Luminaire input power—initial		watts
Luminaire input power—maintained		watts
Luminaire input voltage-nominal range		volts
LED drive current - initial		milliamps
LED drive current - maintained		milliamps
CCT (correlated color temperature)		kelvin
CRI (color rendering index)		
EPA (effective projected area) - nominal		sq. ft.
Luminaire Weight - nominal		lbs.
Control Interface	<input type="checkbox"/> ANSI C136.41, 7-pin	
LED Driver – dimming capability	<input type="checkbox"/> Dimmable, 0-10 VDC	
LED driver- rated life		years
Electrical transient immunity ANSI C136.2 combination wave test level	<input type="checkbox"/> Basic (6kV/3kA) <input type="checkbox"/> Enhanced (10kV / 5kA) <input type="checkbox"/> Elevated (20kV/10kA )	
Vibration Test-ANSI C136.31		<input type="checkbox"/> Level 2
Luminaire warranty period		years
IES LM-80 test duration		hours
LED lumen maintenance at 36,000 hours		%
Max. LED case temperature		degrees Celsius
		IES LM-80-15 report TM-21 calculator
		ISTMT report

State of Illinois  
Department of Transportation  
Bureau of Local Roads and Streets

SPECIAL PROVISION  
FOR  
INSURANCE

Effective: February 1, 2007  
Revised: August 1, 2007

All references to Sections or Articles in this specification shall be construed to mean specific Section or Article of the Standard Specifications for Road and Bridge Construction, adopted by the Department of Transportation.

The Contractor shall name the following entities as additional insured under the Contractor's general liability insurance policy in accordance with Article 107.27:

City of Chicago

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City of Evanston

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The entities listed above and their officers, employees, and agents shall be indemnified and held harmless in accordance with Article 107.26.



Storm Water Pollution Prevention Plan



Route FAU 1334	Marked Route Howard Street	Section Number 17-00218-00-RS
Project Number TLAI(076)	County Cook	Contract Number 61G30

This plan has been prepared to comply with the provisions of the National Pollutant Discharge Elimination System (NPDES) Permit No. ILR10 (Permit ILR10), issued by the Illinois Environmental Protection Agency (IEPA) for storm water discharges from construction site activities.

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Signature 	Date 11/21/19
--	------------------

Print Name SATNANAR	Title Site of Project Manager	Agency City of Evanston
------------------------	----------------------------------	----------------------------

Note: Guidance on preparing each section of BDE 2342 can be found in Chapter 41 of the IDOT Bureau of Design and Environment (BDE) Manual. Chapter 41 and this form also reference the IDOT Drainage Manual which should be readily available.

I. Site Description:

A. Provide a description of the project location; include latitude and longitude, section, town, and range:

The project is located in the City of Evanstone and the City of Chicago Cook County, Illinois. Geographically, the study area is located in Sections 25 and 30, Township 14 North, Range 13E/14E, East of the Third Principal Meridian Lat 42.019° Long 87.690°.

B. Provide a description of the construction activity which is the subject of this plan. Include the number of construction stages, drainage improvements, in-stream work, installation, maintenance, removal of erosion measures, and permanent stabilization:

The work consists of HMA resurfacing, combination curb and gutter replacement, sidewalk/driveay replacement, water main replacement, roadway lighting and modernization of traffic signals. Three construction stages are anticipated. Drainage improvements are replacing ex curbline structures. Permanent stabilization included turf and rock mulch. No in-stream work. Temporary erosion control includes inlet protection in this highly urban environment.

C. Provide the estimated duration of this project:

600 calendar days.

D. The total area of the construction site is estimated to be 7.5 acres.

The total area of the site estimated to be disturbed by excavation, grading or other activities is 12.0 acres.

E. The following are weighted averages of the runoff coefficient for this project before and after construction activities are completed; see Section 4-102 of the IDOT Drainage Manual:

No change.

F. List all soils found within project boundaries; include map unit name, slope information, and erosivity:

533: Urban Land. 2811A: Urban land - Alfic Udarents, clayey, complex, 0-2% slopes. 2800A: Urban land-Psamments complex, nearly level.

G. If wetlands were delineated for this project, provide an extent of wetland acreage at the site; see Phase I report:

No wetlands.

H. Provide a description of potentially erosive areas associated with this project:

None anticipated.

I. The following is a description of soil disturbing activities by stages, their locations, and their erosive factors (e.g., steepness of slopes, length of slopes, etc.):

Project wide: emoval/replacement of sidewalks and drives, pavement patching, and nominal abutting turf restoration. Slopes flatter than 6:1.

J. See the erosion control plans and/or drainage plans for this contract for information regarding drainage patterns, approximate slopes anticipated before and after major grading activities, locations where vehicles enter or exit the site and controls to prevent offsite sediment tracking (to be added after contractor identifies locations), areas of soil disturbance, the location of major structural and non-structural controls identified in the plan, the location of areas where stabilization practices are expected to occur, surface waters (including wetlands) , and locations where storm water is discharged to surface water including wetlands.

K. Identify who owns the drainage system (municipality or agency) this project will drain into:

City of Evanston and City of Chicago.

L. The following is a list of General NPDES ILR40 permittees within whose reporting jurisdiction this project is located:

City of Evanston and City of Chicago.

M. The following is a list of receiving water(s) and the ultimate receiving water(s) for this site. In addition, include receiving waters that are listed as Biologically Significant Streams by the Illinois Department of Natural Resources (IDNR). The location of the receiving waters can be found on the erosion and sediment control plans:

City of Evanston and City of Chicago are combined sewer communities.

N. Describe areas of the site that are to be protected or remain undisturbed. These areas may include steep slopes (i.e., 1:3 or steeper), highly erodible soils, streams, stream buffers, specimen trees, natural vegetation, nature preserves, etc. Include any commitments or requirements to protect adjacent wetlands.

For any storm water discharges from construction activities within 50-feet of Waters of the U.S. (except for activities for water-dependent structures authorized by a Section 404 permit, describe: a) How a 50-foot undisturbed natural buffer will be provided between the construction activity and the Waters of the U.S. or b) How additional erosion and sediment controls will be provided within that area.

None.

O. Per the Phase I document, the following sensitive environmental resources are associated with this project and may have the potential to be impacted by the proposed development. Further guidance on these resources is available in Section 41-4 of the BDE Manual.

None.

303(d) Listed receiving waters for suspended solids, turbidity, or siltation.  
The name(s) of the listed water body, and identification of all pollutants causing impairment:

Provide a description of how erosion and sediment control practices will prevent a discharge of sediment resulting from a storm event equal to or greater than a twenty-five (25) year, twenty-four (24) hour rainfall event:

Inlet protection on all open lid drainage structures will capture sediment.

Provide a description of the location(s) of direct discharge from the project site to the 303(d) water body:

Provide a description of the location(s) of any dewatering discharges to the MS4 and/or water body:

Applicable Federal, Tribal, State, or Local Programs

None.

Floodplain

None.

Historic Preservation

None.

Receiving waters with Total Maximum Daily Load (TMDL) for sediment, total suspended solids, turbidity or siltation TMDL (fill out this section if checked above)

The name(s) of the listed water body:

Provide a description of the erosion and sediment control strategy that will be incorporated into the site design that is consistent with the assumptions and requirements of the TMDL:

If a specific numeric waste load allocation has been established that would apply to the project's discharges, provide a description of the necessary steps to meet that allocation:

Threatened and Endangered Species/Illinois Natural Areas (INAI)/Nature Preserves

None.

Other

Wetland

None.

P. The following pollutants of concern will be associated with this construction project:

- |  |  |
|--|--|
| <input checked="" type="checkbox"/> Antifreeze / Coolants  | <input type="checkbox"/> Solid Waste Debris                                |
| <input checked="" type="checkbox"/> Concrete   | <input type="checkbox"/> Solvents  |
| <input checked="" type="checkbox"/> Concrete Curing Compounds                                      | <input type="checkbox"/> Waste water from cleaning construction equipments |
| <input checked="" type="checkbox"/> Concrete Truck Waste   | <input type="checkbox"/> Other (Specify) _____                             |
| <input checked="" type="checkbox"/> Fertilizers / Pesticides                                       | <input type="checkbox"/> Other (Specify) _____                             |
| <input type="checkbox"/> Paints  | <input type="checkbox"/> Other (Specify) _____                             |
| <input checked="" type="checkbox"/> Petroleum (gas, diesel, oil, kerosene, hydraulic oil / fluids) | <input type="checkbox"/> Other (Specify) _____                             |
| <input checked="" type="checkbox"/> Soil Sediment  | <input type="checkbox"/> Other (Specify) _____                             |

**II. Controls:**

This section of the plan addresses the controls that will be implemented for each of the major construction activities described in Section I.C above and for all use areas, borrow sites, and waste sites. For each measure discussed, the Contractor will be responsible for its implementation as indicated. The Contractor shall provide to the Resident Engineer a plan for the implementation of the measures indicated. The Contractor, and subcontractors, will notify the Resident Engineer of any proposed changes, maintenance, or modifications to keep construction activities compliant with the Permit ILR10. Each such Contractor has signed the required certification on forms which are attached to, and are a part of, this plan:

**A. Erosion and Sediment Controls:** At a minimum, controls must be coordinated, installed and maintained to:

1. Minimize the amount of soil exposed during construction activity;
2. Minimize the disturbance of steep slopes;
3. Maintain natural buffers around surface waters, direct storm water to vegetated areas to increase sediment removal and maximize storm water infiltration, unless infeasible;
4. Minimize soil compaction and, unless infeasible, preserve topsoil.

**B. Stabilization Practices:** Provided below is a description of interim and permanent stabilization practices, including site- specific scheduling of the implementation of the practices. Site plans will ensure that existing vegetation is preserved where attainable and disturbed portions of the site will be stabilized. Stabilization practices may include but are not limited to: temporary seeding, permanent seeding, mulching, geotextiles, sodding, vegetative buffer strips, protection of trees, preservation of mature vegetation, and other appropriate measures. Except as provided below in II.B.1 and II.B.2, stabilization measures shall be initiated **immediately** where construction activities have temporarily or permanently ceased, but in no case more than **one (1) day** after the construction activity in that portion of the site has temporarily or permanently ceases on all disturbed portions of the site where construction will not occur for a period of fourteen (14) or more calendar days.

1. Where the initiation of stabilization measures is precluded by snow cover, stabilization measures shall be initiated as soon as practicable.
2. On areas where construction activity has temporarily ceased and will resume after fourteen (14) days, a temporary stabilization method can be used.

The following stabilization practices will be used for this project:

- |  |  |
|--|--|
| <input checked="" type="checkbox"/> Erosion Control Blanket / Mulching | <input type="checkbox"/> Temporary Turf (Seeding, Class 7) |
| <input type="checkbox"/> Geotextiles                                   | <input type="checkbox"/> Temporary Mulching                |
| <input type="checkbox"/> Permanent Seeding                             | <input type="checkbox"/> Vegetated Buffer Strips           |
| <input type="checkbox"/> Preservation of Mature Seeding                | <input type="checkbox"/> Other (Specify) _____             |
| <input type="checkbox"/> Protection of Trees                           | <input type="checkbox"/> Other (Specify) _____             |
| <input checked="" type="checkbox"/> Sodding                            | <input type="checkbox"/> Other (Specify) _____             |
| <input checked="" type="checkbox"/> Temporary Erosion Control Seeding  | <input checked="" type="checkbox"/> Other (Specify) _____  |

Describe how the stabilization practices listed above will be utilized during construction:

Vegetation disturbance shall be limited to the area necessary to complete the work. Temporary or permanent erosion controls will be installed at the frequency described above. Disturbed soil shall be inspected until permanent stabilization is achieved.

Describe how the stabilization practices listed above will be utilized after construction activities have been completed:

Once construction activity in an area has permanently ceased, that area will be permanently stabilized. Temporary perimeter controls should be removed after final stabilization of those portions of the site upward of the perimeter control.

**C. Structural Practices:** Provided below is a description of structural practices that will be implemented, to the degree attainable, to divert flows from exposed soils, store flows or otherwise limit runoff and the discharge of pollutants from exposed areas of the site. Such practices may include but are not limited to: perimeter erosion barrier, earth dikes, drainage swales, sediment traps, ditch checks, subsurface drains, pipe slope drains, level spreaders, storm drain inlet protection, rock outlet protection, reinforced soil retaining systems, gabions, and temporary or permanent sediment basins. The installation of these devices may be subject to Section 404 of the Clean Water Act.

- |  |  |
|--|--|
| <input type="checkbox"/> Aggregate Ditch             | <input type="checkbox"/> Stabilized Construction Exits |
| <input type="checkbox"/> Concrete Revetment Mats     | <input type="checkbox"/> Stabilized Trench Flow        |
| <input checked="" type="checkbox"/> Dust Suppression | <input type="checkbox"/> Slope Mattress                |
| <input type="checkbox"/> Dewatering Filtering        | <input type="checkbox"/> Slope Walls                   |



- |  |   |  |
|--|---|--|
| <input type="checkbox"/> Gabions                                 | <input type="checkbox"/> Temporary Ditch Check      |  |
| <input type="checkbox"/> In-Stream or Wetland Work               | <input type="checkbox"/> Temporary Pipe Slope Drain |  |
| <input type="checkbox"/> Level Spreaders                         | <input type="checkbox"/> Temporary Sediment Basin   |  |
| <input type="checkbox"/> Paved Ditch                             | <input type="checkbox"/> Temporary Stream Crossing  |  |
| <input type="checkbox"/> Permanent Check Dams                    | <input type="checkbox"/> Turf Reinforcement Mats    |  |
| <input type="checkbox"/> Perimeter Erosion Barrier               | <input type="checkbox"/> Other (Specify) _____      |  |
| <input type="checkbox"/> Permanent Sediment Basin                | <input type="checkbox"/> Other (Specify) _____      |  |
| <input type="checkbox"/> Retaining Walls                         | <input type="checkbox"/> Other (Specify) _____      |  |
| <input type="checkbox"/> Riprap                                  | <input type="checkbox"/> Other (Specify) _____      |  |
| <input type="checkbox"/> Rock Outlet Protection                  | <input type="checkbox"/> Other (Specify) _____      |  |
| <input type="checkbox"/> Sediment Trap                           | <input type="checkbox"/> Other (Specify) _____      |  |
| <input checked="" type="checkbox"/> Storm Drain Inlet Protection | <input type="checkbox"/> Other (Specify) _____      |  |

Describe how the structural practices listed above will be utilized during construction:

Storm drain inlet protection will be installed prior to ground disturbance, maintained during construction, and removed at Engineer's direction after all soils have been permanently stabilized. Existing storm pipes will be adequately protected as necessary construction operations. Additional Best Management Practices will be implemented on an as-needed basis to protect water quality.

Describe how the structural practices listed above will be utilized after construction activities have been completed:

Once construction activity in an area has permanently ceased, temporary structural practices will be removed after final stabilization of those portions of the site upward of the temporary structural practices. Permanent control measures shall be field verified for proper function and installation during active construction.

**D. Treatment Chemicals**

Will polymer flocculants or treatment chemicals be utilized on this project:  Yes  No

If yes above, identify where and how polymer flocculants or treatment chemicals will be utilized on this project.

**E. Permanent (i.e., Post-Construction) Storm Water Management Controls:** Provided below is a description of measures that will be installed during the construction process to control volume and pollutants in storm water discharges that will occur after construction operations have been completed. The installation of these devices may be subject to Section 404 of the Clean Water Act.

- Such practices may include but are not limited to: storm water detention structures (including wet ponds), storm water retention structures, flow attenuation by use of open vegetated swales and natural depressions, infiltration of runoff on site, and sequential systems (which combine several practices).

The practices selected for implementation were determined based on the technical guidance in Chapter 41 (Construction Site Storm Water Pollution Control) of the IDOT BDE Manual. If practices other than those discussed in Chapter 41 are selected for implementation or if practices are applied to situations different from those covered in Chapter 41, the technical basis for such decisions will be explained below.

- Velocity dissipation devices will be placed at discharge locations and along the length of any outfall channel as necessary to provide a non-erosive velocity flow from the structure to a water course so that the natural physical and biological characteristics and functions are maintained and protected (e.g., maintenance of hydrologic conditions such as the hydroperiod and hydrodynamics present prior to the initiation of construction activities).

Description of permanent storm water management controls:

None.

**F. Approved State or Local Laws:** The management practices, controls and provisions contained in this plan will be in accordance with IDOT specifications, which are at least as protective as the requirements contained in the IEPA's Illinois Urban Manual. Procedures and requirements specified in applicable sediment and erosion site plans or storm water management plans approved by local officials

shall be described or incorporated by reference in the space provided below. Requirements specified in sediment and erosion site plans, site permits, storm water management site plans or site permits approved by local officials that are applicable to protecting surface water resources are, upon submittal of an NOI, to be authorized to discharge under the Permit ILR10 incorporated by reference and are enforceable under this permit even if they are not specifically included in the plan.

Description of procedures and requirements specified in applicable sediment and erosion site plans or storm water management plans approved by local officials:

City of Evanston and City of Chicago.

**G. Contractor Required Submittals:** Prior to conducting any professional services at the site covered by this plan, the Contractor and each subcontractor responsible for compliance with the permit shall submit to the Resident Engineer a Contractor Certification Statement, BDE 2342A.

1. The Contractor shall provide a construction schedule containing an adequate level of detail to show major activities with implementation of pollution prevention BMPs, including the following items:

- Approximate duration of the project, including each stage of the project
- Rainy season, dry season, and winter shutdown dates
- Temporary stabilization measures to be employed by contract phases
- Mobilization time-frame
- Mass clearing and grubbing/roadside clearing dates
- Deployment of Erosion Control Practices
- Deployment of Sediment Control Practices (including stabilized cons
  
- Deployment of Construction Site Management Practices (including concrete washout facilities, chemical storage, refueling locations, etc.)
- Paving, saw-cutting, and any other pavement related operations
- Major planned stockpiling operation
- Time frame for other significant long-term operations or activities that may plan non-storm water discharges as dewatering, grinding, etc
- Permanent stabilization activities for each area of the project

2. During the pre-construction meeting, the Contractor and each subcontractor shall provide, as an attachment to their signed Contractor Certification Statement, a discussion of how they will comply with the requirements of the permit in regard to the following items and provide a graphical representation showing location and type of BMPs to be used when applicable:

- Temporary Ditch Checks - Identify what type and the source of Temporary Ditch Checks that will be installed as part of the project. The installation details will then be included with the SWPPP.
- Vehicle Entrances and Exits - Identify type and location of stabilized construction entrances and exits to be used and how they will be maintained.
- Material Delivery, Storage and Use - Discuss where and how materials including chemicals, concrete curing compounds, petroleum products, etc. will be stored for this project.
- Stockpile Management - Identify the location of both on-site and off-site stockpiles. Discuss what BMPs will be used to prevent pollution of storm water from stockpiles.
- Waste Disposal - Discuss methods of waste disposal that will be used for this project.
- Spill Prevention and Control - Discuss steps that will be taken in the event of a material spill (chemicals, concrete curing compounds, petroleum, etc.)
- Concrete Residuals and Washout Wastes - Discuss the location and type of concrete washout facilities to be used on this project and how they will be signed and maintained.
- Litter Management - Discuss how litter will be maintained for this project (education of employees, number of dumpsters, frequency of dumpster pick-up, etc.).
- Vehicle and Equipment Fueling - Identify equipment fueling locations for this project and what BMPs will be used to ensure containment and spill prevention.
- Vehicle and Equipment Cleaning and Maintenance - Identify where equipment cleaning and maintenance locations for this project and what BMPs will be used to ensure containment and spill prevention.
- Dewatering Activities - Identify the controls which will be used during dewatering operations to ensure sediments will not leave the construction site.
- Polymer Flocculants and Treatment Chemicals - Identify the use and dosage of treatment chemicals and provide the Resident Engineer with Material Safety Data Sheets. Describe procedures on how the chemicals will be used and identify who will be responsible for the use and application of these chemicals. The selected individual must be trained on the established procedures.
- Additional measures indicated in the plan.

### III. Maintenance:

When requested by the Contractor, the Resident Engineer will provide general maintenance guides (e.g., IDOT Erosion and Sediment Control Field Guide) to the Contractor for the practices associated with this project. Describe how all items will be checked for structural integrity, sediment accumulation and functionality. Any damage or undermining shall be repaired immediately. Provide specifics on

how repairs will be made. The following additional procedures will be used to maintain, in good and effective operating conditions, the vegetation, erosion and sediment control measures and other protective measures identified in this plan. It will be the Contractor's responsibility to attain maintenance guidelines for any manufactured BMPs which are to be installed and maintained per manufacture's specifications.

**Vegetative Soil Erosion Measures:** The vegetative growth of temporary and permanent seeding, vegetative filters, etc., shall be maintained periodically and supplied adequate watering and fertilizer. Reseed as necessary where vegetation establishment is poor.

**Catch Basin and Inlet Filters:** Inlet filters should be inspected for proper filtering. If filter bags are used, remove sediment from the filter bags when 50% percent of the storage volume has been filled, unless otherwise instructed by the manufacturer. Remove trash and debris during inspections. Accumulated material in the filters should be disposed of properly. Do not puncture holes in filters if ponding occurs.

#### **IV. Inspections:**

Qualified personnel shall inspect disturbed areas of the construction site including Borrow, Waste, and Use Areas, which have not yet been finally stabilized, structural control measures, and locations where vehicles and equipment enter and exit the site using IDOT Storm Water Pollution Prevention Plan Erosion Control Inspection Report, BC 2259. Such inspections shall be conducted at least once every seven (7) calendar days and within twenty-four (24) hours of the end of a storm or by the end of the following business or work day that is 0.5 inch or greater or equivalent snowfall.

Inspections may be reduced to once per month when construction activities have ceased due to frozen conditions. Weekly inspections will recommence when construction activities are conducted, or if there is 0.5" or greater rain event, or a discharge due to snowmelt occurs.

If any violation of the provisions of this plan is identified during the conduct of the construction work covered by this plan, the Resident Engineer shall notify the appropriate IEPA Field Operations Section office by email at: [epa.swnoncomp@illinois.gov](mailto:epa.swnoncomp@illinois.gov), telephone or fax within twenty-four (24) hours of the incident. The Resident Engineer shall then complete and submit an "Incidence of Non-Compliance" (ION) report for the identified violation within five (5) days of the incident. The Resident Engineer shall use forms provided by IEPA and shall include specific information on the cause of noncompliance, actions which were taken to prevent any further causes of noncompliance, and a statement detailing any environmental impact which may have resulted from the noncompliance. All reports of non-compliance shall be signed by a responsible authority in accordance with Part VI. G of the Permit ILR10.

The Incidence of Non-Compliance shall be mailed to the following address:

Illinois Environmental Protection Agency  
Division of Water Pollution Control  
Attn: Compliance Assurance Section  
1021 North Grand East  
Post Office Box 19276  
Springfield, Illinois 62794-9276

#### **V. Failure to Comply:**

Failure to comply with any provisions of this Storm Water Pollution Prevention Plan will result in the implementation of a National Pollutant Discharge Elimination System/Erosion and Sediment Control Deficiency Deduction against the Contractor and/or penalties under the Permit ILR10 which could be passed on to the Contractor.



Bureau of Land • 1021 North Grand Avenue East • P.O. Box 19276 • Springfield • Illinois • 62794-9276

## Uncontaminated Soil Certification by Licensed Professional Engineer or Licensed Professional Geologist for Use of Uncontaminated Soil as Fill in a CCDD or Uncontaminated Soil Fill Operation LPC-663

Revised in accordance with 35 Ill. Adm. Code 1100, as amended by PCB R2012-009 (eff. Aug. 27, 2012)

This certification form is to be used by professional engineers and professional geologists to certify, pursuant to 35 Ill. Adm. Code 1100.205(a)(1)(B), that soil (i) is uncontaminated soil and (ii) is within a pH range of 6.26 to 9.0. If you have questions about this form, please telephone the Bureau of Land Permit Section at 217/524-3300.

This form may be completed online, saved locally, printed and signed, and submitted to prospective clean construction or demolition debris (CCDD) fill operations or uncontaminated soil fill operations.

### I. Source Location Information

(Describe the location of the source of the uncontaminated soil)

Project Name: Howard Street Corridor Improvments Office Phone Number, if available: \_\_\_\_\_

Physical Site Location (address, including number and street):

Howard Street

City: Evanston State: IL Zip Code: 60202

County: Cook Township: Evanston

Lat/Long of approximate center of site in decimal degrees (DD.ddddd) to five decimal places (e.g., 40.67890, -90.12345):

Latitude: 42.019400° Longitude: -87.693276°  
(Decimal Degrees) (-Decimal Degrees)

Identify how the lat/long data were determined:

- GPS  Map Interpolation  Photo Interpolation  Survey  Other

IEPA Site Number(s), if assigned: BOL: \_\_\_\_\_ BOW: \_\_\_\_\_ BOA: \_\_\_\_\_

### II. Owner/Operator Information for Source Site

Site Owner

Site Operator

Name: City of Evanston

Name: \_\_\_\_\_

Street Address: 2100 Ridge Avenue

Street Address: \_\_\_\_\_

PO Box: \_\_\_\_\_

PO Box: \_\_\_\_\_

City: Evanston State: IL

City: \_\_\_\_\_ State: \_\_\_\_\_

Zip Code: 60202 Phone: (847) 448-8210

Zip Code: \_\_\_\_\_ Phone: \_\_\_\_\_

Contact: Lara Biggs

Contact: \_\_\_\_\_

Email, if available: PublicWorks@cityofevanston.org

Email, if available: \_\_\_\_\_

This Agency is authorized to require this information under Section 4 and Title X of the Environmental Protection Act (415 ILCS 5/4, 5/39). Failure to disclose this information may result in: a civil penalty of not to exceed \$50,000 for the violation and an additional civil penalty of not to exceed \$10,000 for each day during which the violation continues (415 ILCS 5/42). This form has been approved by the Forms

Project Name: Howard Street Corridor Improvements

Latitude: 42.019400° Longitude: -87.693276°

Uncontaminated Site Certification

**III. Basis for Certification and Attachments**

For each item listed below, reference the attachments to this form that provide the required information.

- a. A Description of the soil sample points and how they were determined to be sufficient in number and appropriately located 35 Ill. Adm. Code 1100.610(a)]:

Soil boring locations were determined based upon proposed work areas. The Project Area has been developed as commercial and residential properties since at least the 1930s.

- b. Analytical soil testing results to show that soil chemical constituents comply with the maximum allowable concentrations established pursuant to 35 Ill. Adm. Code Part 1100, Subpart F and that the soil pH is within the range of 6.25 to 9.0, including the documentation of chain of custody control, a copy of the lab analysis; the accreditation status of the laboratory performing the analysis; and certification by an authorized agent of the laboratory that the analysis has been performed in accordance with the Agency's rules for the accreditation of environmental and the scope of the accreditation [35 Ill. Adm. Code 1100.201(g), 1100.205(a), 1100.610]:

Soil in the vicinity of borings pH-1 and B-7 shall not be disposed of as CCDD. Soil in the vicinity of boring B-8 may be disposed of at a CCDD facility in the City of Chicago or an MSA county only. All other soils may be disposed of at a CCDD facility. refer to available reports special provisions for the laboratory data.

**IV. Certification Statement, Signature and Seal of Licensed Professional Engineer or Licensed Professional Geologist**

I, Thaddeus J. Cagney (name of licensed professional engineer or geologist) certify under penalty of law that the information submitted, including but not limited to, all attachments and other information, is to the best of my knowledge and belief, true, accurate and complete. In accordance with the Environmental Protection Act [415 ILCS 5/22.51 or 22.51a] and 35 Ill. Adm. Code 1100.205(a), I certify that the soil from this site is uncontaminated soil. I also certify that the soil pH is within the range of 6.25 to 9.0. In addition, I certify that the soil has not been removed from the site as part of a cleanup or removal of contaminants. All necessary documentation is attached.

*Any person who knowingly makes a false, fictitious, or fraudulent material statement, orally or in writing, to the Illinois EPA commits a Class 4 felony. A second or subsequent offense after conviction is a Class 3 felony. (415 ILCS 5/44(h))*

Company Name: GSG Consultants, Inc.  
 Street Address: 623 Cooper Court  
 City: Schaumburg State: IL Zip Code: 60173  
 Phone: 630-994-2600

Thaddeus J. Cagney  
 Printed Name:

*Thaddeus J. Cagney*  
 Licensed Professional Engineer or  
 Licensed Professional Geologist Signature:

June 14, 2019  
 Date:



P.E. or L.P.G. Seal:

## 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."

80384

## CONSTRUCTION AIR QUALITY – DIESEL RETROFIT (BDE)

Effective: June 1, 2010

Revised: November 1, 2014

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 using the phased in approach shown below. Equipment that is of a model year older than the year given for that equipment’s respective horsepower range shall be retrofitted:

Effective Dates	Horsepower Range	Model Year
June 1, 2010 <sup>1/</sup>	600-749	2002
	750 and up	2006
June 1, 2011 <sup>2/</sup>	100-299	2003
	300-599	2001
	600-749	2002
	750 and up	2006
June 1, 2012 <sup>2/</sup>	50-99	2004
	100-299	2003
	300-599	2001
	600-749	2002
	750 and up	2006

1/ Effective dates apply to Contractor diesel powered off-road equipment assigned to the contract.

2/ Effective dates apply to Contractor and subcontractor diesel powered off-road equipment assigned to the contract.

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* (<http://www.epa.gov/cleandiesel/verification/verif-list.htm>), 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.

80261

## **DISADVANTAGED BUSINESS ENTERPRISE PARTICIPATION (BDE)**

Effective: September 1, 2000

Revised: March 2, 2019

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

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

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

The Contractor, subrecipient, or subcontractor shall not discriminate on the basis of race, color, national origin, or sex in the performance of this contract. The Contractor shall carry out applicable requirements of 49 CFR Part 26 in the award and administration of contracts funded in whole or in part with federal or state funds. Failure by the Contractor to carry out these requirements is a material breach of this contract, which may result in the termination of this contract or such other remedy as the recipient deems appropriate, which may include, but is not limited to:

- (a) Withholding progress payments;
- (b) Assessing sanctions;
- (c) Liquidated damages; and/or
- (d) Disqualifying the Contractor from future bidding as non-responsible.

OVERALL GOAL SET FOR THE DEPARTMENT. As a requirement of compliance with 49 CFR Part 26, the Department has set an overall goal for DBE participation in its federally assisted contracts. That goal applies to all federal-aid funds the Department will expend in its federally assisted contracts for the subject reporting fiscal year. The Department is required to make a

good faith effort to achieve the overall goal. The dollar amount paid to all approved DBE companies performing work called for in this contract is eligible to be credited toward fulfillment of the Department's overall goal.

CONTRACT GOAL TO BE ACHIEVED BY THE CONTRACTOR. This contract includes a specific DBE utilization goal established by the Department. The goal has been included because the Department has determined the work of this contract has subcontracting opportunities that may be suitable for performance by DBE companies. The determination is based on an assessment of the type of work, the location of the work, and the availability of DBE companies to do a part of the work. The assessment indicates, in the absence of unlawful discrimination and in an arena of fair and open competition, DBE companies can be expected to perform 13.00 % of the work. This percentage is set as the DBE participation goal for this contract. Consequently, in addition to the other award criteria established for this contract, the Department will only award this contract to a bidder who makes a good faith effort to meet this goal of DBE participation in the performance of the work. A bidder makes a good faith effort for award consideration if either of the following is done in accordance with the procedures set for in this Special Provision:

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

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

<http://www.idot.illinois.gov/doing-business/certifications/disadvantaged-business-enterprise-certification/il-ucp-directory/index>.

BIDDING PROCEDURES. Compliance with this Special Provision is a material bidding requirement and failure of the bidder to comply will render the bid not responsive.

The bidder shall submit a DBE Utilization Plan (form SBE 2026), and a DBE Participation Statement (form SBE 2025) for each DBE company proposed for the performance of work to achieve the contract goal, with the bid. If the Utilization Plan indicates the contract goal will not be met, documentation of good faith efforts shall also be submitted. The documentation of good faith efforts must include copies of each DBE and non-DBE subcontractor quote submitted to the bidder when a non-DBE subcontractor is selected over a DBE for work on the contract. The required forms and documentation must 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 Utilization Plan if it does not meet the bidding procedures set forth herein and the bid will be declared not responsive. In the event the bid is declared not 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.

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

- (a) The following is a list of types of action that the Department will consider as part of the evaluation of the bidder's good faith efforts to obtain participation. These listed factors are not intended to be a mandatory checklist and are not intended to be exhaustive. Other factors or efforts brought to the attention of the Department may be relevant in appropriate cases and will be considered by the Department.
  - (1) Soliciting through all reasonable and available means (e.g. attendance at pre-bid meetings, advertising and/or written notices) the interest of all certified DBE companies that have the capability to perform the work of the contract. The bidder must solicit this interest within sufficient time to allow the DBE companies to respond to the solicitation. The bidder must determine with certainty if the DBE companies are interested by taking appropriate steps to follow up initial solicitations.
  - (2) Selecting portions of the work to be performed by DBE companies in order to increase the likelihood that the DBE goals will be achieved. This includes, where appropriate, breaking out contract work items into economically feasible units to facilitate DBE participation, even when the Contractor might otherwise prefer to perform these work items with its own forces.
  - (3) Providing interested DBE companies with adequate information about the plans, specifications, and requirements of the contract in a timely manner to assist them in responding to a solicitation.

- (4) a. Negotiating in good faith with interested DBE companies. It is the bidder's responsibility to make a portion of the work available to DBE subcontractors and suppliers and to select those portions of the work or material needs consistent with the available DBE subcontractors and suppliers, so as to facilitate DBE participation. Evidence of such negotiation includes the names, addresses, and telephone numbers of DBE companies that were considered; a description of the information provided regarding the plans and specifications for the work selected for subcontracting; and evidence as to why additional agreements could not be reached for DBE companies to perform the work.
  - b. A bidder using good business judgment would consider a number of factors in negotiating with subcontractors, including DBE subcontractors, and would take a firm's price and capabilities as well as contract goals into consideration. However, the fact that there may be some additional costs involved in finding and using DBE companies is not in itself sufficient reason for a bidder's failure to meet the contract DBE goal, as long as such costs are reasonable. Also the ability or desire of a bidder to perform the work of a contract with its own organization does not relieve the bidder of the responsibility to make good faith efforts. Bidders are not, however, required to accept higher quotes from DBE companies if the price difference is excessive or unreasonable. In accordance with the above Bidding Procedures, the documentation of good faith efforts must include copies of each DBE and non-DBE subcontractor quote submitted to the bidder when a non-DBE subcontractor was selected over a DBE for work on the contract.
- (5) Not rejecting DBE companies as being unqualified without sound reasons based on a thorough investigation of their capabilities. The bidder's standing within its industry, membership in specific groups, organizations, or associations and political or social affiliations (for example union vs. non-union employee status) are not legitimate causes for the rejection or non-solicitation of bids in the bidder's efforts to meet the project goal.
  - (6) Making efforts to assist interested DBE companies in obtaining bonding, lines of credit, or insurance as required by the recipient or Contractor.
  - (7) Making efforts to assist interested DBE companies in obtaining necessary equipment, supplies, materials, or related assistance or services.
  - (8) Effectively using the services of available minority/women community organizations; minority/women contractors' groups; local, state, and federal minority/women business assistance offices; and other organizations as allowed on a case-by-case basis to provide assistance in the recruitment and placement of DBE companies.
- (b) If the Department determines the bidder has made a good faith effort to secure the work commitment of DBE companies to meet the contract goal, the Department will award the contract provided it is otherwise eligible for award. If the Department determines the



bidder has failed to meet the requirements of this Special Provision or that a good faith effort has not been made, the Department will notify the responsible company official designated in the Utilization Plan that the bid is not responsive. The notification will also include a statement of reasons for the adverse determination. If the Utilization Plan is not approved because it is deficient as a technical matter, unless waived by the Department, the bidder will be notified and will be allowed no more than a five calendar day period to cure the deficiency.

- (c) The bidder may request administrative reconsideration of an adverse determination by emailing the Department at "[DOT.DBE.UP@illinois.gov](mailto:DOT.DBE.UP@illinois.gov)" within the five calendar days after the receipt of the notification of the determination. The determination shall become final if a request is not made on or before the fifth calendar day. A request may provide additional written documentation or argument concerning the issues raised in the determination statement of reasons, provided the documentation and arguments address efforts made prior to submitting the bid. The request will be reviewed by the Department's Reconsideration Officer. The Reconsideration Officer will extend an opportunity to the bidder to meet in person to consider all issues of documentation and whether the bidder made a good faith effort to meet the goal. After the review by the Reconsideration Officer, the bidder will be sent a written decision within ten working days after receipt of the request for reconsideration, explaining the basis for finding that the bidder did or did not meet the goal or make adequate good faith efforts to do so. A final decision by the Reconsideration Officer that a good faith effort was made shall approve the Utilization Plan submitted by the bidder and shall clear the contract for award. A final decision that a good faith effort was not made shall render the bid not responsive.

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

- (a) DBE as the Contractor: 100 percent goal credit for that portion of the work performed by the DBE's own forces, including the cost of materials and supplies. Work that a DBE subcontracts to a non-DBE does not count toward the DBE goals.
- (b) DBE as a joint venture Contractor: 100 percent goal credit for that portion of the total dollar value of the contract equal to the distinct, clearly defined portion of the work performed by the DBE's own forces.

- (c) DBE as a subcontractor: 100 percent goal credit for the work of the subcontract performed by the DBE's own forces, including the cost of materials and supplies, excluding the purchase of materials and supplies or the lease of equipment by the DBE subcontractor from the Contractor or its affiliates. Work that a DBE subcontractor in turn subcontracts to a non-DBE does not count toward the DBE goal.
- (d) DBE as a trucker: 100 percent goal credit for trucking participation provided the DBE is responsible for the management and supervision of the entire trucking operation for which it is responsible. At least one truck owned, operated, licensed, and insured by the DBE must be used on the contract. Credit will be given for the following:
  - (1) The DBE may lease trucks from another DBE firm, including an owner-operator who is certified as a DBE. The DBE who leases trucks from another DBE receives credit for the total value of the transportation services the lessee DBE provides on the contract.
  - (2) The DBE may also lease trucks from a non-DBE firm, including from an owner-operator. The DBE who leases trucks from a non-DBE is entitled to credit only for the fee or commission it receives as a result of the lease arrangement.
- (e) DBE as a material supplier:
  - (1) 60 percent goal credit for the cost of the materials or supplies purchased from a DBE regular dealer.
  - (2) 100 percent goal credit for the cost of materials or supplies obtained from a DBE manufacturer.
  - (3) 100 percent credit for the value of reasonable fees and commissions for the procurement of materials and supplies if not a DBE regular dealer or DBE manufacturer.

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

- (a) NO AMENDMENT. No amendment to the Utilization Plan may be made without prior written approval from the Department's Bureau of Small Business Enterprises. All requests for amendment to the Utilization Plan shall be emailed to the Department at [DOT.DBE.UP@illinois.gov](mailto:DOT.DBE.UP@illinois.gov).
- (b) CHANGES TO WORK. Any deviation from the DBE condition-of-award or contract plans, specifications, or special provisions must be approved, in writing, by the Department as provided elsewhere in the Contract. The Contractor shall notify affected DBEs in writing of any changes in the scope of work which result in a reduction in the dollar amount condition-of-award to the contract. Where the revision includes work committed to a new DBE subcontractor, not previously involved in the project, then a Request for Approval of Subcontractor, Department form BC 260A or AER 260A, must be signed and submitted. If the commitment of work is in the form of additional tasks assigned to an existing subcontract, a new Request for Approval of Subcontractor will not be required. However, the Contractor must document efforts to assure the existing DBE subcontractor is capable of performing the additional work and has agreed in writing to the change.
- (c) SUBCONTRACT. The Contractor must provide copies of 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.
- (d) ALTERNATIVE WORK METHODS. In addition to the above requirements for reductions in the condition of award, additional requirements apply to the two cases of Contractor-initiated work substitution proposals. Where the contract allows alternate work methods which serve to delete or create underruns in condition of award DBE work, and the Contractor selects that alternate method or, where the Contractor proposes a substitute work method or material that serves to diminish or delete work committed to a DBE and replace it with other work, then the Contractor must demonstrate one of the following:
- (1) The replacement work will be performed by the same DBE (as long as the DBE is certified in the respective item of work) in a modification of the condition of award; or
  - (2) The DBE is aware its work will be deleted or will experience underruns and has agreed in writing to the change. If this occurs, the Contractor shall substitute other work of equivalent value to a certified DBE or provide documentation of good faith efforts to do so; or
  - (3) The DBE is not capable of performing the replacement work or has declined to perform the work at a reasonable competitive price. If this occurs, the Contractor shall substitute other work of equivalent value to a certified DBE or provide documentation of good faith efforts to do so.

- (e) TERMINATION AND REPLACEMENT PROCEDURES. The Contractor shall not terminate or replace a DBE listed on the approved Utilization Plan, or perform with other forces work designated for a listed DBE except as provided in this Special Provision. The Contractor shall utilize the specific DBEs listed to perform the work and supply the materials for which each is listed unless the Contractor obtains the Department's written consent as provided in subsection (a) of this part. Unless Department consent is provided for termination of a DBE subcontractor, the Contractor shall not be entitled to any payment for work or material unless it is performed or supplied by the DBE in the Utilization Plan.

As stated above, the Contractor shall not terminate or replace a DBE subcontractor listed in the approved Utilization Plan without prior written consent. This includes, but is not limited to, instances in which the Contractor seeks to perform work originally designated for a DBE subcontractor with its own forces or those of an affiliate, a non-DBE firm, or with another DBE firm. Written consent will be granted only if the Bureau of Small Business Enterprises agrees, for reasons stated in its concurrence document, that the Contractor has good cause to terminate or replace the DBE firm. Before transmitting to the Bureau of Small Business Enterprises any request to terminate and/or substitute a DBE subcontractor, the Contractor shall give notice in writing to the DBE subcontractor, with a copy to the Bureau, of its intent to request to terminate and/or substitute, and the reason for the request. The Contractor shall give the DBE five days to respond to the Contractor's notice. The DBE so notified shall advise the Bureau and the Contractor of the reasons, if any, why it objects to the proposed termination of its subcontract and why the Bureau should not approve the Contractor's action. If required in a particular case as a matter of public necessity, the Bureau may provide a response period shorter than five days.

For purposes of this paragraph, good cause includes the following circumstances:

- (1) The listed DBE subcontractor fails or refuses to execute a written contract;
- (2) The listed DBE subcontractor fails or refuses to perform the work of its subcontract in a way consistent with normal industry standards. Provided, however, that good cause does not exist if the failure or refusal of the DBE subcontractor to perform its work on the subcontract results from the bad faith or discriminatory action of the Contractor;
- (3) The listed DBE subcontractor fails or refuses to meet the Contractor's reasonable, nondiscriminatory bond requirements;
- (4) The listed DBE subcontractor becomes bankrupt, insolvent, or exhibits credit unworthiness;
- (5) The listed DBE subcontractor is ineligible to work on public works projects because of suspension and debarment proceedings pursuant 2 CFR Parts 180, 215 and 1200 or applicable state law.

- (6) The Contractor has determined the listed DBE subcontractor is not a responsible contractor;
- (7) The listed DBE subcontractor voluntarily withdraws from the projects and provides written notice to the Contractor of its withdrawal;
- (8) The listed DBE is ineligible to receive DBE credit for the type of work required;
- (9) A DBE owner dies or becomes disabled with the result that the listed DBE subcontractor is unable to complete its work on the contract;
- (10) Other documented good cause that compels the termination of the DBE subcontractor. Provided, that good cause does not exist if the Contractor seeks to terminate a DBE it relied upon to obtain the contract so that the Contractor can self-perform the work for which the DBE contractor was engaged or so that the Contractor can substitute another DBE or non-DBE contractor after contract award.

When a DBE is terminated or fails to complete its work on the Contract for any reason, the Contractor shall make a good faith effort to find another DBE to substitute for the original DBE to perform at least the same amount of work under the contract as the terminated DBE to the extent needed to meet the established Contract goal. The good faith efforts shall be documented by the Contractor. If the Department requests documentation under this provision, the Contractor shall submit the documentation within seven days, which may be extended for an additional seven days if necessary at the request of the Contractor. The Department will provide a written determination to the Contractor stating whether or not good faith efforts have been demonstrated.

- (f) FINAL PAYMENT. After the performance of the final item of work or delivery of material by a DBE and final payment therefore to the DBE by the Contractor, but not later than 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 on Department form SBE 2115 to the Resident Engineer. If full and final payment has not been made to the DBE, the DBE Payment Agreement shall indicate whether a disagreement as to the payment required exists between the Contractor and the DBE or if the Contractor believes the work has not been satisfactorily completed. If the Contractor does not have the full amount of work indicated in the Utilization Plan performed by the DBE companies indicated in the Utilization Plan and after good faith efforts are reviewed, the Department may deduct from contract payments to the Contractor the amount of the goal not achieved as liquidated and ascertained damages. The Contractor may request an administrative reconsideration of any amount deducted as damages pursuant to subsection (h) of this part.
- (g) ENFORCEMENT. The Department reserves the right to withhold payment to the Contractor to enforce the provisions of this Special Provision. Final payment shall not be

made on the contract until such time as the Contractor submits sufficient documentation demonstrating achievement of the goal in accordance with this Special Provision or after liquidated damages have been determined and collected.

- (h) RECONSIDERATION. Notwithstanding any other provision of the contract, including but not limited to Article 109.09 of the Standard Specifications, the Contractor may request administrative reconsideration of a decision to deduct the amount of the goal not achieved as liquidated damages. A request to reconsider shall be delivered to the Contract Compliance Section and shall be handled and considered in the same manner as set forth in paragraph (c) of "Good Faith Effort Procedures" of this Special Provision, except a final decision that a good faith effort was not made during contract performance to achieve the goal agreed to in the Utilization Plan shall be the final administrative decision of the Department. The result of the reconsideration process is not administratively appealable to the U.S. Department of Transportation.

80029

## **DISPOSAL FEES (BDE)**

Effective: November 1, 2018

Replace Articles 109.04(b)(5) – 109.04(b)(8) of the Standard Specifications with the following:

- “(5) Disposal Fees. When the extra work performed includes paying for disposal fees at a clean construction and demolition debris facility, an uncontaminated soil fill operation or a landfill, the Contractor shall receive, as administrative costs, an amount equal to five percent of the first \$10,000 and one percent of any amount over \$10,000 of the total approved costs of such fees.
- (6) Miscellaneous. No additional allowance will be made for general superintendence, the use of small tools, or other costs for which no specific allowance is herein provided.
- (7) Statements. No payment will be made for work performed on a force account basis until the Contractor has furnished the Engineer with itemized statements of the cost of such force account work. Statements shall be accompanied and supported by invoices for all materials used and transportation charges. However, if materials used on the force account work are not specifically purchased for such work but are taken from the Contractor’s stock, then in lieu of the invoices, the Contractor shall furnish an affidavit certifying that such materials were taken from his/her stock, that the quantity claimed was actually used, and that the price and transportation claimed represent the actual cost to the Contractor.

Itemized statements at the cost of force account work shall be detailed as follows.

- a. Name, classification, date, daily hours, total hours, rate, and extension for each laborer and foreman. Payrolls shall be submitted to substantiate actual wages paid if so requested by the Engineer.
  - b. Designation, dates, daily hours, total hours, rental rate, and extension for each unit of machinery and equipment.
  - c. Quantities of materials, prices and extensions.
  - d. Transportation of materials.
  - e. Cost of property damage, liability and workmen’s compensation insurance premiums, unemployment insurance contributions, and social security tax.
- (8) Work Performed by an Approved Subcontractor. When extra work is performed by an approved subcontractor, the Contractor shall receive, as administrative costs, an amount equal to five percent of the total approved costs of such work with the minimum payment being \$100.

- (9) All statements of the cost of force account work shall be furnished to the Engineer not later than 60 days after receipt of the Central Bureau of Construction form "Extra Work Daily Report". If the statement is not received within the specified time frame, all demands for payment for the extra work are waived and the Department is released from any and all such demands. It is the responsibility of the Contractor to ensure that all statements are received within the specified time regardless of the manner or method of delivery."

80402



## DOWEL BAR INSERTER (BDE)

Effective: January 1, 2017

Revised: January 1, 2018

Add the following to Article 420.03 of the Standard Specifications.

“(l) Mechanical Dowel Bar Inserter .....1103.20”

Revise the first paragraph of Article 420.05(b)(1) of the Supplemental Specifications to read:

“Preformed or Drilled Holes. If applicable, the tie bars shall be installed after the dowel bars have been tested with the MIT Scan-2 device according to Article 420.05(c)(2)b.2. The tie bars shall be installed with a nonshrink grout or chemical adhesive providing a minimum pull-out strength as follows.”

Revise Article 420.05(c) of the Standard Specifications to read:

“(c) Transverse Contraction Joints. Transverse contraction joints shall consist of planes of weakness created by sawing grooves in the surface of the pavement and shall include load transfer devices consisting of dowel bars. Transverse contraction joints shall be according to the following.”

Revise Article 420.05(c)(2) of the Standard Specifications to read:

“(2) Dowel Bars. Dowel Bars shall be installed parallel to the centerline of the pavement and parallel to the proposed pavement surface. Installation shall be according to one of the following methods.

- a. Dowel Bar Assemblies. The assembly shall act as a rigid unit with each component securely held in position relative to the other members of the assembly. The entire assembly shall be held securely in place by means of nails which shall penetrate the stabilized subbase. At least ten nails shall be used for each 10, 11, or 12 ft (3, 3.3, or 3.6 m) section of assembly.

Metal stakes shall be used instead of nails, with soil or granular subbase. The stakes shall loop over or attach to the top parallel spacer bar of the assembly and penetrate the subgrade or subbase at least 12 in. (300 mm).

At the location of each dowel bar assembly, the subgrade or subbase shall be reshaped and re-tamped when necessary.

Prior to placing concrete, any deviation of the dowel bars from the correct horizontal or vertical alignment (horizontal skew or vertical tilt) greater than 3/8 in. in 12 in (9 mm in 300 mm) shall be corrected and a light coating of oil shall be uniformly applied to all dowel bars.

Care shall be exercised in depositing the concrete at the dowel bar assemblies so the horizontal and vertical alignment will be retained.

- b. Dowel Bar Insertion. The dowel bars may be placed in the pavement slab with a mechanical dowel bar inserter (DBI) attached to a formless paver for pavements  $\geq 7.0$  in. (175 mm) in thickness. A light coating of oil shall be uniformly applied to all dowel bars.

The DBI shall insert the dowel bars with vibration into the plastic concrete after the concrete has been struck off and consolidated without deformation of the slab. After the bars have been inserted, the concrete shall be refinished and no voids shall exist around the dowel bars. The forward movement of the paver shall not be interrupted by the inserting of the dowel bars.

The location of each row of dowel bars shall be marked in a manner to facilitate where to insert the bars, and where to saw the transverse joint.

1. Placement Tolerances for Dowel Bars. The DBI shall place the dowel bars in the concrete pavement within the following tolerances.

- (a.) Longitudinal Translation (Mislocation). Longitudinal translation (mislocation) shall be defined as the position of the center of the dowel bar along the longitudinal axis, in relation to the sawed joint.

The quality control tolerance for longitudinal translation shall not exceed 2.0 in (50 mm). If this tolerance is exceeded, adjustments shall be made to the paving operation.

Any joint having two or more dowel bars with an embedment length less than 4.0 in. (100 mm) within 12 in. (300 mm) of the same wheelpath will be considered unacceptable. The left and right wheelpaths shall be determined by excluding the middle 2.5 ft (0.8 m) of the pavement lane, and by excluding the outer 1.0 ft (0.3 m) measured from each pavement lane edge. Any joint having an average dowel bar embedment length less than 5.25 in. (130 mm) will also be considered unacceptable. Embedment length shall be defined as the length of dowel bar embedded on the short side of the sawed joint. An unacceptable joint shall be replaced with a minimum of 6 ft (1.8 m) of pavement centered over the joint according to Section 442 for Class B patches.

- (b.) Horizontal Translation (Mislocation). Horizontal translation (mislocation) shall be defined as the difference in the actual dowel bar location parallel to the longitudinal or edge joint from its theoretical position as shown on the plans.

The quality control tolerance for horizontal translation shall not exceed 2.0 in. (50 mm). If this tolerance is exceeded, adjustments shall be made to the paving operation.

Any joint having a dowel bar with a translation greater than 4.0 in. (100 mm) will be considered unacceptable, but may remain in place unless the Engineer determines the joint will not function. If the joint is unable to remain in place, the joint shall be replaced with a minimum of 6 ft (1.8 m) of pavement centered over the joint according to Section 442 for Class B patches.

- (c.) Vertical Translation (Mislocation). Vertical translation (mislocation) shall be defined as the difference in the vertical position of the dowel bar relative to the theoretical midpoint of the slab.

The quality control tolerance for vertical translation shall be as shown in the following table. If these tolerances are exceeded, adjustments shall be made to the paving operation.

Pavement Thickness	Dowel Bar Diameter	Vertical Translation Tolerance Above Midpoint	Vertical Translation Tolerance Below Midpoint
≥7 in. to <8 in. (≥175 mm to <200 mm)	1.25 in. (31 mm)	0.25 in. (6 mm)	0.5 in. (13 mm)
≥8 in. to <9 in. (≥200 mm to <225 mm)	1.50 in. (38 mm)	0.25 in. (6 mm)	0.5 in. (13 mm)
≥9 in. to <10 in. (≥225 mm to <250 mm)	1.50 in. (38 mm)	0.75 in. (19 mm)	0.75 in. (19 mm)
≥10 in. (≥250 mm)	1.50 in. (38 mm)	0.75 in. (19 mm)	1.0 in. (25 mm)

Any joint having a dowel bar with top concrete cover less than T/3, where T is slab thickness, will be considered unacceptable. Any joint having 2 or more dowel bars with bottom concrete cover less than 2.0 in. (50 mm) will also be considered unacceptable. An unacceptable joint shall be replaced with a minimum of 6 ft (1.8 m) of pavement according to Section 442 for Class B patches.

- (d.) Vertical Tilt or Horizontal Skew (Misalignment). Vertical tilt or horizontal skew (misalignment) shall be defined as the difference in position of the dowel bar ends with respect to each other. Vertical tilt is measured in the vertical axis whereas horizontal skew is measured in the horizontal axis. Misalignment shall be measured in terms of a joint score. The joint score shall be defined as the degree of misalignment evaluated for a single

transverse joint for each lane of pavement. The joint score shall be determined as follows:

$$Joint\ Score = \left( 1 + \left( \frac{x}{x-n} \right) \sum_{i=1}^{x-n} W_i \right)$$

where:

$W_i$  = weighting factor (Table 1) for dowel  $i$

$x$  = number of dowels in a single joint

$n$  = number of dowels excluded from the joint score calculation due to measurement interference

*Single Dowel Misalignment* – The degree of misalignment applicable to a single dowel bar, calculated as:

$$Single\ Dowel\ Misalignment = \sqrt{(Horizontal\ Skew)^2 + (Vertical\ Tilt)^2}$$

Table 1. Weighting Factors in Joint Score Determination	
Single Dowel Bar Misalignment (SDM)	W, Weighting Factor
SDM ≤ 0.6 in. (15 mm)	0
0.6 in. (15 mm) < SDM ≤ 0.8 in. (20 mm)	2
0.8 in. (20 mm) < SDM ≤ 1 in. (25 mm)	4
1 in. (25 mm) < SDM ≤ 1.5 in. (38 mm)	5
1.5 in. (38 mm) < SDM	10

The quality control tolerance for vertical tilt or horizontal skew shall not exceed 0.6 in. (15 mm). If the tolerance is exceeded for either one, adjustments shall be made to the paving operation.

Any joint having a dowel bar with a vertical tilt or horizontal skew greater than 1.5 in. (38 mm) shall be cut. If more than one dowel bar is required to be cut in the joint, the joint will be considered unacceptable and shall be replaced with a minimum of 6 ft (1.8 m) of pavement centered over the joint according to Section 442 for Class B patches.

Single dowel bar misalignment shall be controlled to provide the joint scores shown in the following table.

Number of Dowel Bars in the Joint	Maximum Joint Score
< 5	4
≥ 5 but ≤ 9	8
> 9	12

A joint score greater than the specified maximum will be considered locked. Three consecutive joints with a score greater than the specified maximum total score will all be considered unacceptable.

Three consecutive locked joints shall be corrected by selecting one joint and cutting a dowel bar. Preference shall be given to cutting a dowel bar within the middle 2.5 ft (0.8 m) of the pavement lane to avoid the wheelpaths. If none of the three locked joints will have a joint score less than or equal to the specified maximum after selecting one dowel bar to cut, one of the joints shall be replaced with a minimum of 6 ft (1.8 m) of pavement centered over the joint according to Section 442 for Class B patches.

(e.) For unacceptable work, the Contractor may propose alternative repairs for consideration by the Engineer.

2. Testing of Dowel Bar Placement. The placement of the dowel bars shall be tested within 24 hours of paving with a calibrated MIT Scan-2 device according to "Use of Magnetic Tomography Technology to Evaluate Dowel Placement" (Publication No. FHWA-IF-06-006) by the Federal Highway Administration.

A trained operator shall perform the testing, and all testing shall be performed in the presence of the Engineer. The device shall be calibrated to the type and size dowel bar used in the work according to the manufacturer's instructions. Calibration documentation shall be provided to the Engineer prior to construction. The device shall be recalibrated and/or validate readings as required by the Engineer. The device may be utilized as a process control and make necessary adjustments to ensure the dowel bars are placed in the correct location.

(a.) Test Section. Prior to start of production paving, a test section consisting of 30 transverse joints shall be constructed. The test section may be performed on the actual pavement, but production paving shall not begin until an acceptable test section has been constructed. The test section will be considered acceptable when all of the following are met:

- (1.) 90 percent of the dowel bars meet the quality control tolerance for longitudinal, horizontal, or vertical translation (mislocation);
- (2.) 90 percent of the dowel bars meet the quality control tolerance for vertical tilt or horizontal skew deviation (misalignment); and
- (3.) none of the joints are considered unacceptable prior to a corrective measure for mislocation or misalignment.

If the test section fails, another test section consisting of 30 joints shall be constructed.

The test section requirement may be waived by the Engineer if the Contractor has constructed an acceptable test section and successfully used the DBI on a Department contract within the same calendar year.

- (b.) Production Paving. After the test section is approved, production paving may begin. The mislocation and misalignment of each dowel bar for the first ten joints constructed, and every tenth joint thereafter, shall be tested.

If two consecutive days of paving result in 5 percent or more of the joints on each day being unacceptable prior to a corrective measure, production paving shall be discontinued and a new test section shall be constructed.

If any joint is found to be unacceptable prior to a corrective measure, testing of additional joints on each side of the unacceptable joint shall be performed until acceptable joints are found.

- (c.) Test Report. Test reports shall be provided to the Engineer within two working days of completing each day's testing. The test report shall include the following.

(1.) Contract number, placement date, county-route-section, direction of traffic, scan date, Contractor, and name of individual performing the tests.

(2.) Provide the standard report generated from the on-board printer of the imaging technology used for every dowel and joint measured.

(3.) For every dowel measured, provide the joint identification number, lane number and station, dowel bar number or x-location, direction of testing and reference joint location/edge location, longitudinal translation, horizontal translation, vertical translation, vertical tilt, and horizontal skew.

(4.) Identify each dowel bar with a maximum longitudinal, horizontal, or vertical translation that has been exceeded. Identify each dowel bar with a maximum vertical tilt or horizontal skew deviation that has been exceeded.

(5.) Joint Score Details: Provide the joint identification number, lane number, station, and calculated joint score for each joint.

- (6.) Locked Joint Identification: Identify each joint where the maximum joint score is exceeded.
- (d.) Exclusions. Exclude the following from dowel bar mislocation and misalignment measurements.
  - (1.) Transverse construction joints (headers).
  - (2.) Dowel bars within 24 in. (610 mm) of metallic manholes, inlets, metallic castings, or other nearby or underlying steel reinforced objects.
  - (3.) The outside dowel bar when tie bars are installed with mechanical equipment in fresh concrete. For tie bar installations involving preformed or drilled holes, installation of the tie bar shall be performed after testing with the MIT Scan-2 device.
  - (4.) Joints located directly under high voltage power lines.
  - (5.) Subject to the approval of the Engineer, any other contributors to magnetic interference.
- (e.) Deficiency Deduction. When the Contractor has cut 25 dowel bars to correct unacceptable joints, the Contractor shall be liable and shall pay to the Department a deficiency deduction of \$500.00 for the cost of the bars. Thereafter, an additional deficiency deduction of \$20.00 for each additional bar cut will be assessed.”

Add the following to Section 1103 of the Standard Specifications.

**“1103.20 Mechanical Dowel Bar Inserter.** The mechanical dowel bar inserter (DBI) shall be self-contained and supported on the formless paver with the ability to move separately from the paver. The DBI shall be equipped with insertion forks along with any other devices necessary for finishing the concrete the full width of the pavement. The insertion forks shall have the ability to vibrate at a minimum frequency of 3000 VPM.”

80378

## **ELECTRIC SERVICE INSTALLATION (BDE)**

Effective: January 1, 2020

Revise Article 804.04 of the Standard Specifications to read:

**“804.04 Installation.** The electric service installation shall extend from the existing utility owned transformer to the point of cable termination of the incoming power at the controller enclosure.

The Contractor shall ascertain the work being provided by the electric utility and shall provide all additional material and work required to complete the electric service installation while meeting the requirements of the utility. Unless otherwise required by the utility, grounding shall be according to Section 806, raceways shall be according to Sections 810 – 812, and conductors shall be according to Sections 817 – 818.

The electric service installation shall include an appropriate service disconnect and when required, metering. Metering shall include all metering material, including potential and current transformers. The metering and service disconnect shall be installed remote to the controller enclosure where possible.

The total length of aerial and underground service between the controller enclosure and utility transformer shall not exceed 250 ft (76 m). The service pole or structure and controller shall be located adjacent to the right-of-way line or a minimum distance of 30 ft (9 m) from the edge of pavement. The exact location will be established by the Engineer.

Specific requirements for aerial and underground electric service installations shall be as follows.

- (a) **Aerial Electric Service.** The aerial service shall be mounted on a wood pole, along with a weatherhead, disconnect switch, meter base (if required), and all appurtenances to complete the installation.

The wood pole shall be installed according to Article 830.03(c), except the pole shall be a minimum of 25 ft (7.5 m) in length and shall be increased as necessary to maintain ground clearance.

- (b) **Underground Electric Service.**

- (1) **Ground Mounted Service.** The ground mounted service shall be installed on a corrosion resistant pedestal or structure with a service disconnect switch, meter base (if required), and all appurtenances to complete the installation.

- (2) **Pole Mounted Service.** The service shall be installed on a 12 ft (3.7 m) wood pole on which the meter base (if required) and service disconnect switch shall be channel



mounted. The wood pole shall be installed according to Article 830.03(c), except the pole shall be plumb.

- (c) Conduit Protection. Feeder conductors in PVC conduit on the service pole or structure shall be protected by galvanized steel "U" guard. When on a pole, the "U" guard shall be attached with 3/8 in. x 3 in. (M10 x 75 mm) galvanized steel lag bolts."

Revise Article 804.05 of the Standard Specifications to read:

**"804.05 Basis of Payment.** This work will be paid for at the contract unit price per each for ELECTRIC SERVICE INSTALLATION.

For aerial electric service, work on the utility side of the weatherhead at the service pole will be paid for according to Article 109.04 when not provided by the utility company.

For underground electric service, work on the utility side of the service pole, pedestal, or structure where the service cables penetrate the ground will be paid for according to Article 109.04 when not provided by the utility company.

Any charges by the utility company to provide electrical service will be paid for according to Article 109.05."

80421

## EMULSIFIED ASPHALTS (BDE)

Effective: August 1, 2019

Revise Article 1032.06 of the Standard Specifications to read:

**“1032.06 Emulsified Asphalts.** Emulsified asphalts will be accepted according to the current Bureau of Materials Policy Memorandum, “Emulsified Asphalt Acceptance Procedure”. These materials shall be homogeneous and shall show no separation of asphalt after thorough mixing, within 30 days after delivery, provided separation has not been caused by freezing. They shall coat the aggregate being used in the work to the satisfaction of the Engineer and shall be according to the following requirements.

- (a) Anionic Emulsified Asphalt. Anionic emulsified asphalts RS-1, RS-2, HFRS-2, SS-1h, and SS-1 shall be according to AASHTO M 140, except as follows.
  - (1) The cement mixing test will be waived when the emulsion is being used as a tack coat.
  - (2) The Solubility in Trichloroethylene test according to AASHTO T 44 may be run in lieu of Ash Content and shall meet a minimum of 97.5 percent.
- (b) Cationic Emulsified Asphalt. Cationic emulsified asphalts CRS-1, CRS-2, CSS-1h, and CSS-1 shall be according to AASHTO M 208, except as follows.
  - (1) The cement mixing test will be waived when the emulsion is being used as a tack coat.
  - (2) The Solubility in Trichloroethylene test according to AASHTO T 44 may be run in lieu of Ash Content and shall meet a minimum of 97.5 percent.
- (c) High Float Emulsion. High float emulsions HFE-90, HFE-150, and HFE-300 are medium setting and shall be according to the following table.

Test	HFE-90	HFE-150	HFE-300
Viscosity, Saybolt Furol, at 122 °F (50 °C), (AASHTO T 59), SFS <sup>1/</sup>	50 min.	50 min.	50 min.
Sieve Test, No. 20 (850 µm), retained on sieve, (AASHTO T 59), %	0.10 max.	0.10 max.	0.10 max.
Storage Stability Test, 1 day, (AASHTO T 59), %	1 max.	1 max.	1 max.
Coating Test (All Grades), (AASHTO T 59), 3 minutes	stone coated thoroughly		
Distillation Test, (AASHTO T 59): Residue from distillation test to 500 °F (260 °C), % Oil distillate by volume, %	65 min. 7 max.	65 min. 7 max.	65 min. 7 max.

Characteristics of residue from distillation test to 500 °F (260 °C): Penetration at 77 °F (25 °C), (AASHTO T 49), 100 g, 5 sec, dmm	90-150	150-300	300 min.
Float Test at 140 °F (60 °C), (AASHTO T 50), sec.	1200 min.	1200 min.	1200 min.

1/ The emulsion shall be pumpable.

- (d) Penetrating Emulsified Prime. Penetrating Emulsified Prime (PEP) shall be according to AASHTO T 59, except as follows.

Test	Result
Viscosity, Saybolt Furol, at 77 °F (25 °C), SFS	75 max.
Sieve test, retained on No. 20 (850 µm) sieve, %	0.10 max.
Distillation to 500 °F (260 °C) residue, %	38 min.
Oil distillate by volume, %	4 max.

The PEP shall be tested according to the current Bureau of Materials Illinois Laboratory Test Procedure (ILTP), "Sand Penetration Test of Penetrating Emulsified Prime (PEP)". The time of penetration shall be equal to or less than that of MC-30. The depth of penetration shall be equal to or greater than that of MC-30.

- (e) Delete this subparagraph.
- (f) Polymer Modified Emulsified Asphalt. Polymer modified emulsified asphalts, e.g. SS-1hP, CSS-1hP, CRS-2P (formerly CRSP), CQS-1hP (formerly CSS-1h Latex Modified) and HFRS-2P (formerly HFP) shall be according to AASHTO M 316, except as follows.
- (1) The cement mixing test will be waived when the polymer modified emulsion is being used as a tack coat.
  - (2) CQS-1hP (formerly CSS-1h Latex Modified) emulsion for micro-surfacing treatments shall use latex as the modifier.
  - (3) Upon examination of the storage stability test cylinder after standing undisturbed for 24 hours, the surface shall show minimal to no white, milky colored substance and shall be a homogenous brown color throughout.
  - (4) The distillation for all polymer modified emulsions shall be performed according to AASHTO T 59, except the temperature shall be  $374 \pm 9$  °F ( $190 \pm 5$  °C) to be held for a period of 15 minutes and measured using an ASTM 16F (16C) thermometer.
  - (5) The specified temperature for the Elastic Recovery test for all polymer modified emulsions shall be  $50.0 \pm 1.0$  °F ( $10.0 \pm 0.5$  °C).

(6) The Solubility in Trichloroethylene test according to AASHTO T 44 may be run in lieu of Ash Content and shall meet a minimum of 97.5 percent.

(g) Non-Tracking Emulsified Asphalt. Non-tracking emulsified asphalt NTEA (formerly SS-1vh) shall be according to the following.

Test	Requirement
Saybolt Viscosity at 77 °F (25 °C), (AASHTO T 59), SFS	20-100
Storage Stability Test, 24 hr, (AASHTO T 59), %	1 max.
Residue by Distillation, 500 ± 10 °F (260 ± 5 °C), or Residue by Evaporation, 325 ± 5 °F (163 ± 3 °C), (AASHTO T 59), %	50 min.
Sieve Test, No. 20 (850 µm), (AASHTO T 59), %	0.3 max.
Tests on Residue from Evaporation	
Penetration at 77 °F (25 °C), 100 g, 5 sec, (AASHTO T 49), dmm	40 max.
Softening Point, (AASHTO T 53), °F (°C)	135 (57) min.
Ash Content, (AASHTO T 111), % <sup>1/</sup>	1 max.

1/ The Solubility in Trichloroethylene test according to AASHTO T 44 may be run in lieu of Ash Content and shall meet a minimum of 97.5 percent

The different grades are, in general, used for the following.

Grade	Use
SS-1, SS-1h, RS-1, RS-2, CSS-1, CRS-1, CRS-2, CSS-1h, HFE-90, SS-1hP, CSS-1hP, NTEA (formerly SS-1vh)	Tack Coat
PEP	Prime Coat
RS-2, HFE-90, HFE-150, HFE-300, CRS-2P (formerly CRSP), HFRS-2P (formerly HFP), CRS-2, HFRS-2	Bituminous Surface Treatment
CQS-1hP (formerly CSS-1h Latex Modified)	Micro-Surfacing Slurry Sealing Cape Seal"

80415

## **ENGINEER'S FIELD OFFICE AND LABORATORY (BDE)**

Effective: January 1, 2020

Revise the last sentence of the first paragraph of Article 670.01 of the Standard Specifications to read:

“The building shall remain available for use until released by the Engineer.”

Revise the fifth and sixth paragraphs of Article 670.02 of the Standard Specifications to read:

“Sanitary facilities shall include hot and cold potable running water, lavatory and toilet as an integral part of the office where available. A portable toilet, if necessary, shall be serviced once per week. Solid waste disposal consisting of two waste baskets and an outside trash container of sufficient size to accommodate a weekly provided pick-up service.

In addition, the following furniture and equipment meeting the approval of the Engineer shall be furnished.”

Revise Article 670.02(b) through 670.02(r) of the Standard Specifications to read:

- “(b) One desk with minimum working surface of 48 x 72 in. (1.2 x 1.8 m).
- (c) Two free standing four drawer legal size file cabinets with lock and an underwriters' laboratories insulated file device 350 degrees one hour rating.
- (d) Table(s) and chairs capable of seating 10 people.
- (e) One equipment cabinet of minimum inside dimension of 44 in. (1100 mm) high x 24 in. (600 mm) wide x 30 in. (750 mm) deep with lock. The walls shall be of steel with a 3/32 in. (2 mm) minimum thickness with concealed hinges and enclosed lock constructed in such a manner as to prevent entry by force. The cabinet assembly shall be permanently attached to a structural element of the field office in a manner to prevent theft of the entire cabinet.
- (f) One refrigerator with a minimum size of 14 cu ft (0.40 cu m) with a freezer unit.
- (g) One electric desk type tape printing calculator.
- (h) A minimum of two communication paths. The configuration shall include:
  - (1) Internet Connection. An internet service connection with a wireless router capable of providing service to a minimum of five devices. The internet service shall be for unlimited data with a minimum internet data download speed of 25 megabits per second. For areas where this minimum download speed is not available, the maximum speed available for the area shall be provided.

- (2) Telephone Line. One landline touch tone telephone with voicemail or answering machine. The telephone shall have an unpublished number.
- (i) One plain paper wireless color printer capable of reproducing prints up to 11 x 17 in. (280 x 432 mm) with an automatic feed tray. Separate paper trays for letter size and 11 x 17 in. (280 x 432 mm) paper shall be provided. The wireless printer shall also be equipped to copy in color and scan documents.
- (j) One electric water cooler dispenser.
- (k) One first-aid cabinet fully equipped.
- (l) One microwave oven (minimum 700 watt) with a turntable and 1 cu ft (0.03 cu m) minimum capacity.
- (m) One fire-proof safe, 0.5 cu ft (0.01 cu m) minimum capacity.
- (n) One electric paper shredder.
- (o) One post mounted rain gauge, located on the project site for each 5 miles (8 km) of project length.”

Revise the last sentence of the first paragraph of Articles 670.04 and 670.05 of the Standard Specifications to read:

“Doors and windows shall be equipped with locks.”

Revise Article 670.04(c) through 670.04(n) of the Standard Specifications to read:

- “(c) Two folding chairs.
- (d) One equipment cabinet of minimum inside dimension of 44 in. (1100 mm) high x 24 in. (600 mm) wide x 30 in. (750 mm) deep with lock. The walls shall be of steel with a 3/32 in. (2 mm) minimum thickness with concealed hinges and enclosed lock constructed to prevent entry by force. The cabinet assembly shall be permanently attached to a structural element of the field office to prevent theft of the entire cabinet.
- (e) A minimum of two communication paths. The configuration shall include:
  - (1) Internet Connection. An internet service connection with a wireless router capable of providing service to a minimum of five devices. The internet service shall be for unlimited data with a minimum internet download speed of 25 megabits per second. For areas where this minimum download speed is not available, the maximum speed available for the area shall be provided.

(2) Telephone Line. One land line touch tone telephone with voicemail or answering machine. The telephone shall have an unpublished number.

(f) One electric desk type tape printing calculator.

(g) One first-aid cabinet fully equipped.

(h) One plain paper wireless color printer capable of reproducing prints up to 11 x 17 in. (280 x 432 mm) with an automatic feed tray. Separate paper trays for letter size and 11 x 17 in. (280 x 432 mm) paper shall be provided. The wireless printer shall also be equipped to copy in color and scan documents.

(i) A portable toilet meeting Federal, State, and local health department requirements shall be provided, maintained clean and in good working condition, and shall be stocked with lavatory and sanitary supplies at all times. The portable toilet shall be serviced once per week.

(j) One electric water cooler dispenser.

(k) One refrigerator with a minimum size of 14 cu ft (0.45 cu m) with a freezer unit.

(l) One microwave oven (minimum 700 watt) with a turntable and 1 cu ft (0.03 cu m) minimum capacity.”

Revise Article 670.05(f) of the Standard Specifications to read:

“(f) One landline touch tone telephone with voicemail or an answering machine. The telephone shall have an unpublished number.”

Delete the last sentence of the second paragraph of Article 670.06 of the Standard Specifications.

Revise the fifth sentence of the first paragraph of Article 670.07 of the Supplemental Specifications to read:

“This price shall include all utility costs and shall reflect the salvage value of the building or buildings, equipment, and furniture which remain the property of the Contractor after release by the Engineer, except the Department will pay that portion of the monthly long distance and monthly local telephone, when combined, exceed \$250.”

80423

## **EQUIPMENT PARKING AND STORAGE (BDE)**

Effective: November 1, 2017

Replace the first paragraph of Article 701.11 of the Standard Specifications with the following.

**“701.11 Equipment Parking and Storage.** During working hours, all vehicles and/or nonoperating equipment which are parked, two hours or less, shall be parked at least 8 ft (2.5 m) from the open traffic lane. For other periods of time during working and for all nonworking hours, all vehicles, materials, and equipment shall be parked or stored as follows.

- (a) When the project has adequate right-of-way, vehicles, materials, and equipment shall be located a minimum of 30 ft (9 m) from the pavement.
- (b) When adequate right-of-way does not exist, vehicles, materials, and equipment shall be located a minimum of 15 ft (4.5 m) from the edge of any pavement open to traffic.
- (c) Behind temporary concrete barrier, vehicles, materials, and equipment shall be located a minimum of 24 in. (600 mm) behind free standing barrier or a minimum of 6 in. (150 mm) behind barrier that is either pinned or restrained according to Article 704.04. The 24 in. or 6 in. measurement shall be from the base of the non-traffic side of the barrier.
- (d) Behind other man-made or natural barriers meeting the approval of the Engineer.”

80388



**MANHOLES, VALVE VAULTS, AND FLAT SLAB TOPS (BDE)**

Effective: January 1, 2018

Revised: March 1, 2019

Description. In addition to those manufactured according to the current standards included in this contract, manholes, valve vaults, and flat slab tops manufactured prior to March 1, 2019, according to the previous Highway Standards listed below will be accepted on this contract:

Product	Previous Standards		
Precast Manhole Type A, 4' (1.22 m) Diameter	602401-05	602401-04	602401-03
Precast Manhole Type A, 5' (1.52 m) Diameter	602402-01	602402	602401-03
Precast Manhole Type A, 6' (1.83 m) Diameter	602406-09	602406-08	602406-07
Precast Manhole Type A, 7' (2.13 m) Diameter	602411-07	602411-06	602411-05
Precast Manhole Type A, 8' (2.44 m) Diameter	602416-07	602416-06	602416-05
Precast Manhole Type A, 9' (2.74 m) Diameter	602421-07	602421-06	602421-05
Precast Manhole Type A, 10' (3.05 m) Diameter	602426-01	602426	
Precast Valve Vault Type A, 4' (1.22 m) Diameter	602501-04	602501-03	602501-02
Precast Valve Vault Type A, 5' (1.52 m) Diameter	602506-01	602506	602501-02
Precast Reinforced Concrete Flat Slab Top	602601-05	602601-04	

The following revisions to the Standard Specifications shall apply to manholes, valve vaults, and flat slab tops manufactured according to the current standards included in this contract:

Revise Article 602.02(g) of the Standard Specifications to read:

“(g) Structural Steel (Note 4) ..... 1006.04

Note 4. All components of the manhole joint splice shall be galvanized according to the requirements of AASHTO M 111 or M 232 as applicable.”

Add the following to Article 602.02 of the Standard Specifications:

“(s) Anchor Bolts and Rods (Note 5) ..... 1006.09

Note 5. The threaded rods for the manhole joint splice shall be according to the requirements of ASTM F 1554, Grade 55, (Grade 380).”

Revise the second paragraph of Article 1042.10 of the Standard Specifications to read:

“Catch basin Types A, B, C, and D; Manhole Type A; Inlet Types A and B; Drainage Structures Types 1, 2, 3, 4, 5, and 6; Valve Vault Type A; and reinforced concrete flat slab top (Highway Standard 602601) shall be manufactured according to AASHTO M 199 (M 199M), except the minimum wall thickness shall be as shown on the plans. Additionally, catch basins, inlets, and drainage structures shall have a minimum concrete compressive strength of 4500 psi

(31,000 kPa) at 28 days and manholes, valve vaults, and reinforced concrete flat slab tops shall have a minimum concrete compressive strength of 5000 psi (34,500 kPa) at 28 days.”

80393

**PAVEMENT MARKING REMOVAL (BDE)**

Effective: July 1, 2016

Revise Article 783.02 of the Standard Specifications to read:

**“783.02 Equipment.** Equipment shall be according to the following.

Item	Article/Section
(a) Grinders (Note 1)	
(b) Water Blaster with Vacuum Recovery .....	1101.12

Note 1. Grinding equipment shall be approved by the Engineer.”

Revise the first paragraph of Article 783.03 of the Standard Specifications to read:

**“783.03 Removal of Conflicting Markings.** Existing pavement markings that conflict with revised traffic patterns shall be removed. If darkness or inclement weather prohibits the removal operations, such operations shall be resumed the next morning or when weather permits. In the event of removal equipment failure, such equipment shall be repaired, replaced, or leased so removal operations can be resumed within 24 hours.”

Revise the first and second sentences of the first paragraph of Article 783.03(a) of the Standard Specifications to read:

“The existing pavement markings shall be removed by the method specified and in a manner that does not materially damage the surface or texture of the pavement or surfacing. Small particles of tightly adhering existing markings may remain in place, if in the opinion of the Engineer, complete removal of the small particles will result in pavement surface damage.”

Revise the first paragraph of Article 783.04 of the Standard Specifications to read:

**“783.04 Cleaning.** The roadway surface shall be cleaned of debris or any other deleterious material by the use of compressed air or water blast.”

Revise the first paragraph of Article 783.06 of the Standard Specifications to read:

**“783.06 Basis of Payment.** This work will be paid for at the contract unit price per each for RAISED REFLECTIVE PAVEMENT MARKER REMOVAL, or at the contract unit price per square foot (square meter) for PAVEMENT MARKING REMOVAL – GRINDING and/or PAVEMENT MARKING REMOVAL – WATER BLASTING.”

Delete Article 1101.13 from the Standard Specifications.

80371

## PORTLAND CEMENT CONCRETE (BDE)

Effective: November 1, 2017

Revise the Air Content % of Class PP Concrete in Table 1 Classes of Concrete and Mix Design Criteria in Article 1020.04 of the Standard Specifications to read:

"TABLE 1. CLASSES OF CONCRETE AND MIX DESIGN CRITERIA		
Class of Conc.	Use	Air Content %
PP	Pavement Patching Bridge Deck Patching (10)	
	PP-1	4.0 - 8.0"
	PP-2	
	PP-3	
	PP-4	
	PP-5	

Revise Note (4) at the end of Table 1 Classes of Concrete and Mix Design Criteria in Article 1020.04 of the Standard Specifications to read:

"(4) For all classes of concrete, the maximum slump may be increased to 7 in (175 mm) when a high range water-reducing admixture is used. For Class SC, the maximum slump may be increased to 8 in. (200 mm). For Class PS, the maximum slump may be increased to 8 1/2 in. (215 mm) if the high range water-reducing admixture is the polycarboxylate type."

80389

## **PROGRESS PAYMENTS (BDE)**

Effective: November 2, 2013

Revise Article 109.07(a) of the Standard Specifications to read:

“(a) Progress Payments. At least once each month, the Engineer will make a written estimate of the quantity of work performed in accordance with the contract, and the value thereof at the contract unit prices. The amount of the estimate approved as due for payment will be vouchered by the Department and presented to the State Comptroller for payment. No amount less than \$1000.00 will be approved for payment other than the final payment.

Progress payments may be reduced by liens filed pursuant to Section 23(c) of the Mechanics' Lien Act, 770 ILCS 60/23(c).

If a Contractor or subcontractor has defaulted on a loan issued under the Department's Disadvantaged Business Revolving Loan Program (20 ILCS 2705/2705-610), progress payments may be reduced pursuant to the terms of that loan agreement. In such cases, the amount of the estimate related to the work performed by the Contractor or subcontractor, in default of the loan agreement, will be offset, in whole or in part, and vouchered by the Department to the Working Capital Revolving Fund or designated escrow account. Payment for the work shall be considered as issued and received by the Contractor or subcontractor on the date of the offset voucher. Further, the amount of the offset voucher shall be a credit against the Department's obligation to pay the Contractor, the Contractor's obligation to pay the subcontractor, and the Contractor's or subcontractor's total loan indebtedness to the Department. The offset shall continue until such time as the entire loan indebtedness is satisfied. The Department will notify the Contractor and Fund Control Agent in a timely manner of such offset. The Contractor or subcontractor shall not be entitled to additional payment in consideration of the offset.

The failure to perform any requirement, obligation, or term of the contract by the Contractor shall be reason for withholding any progress payments until the Department determines that compliance has been achieved.”

80328

## REMOVAL AND DISPOSAL OF REGULATED SUBSTANCES (BDE)

Effective: January 1, 2019

Revised: January 1, 2020

Revise Section 669 of the Standard Specifications to read:

### **“SECTION 669. REMOVAL AND DISPOSAL OF REGULATED SUBSTANCES**

**669.01 Description.** This work shall consist of the transportation and proper disposal of regulated substances. This work shall also consist of the removal, transportation, and proper disposal of underground storage tanks (UST), their contents and associated underground piping to the point where the piping is above the ground, including determining the content types and estimated quantities.

**669.02 Equipment.** The Contractor shall notify the Engineer of the delivery of all excavation, storage, and transportation equipment to a work area location. The equipment shall comply with OSHA and American Petroleum Institute (API) guidelines and shall be furnished in a clean condition. Clean condition means the equipment does not contain any residual material classified as a non-special waste, non-hazardous special waste, or hazardous waste. Residual materials include, but are not limited to, petroleum products, chemical products, sludges, or any other material present in or on equipment.

Before beginning any associated soil or groundwater management activity, the Contractor shall provide the Engineer with the opportunity to visually inspect and approve the equipment. If the equipment contains any contaminated residual material, decontamination shall be performed on the equipment as appropriate to the regulated substance and degree of contamination present according to OSHA and API guidelines. All cleaning fluids used shall be treated as the contaminant unless laboratory testing proves otherwise.

**669.03 Pre-Construction Submittals and Qualifications.** Prior to beginning this work, or working in areas with regulated substances, the Contractor shall submit a “Regulated Substances Pre-Construction Plan (RSPCP)” to the Engineer for review and approval using form BDE 2730. The form shall be signed by an Illinois licensed Professional Engineer or Professional Geologist.

As part of the RSPCP, the Contractor(s) or firm(s) performing the work shall meet the following qualifications.

- (a) Regulated Substances Monitoring. Qualification for environmental observation and field screening of regulated substances work and environmental observation of UST removal shall require either pre-qualification in Hazardous Waste by the Department or demonstration of acceptable project experience in remediation and operations for contaminated sites in accordance with applicable Federal, State, or local regulatory requirements using BDE 2730.

Qualification for each individual performing regulated substances monitoring shall require a minimum of one-year of experience in similar activities as those required for the project.

- (b) Underground Storage Tank Removal. Qualification for underground storage tank (UST) removal work shall require licensing and certification with the Office of the State Fire Marshall (OSFM) and possession of all permits required to perform the work. A copy of the permit shall be provided to the Engineer prior to tank removal.

The qualified Contractor(s) or firm(s) shall also document it does not have any current or former ties with any of the properties contained within, adjoining, or potentially affecting the work.

The Engineer will require up to 21 calendar days for review of the RSPCP. The review may involve rejection or revision and resubmittal; in which case, an additional 21 days will be required for each subsequent review. Work shall not commence until the RSPCP has been approved by the Engineer. After approval, the RSPCP shall be revised as necessary to reflect changed conditions in the field and documented using BDE 2730A "Regulated Substances Pre-Construction Plan (RSPCP) Addendum" and submitted to the Engineer for approval.

## **CONSTRUCTION REQUIREMENTS**

**669.04 Regulated Substances Monitoring.** Regulated substances monitoring includes environmental observation and field screening during regulated substances management activities at the contract specific work areas. 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)".

- (a) Environmental Observation. Prior to beginning excavation, the Contractor shall mark the limits of the contract specific work areas. Once work begins, the monitoring personnel shall be present on-site continuously during the excavation and loading of material.
- (b) Field Screening. Field screening shall be performed during the excavation and loading of material from the contract specific work areas, except for material classified according to Article 669.05(b)(1) or 669.05(c) where field screening is not required.

Field screening shall be performed with either a photoionization detector (PID) (minimum 10.6eV lamp) or a flame ionization detector (FID), and other equipment as appropriate, to monitor for potential contaminants associated with regulated substances. The PID or FID shall be calibrated on-site, and background level readings taken and recorded daily, and as field and weather conditions change. Field screen readings on the PID or FID in excess of background levels indicates the potential presence of regulated substances requiring handling as a non-special waste, special waste, or hazardous waste. PID or FID readings may be used as the basis of increasing the limits of removal with the approval of the Engineer but shall in no case be used to decrease the limits.

**669.05 Regulated Substances Management and Disposal.** The management and disposal of soil and/or groundwater containing regulated substances shall be according to the following:

- (a) **Soil Analytical Results Exceed Most Stringent MAC.** When the soil analytical results indicate detected levels exceed the most stringent maximum allowable concentration (MAC) for chemical constituents in soil established pursuant to Subpart F of 35 Ill. Adm. Code 1100.605, the soil shall be managed as follows:
  - (1) When analytical results indicate inorganic chemical constituents exceed the most stringent MAC, but still considered within area background levels by the Engineer, the excavated soil can be utilized within the right-of-way as embankment or fill, when suitable. If the soils cannot be utilized within the right-of-way, they shall be managed and disposed of at a landfill as a non-special waste.
  - (2) When analytical results indicate inorganic chemical constituents exceed the most stringent MAC but do not exceed the MAC for a Metropolitan Statistical Area (MSA) County identified in 35 Ill. Admin. Code 742 Appendix A. Table G, the excavated soil can be utilized within the right-of-way as embankment or fill, when suitable, or managed and disposed of at a clean construction and demolition debris (CCDD) facility or an uncontaminated soil fill operation (USFO) within an MSA County provided the pH of the soil is within the range of 6.25 - 9.0, inclusive.
  - (3) When analytical results indicate chemical constituents exceed the most stringent MAC but do not exceed the MAC for an MSA County excluding Chicago, or the MAC within the Chicago corporate limits, the excavated soil can be utilized within the right-of-way as embankment or fill, when suitable, or managed and disposed of off-site at a CCDD facility or an USFO within an MSA County excluding Chicago or within the Chicago corporate limits provided the pH of the soil is within the range of 6.25 - 9.0, inclusive.
  - (4) When analytical results indicate chemical constituents exceed the most stringent MAC but do not exceed the MAC for an MSA County excluding Chicago, the excavated soil can be utilized within the right-of-way as embankment or fill, when suitable, or managed and disposed of off-site at a CCDD facility or an USFO within an MSA County excluding Chicago provided the pH of the soil is within the range of 6.25 - 9.0, inclusive.
  - (5) When the Engineer determines soil cannot be managed according to Articles 669.05(a)(1) through (a)(4) above and the materials do not contain special waste or hazardous waste, as determined by the Engineer, the soil shall be managed and disposed of at a landfill as a non-special waste.
  - (6) When analytical results indicate soil is hazardous by characteristic or listing pursuant to 35 Ill. Admin. Code 721, contains radiological constituents, or the Engineer otherwise determines the soil cannot be managed according to Articles 669.05(a)(1)



through (a)(5) above, the soil shall be managed and disposed of off-site as a special waste or hazardous waste as applicable.

(b) Soil Analytical Results Do Not Exceed Most Stringent MAC. When the soil analytical results indicate that detected levels do not exceed the most stringent MAC, the excavated soil can be utilized within the right-of-way as embankment or fill, when suitable, or managed and disposed of off-site according to Article 202.03. However, the excavated soil cannot be taken to a CCDD facility or an USFO for any of the following reasons.

(1) The pH of the soil is less than 6.25 or greater than 9.0.

(2) The soil exhibited PID or FID readings in excess of background levels.

(c) Soil Analytical Results Exceed Most Stringent MAC but Do Not Exceed Tiered Approach to Corrective Action Objectives (TACO) Residential. When the soil analytical results indicate that detected levels exceed the most stringent MAC but do not exceed TACO Tier 1 Soil Remediation Objectives for Residential Properties pursuant to 35 Ill. Admin. Code 742 Appendix B Table A, the excavated soil can be utilized within the right-of-way as embankment or fill, when suitable, or managed and disposed of off-site according to Article 202.03. However, the excavated soil cannot be taken to a CCDD facility or an USFO.

(d) Groundwater. When groundwater analytical results indicate the detected levels are above Appendix B, Table E of 35 Ill. Admin. Code 742, the most stringent Tier 1 Groundwater Remediation Objectives for Groundwater Component of the Groundwater Ingestion Route for Class 1 groundwater, the groundwater shall be managed off-site as a special waste or hazardous waste as applicable. Special waste groundwater shall be containerized and trucked to an off-site treatment facility, or may be discharged to a sanitary sewer or combined sewer when permitted by the local sewer authority. Groundwater discharged to a sanitary sewer or combined sewer shall be pre-treated to remove particulates and measured with a calibrated flow meter to comply with applicable discharge limits. A copy of the permit shall be provided to the Engineer prior to discharging groundwater to the sanitary sewer or combined sewer.

Groundwater encountered within trenches may be managed within the trench and allowed to infiltrate back into the ground. If the groundwater cannot be managed within the trench, it may be discharged to a sanitary sewer or combined sewer when permitted by the local sewer authority, or it shall be containerized and trucked to an off-site treatment facility as a special waste or hazardous waste. The Contractor is prohibited from discharging groundwater within the trench through a storm sewer. The Contractor shall install backfill plugs within the area of groundwater contamination.

One backfill plug shall be placed down gradient to the area of groundwater contamination. Backfill plugs shall be installed at intervals not to exceed 50 ft (15 m). Backfill plugs are to be 4 ft (1.2 m) long, measured parallel to the trench, full trench width and depth. Backfill plugs shall not have any fine aggregate bedding or backfill, but shall be entirely cohesive

soil or any class of concrete. The Contractor shall provide test data that the material has a permeability of less than  $10^{-7}$  cm/sec according to ASTM D 5084, Method A or per another test method approved by the Engineer.

The Contractor shall use due care when transferring contaminated material from the area of origin to the transporter. Should releases of contaminated material to the environment occur (i.e., spillage onto the ground, etc.), the Contractor shall clean-up spilled material and place in the appropriate storage containers as previously specified. Clean-up shall include, but not be limited to, sampling beneath the material staging area to determine complete removal of the spilled material.

The Contractor shall provide engineered barriers, when required, and shall include materials sufficient to completely line excavation surfaces, including sloped surfaces, bottoms, and sidewall faces, within the areas designated for protection.

The Contractor shall obtain all documentation including any permits and/or licenses required to transport the material containing regulated substances to the disposal facility. The Contractor shall coordinate with the Engineer on the completion of all documentation. The Contractor shall make all arrangements for collection and analysis of landfill acceptance testing. The Contractor shall coordinate waste disposal approvals with the disposal facility.

The Contractor shall provide the Engineer with all transport-related documentation within two days of transport or receipt of said document(s). For management of special or hazardous waste, the Contractor shall provide the Engineer with documentation that the Contractor is operating with a valid Illinois special waste transporter permit at least two weeks before transporting the first load of contaminated material.

Transportation and disposal of material classified according to Article 669.05(a)(5) or 669.05(a)(6) shall be completed each day so that none of the material remains on-site by the close of business, except when temporary staging has been approved.

Any waste generated as a special or hazardous waste from a non-fixed facility shall be manifested off-site using the Department's county generator number provided by the Bureau of Design and Environment. An authorized representative of the Department shall sign all manifests for the disposal of the contaminated material and confirm the Contractor's transported volume. Any waste generated as a non-special waste may be managed off-site without a manifest, a special waste transporter, or a generator number.

The Contractor shall select a landfill permitted for disposal of the contaminant within the State of Illinois. The Department will review and approve or reject the facility proposed by the Contractor to use as a landfill. The Contractor shall verify whether the selected disposal facility is compliant with those applicable standards as mandated by their permit and whether the disposal facility is presently, has previously been, or has never been, on the United States Environmental Protection Agency (U.S. EPA) National Priorities List or the Resource Conservation and Recovery Act (RCRA) List of Violating Facilities. The use of a Contractor selected landfill shall in no manner delay the construction schedule or alter the Contractor's responsibilities as set forth.

**669.06 Non-Special Waste Certification.** An authorized representative of the Department shall sign and date all non-special waste certifications. The Contractor shall be responsible for providing the Engineer with the required information that will allow the Engineer to certify the waste is not a special waste.

(a) Definition. A waste is considered a non-special waste as long as it is not:

- (1) a potentially infectious medical waste;
- (2) a hazardous waste as defined in 35 Ill. Admin. Code 721;
- (3) an industrial process waste or pollution control waste that contains liquids, as determined using the paint filter test set forth in subdivision (3)(A) of subsection (m) of 35 Ill. Admin. Code 811.107;
- (4) a regulated asbestos-containing waste material, as defined under the National Emission Standards for Hazardous Air Pollutants in 40 CFR Part 61.141;
- (5) a material containing polychlorinated biphenyls (PCB's) regulated pursuant to 40 CFR Part 761;
- (6) a material subject to the waste analysis and recordkeeping requirements of 35 Ill. Admin. Code 728.107 under land disposal restrictions of 35 Ill. Admin. Code 728;
- (7) a waste material generated by processing recyclable metals by shredding and required to be managed as a special waste under Section 22.29 of the Environmental Protection Act; or
- (8) an empty portable device or container in which a special or hazardous waste has been stored, transported, treated, disposed of, or otherwise handled.

(b) Certification Information. All information used to determine the waste is not a special waste shall be attached to the certification. The information shall include but not be limited to:

- (1) the means by which the generator has determined the waste is not a hazardous waste;
- (2) the means by which the generator has determined the waste is not a liquid;
- (3) if the waste undergoes testing, the analytic results obtained from testing, signed and dated by the person responsible for completing the analysis;
- (4) if the waste does not undergo testing, an explanation as to why no testing is needed;

(5) a description of the process generating the waste; and

(6) relevant material safety data sheets.

**669.07 Temporary Staging.** Soil classified according to Articles 669.05(a)(2), (b)(1), or (c) may be temporarily staged at the Contractor's option. 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.

Temporary staging shall be accomplished within the right-of-way and the Contractor's means and methods shall be described in the approved or amended RSPCP. Staging areas shall not be located within 200 feet (61 m) of a public or private water supply well; nor within 100 feet (30 m) of sensitive environmental receptor areas, including wetlands, rivers, streams, lakes, or designated habitat zones.

The method of staging shall consist of containerization or stockpiling as applicable for the type, classification, and physical state (i.e., liquid, solid, semisolid) of the material. Materials of different classifications shall be staged separately with no mixing or co-mingling.

When containers are used, the containers and their contents shall remain intact and inaccessible to unauthorized persons until the manner of disposal is determined. The Contractor shall be responsible for all activities associated with the storage containers including, but not limited to, the procurement, transport, and labeling of the containers. The Contractor shall not use a storage container if visual inspection of the container reveals the presence of free liquids or other substances that could cause the waste to be reclassified as a hazardous or special waste.

When stockpiles are used, they shall be covered with a minimum 20-mil plastic sheeting or tarps secured using weights or tie-downs. Perimeter berms or diversionary trenches shall be provided to contain and collect for disposal any water that drains from the soil. Stockpiles shall be managed to prevent or reduce potential dust generation.

When staging non-special waste, special waste, or hazardous waste, the following additional requirements shall apply:

- (a) **Non-Special Waste.** When stockpiling soil classified according to Article 669.05(a)(1) or 669.05(a)(5), an impermeable surface barrier between the materials and the ground surface shall be installed. The impermeable barrier shall consist of a minimum 20-mil plastic liner material and the surface of the stockpile area shall be clean and free of debris prior to placement of the liner. Measures shall also be taken to limit or discourage access to the staging area.
- (b) **Special Waste and Hazardous Waste.** Soil classified according to Article 669.05(a)(6) shall not be stockpiled but shall be containerized immediately upon generation in containers, tanks or containment buildings as defined by RCRA, Toxic Substances Control

Act (TSCA), and other applicable State or local regulations and requirements, including 35 Ill. Admin. Code Part 722, Standards Applicable to Generators of Hazardous Waste.

The staging area(s) shall be enclosed (by a fence or other structure) to restrict direct access to the area, and all required regulatory identification signs applicable to a staging area containing special waste or hazardous waste shall be deployed.

Storage containers shall be placed on an all-weather gravel-packed, asphalt, or concrete surface. Containers shall be in good condition and free of leaks, large dents, or severe rusting, which may compromise containment integrity. Containers must be constructed of, or lined with, materials that will not react or be otherwise incompatible with the hazardous or special waste contents. Containers used to store liquids shall not be filled more than 80 percent of the rated capacity. Incompatible wastes shall not be placed in the same container or comingled.

All containers shall be legibly labeled and marked using pre-printed labels and permanent marker in accordance with applicable regulations, clearly showing the date of waste generation, location and/or area of waste generation, and type of waste. The Contractor shall place these identifying markings on an exterior side surface of the container.

Storage containers shall be kept closed, and storage pads covered, except when access is needed by authorized personnel.

Special waste and hazardous waste shall be transported and disposed within 90 days from the date of generation.

**669.08 Underground Storage Tank Removal.** For the purposes of this section, an underground storage tank (UST) includes the underground storage tank, piping, electrical controls, pump island, vent pipes and appurtenances.

Prior to removing an UST, the Engineer shall determine whether the Department is considered an "owner" or "operator" of the UST as defined by the UST regulations (41 Ill. Adm. Code Part 176). Ownership of the UST refers to the Department's owning title to the UST during storage, use or dispensing of regulated substances. The Department may be considered an "operator" of the UST if it has control of, or has responsibility for, the daily operation of the UST. The Department may however voluntarily undertake actions to remove an UST from the ground without being deemed an "operator" of the UST.

In the event the Department is deemed not to be the "owner" or "operator" of the UST, the OSFM removal permit shall reflect who was the past "owner" or "operator" of the UST. If the "owner" or "operator" cannot be determined from past UST registration documents from OSFM, then the OSFM removal permit will state the "owner" or "operator" of the UST is the Department. The Department's Office of Chief Counsel (OCC) will review all UST removal permits prior to submitting any removal permit to the OSFM. If the Department is not the "owner" or "operator" of the UST then it will not register the UST or pay any registration fee.

The Contractor shall be responsible for obtaining permits required for removing the UST, notification to the OSFM, using an OSFM certified tank contractor, removal and disposal of the UST and its contents, and preparation and submittal of the OSFM Site Assessment Report in accordance with 41 Ill. Admin. Code Part 176.330.

The Contractor shall contact the Engineer and the OSFM's office at least 72 hours prior to removal to confirm the OSFM inspector's presence during the UST removal. Removal, transport, and disposal of the UST shall be according to the applicable portions of the latest revision of the "American Petroleum Institute (API) Recommended Practice 1604".

The Contractor shall collect and analyze tank content (sludge) for disposal purposes. The Contractor shall remove as much of the regulated substance from the UST system as necessary to prevent further release into the environment. All contents within the tank shall be removed, transported and disposed of, or recycled. The tank shall be removed and rendered empty according to IEPA definition.

The Contractor shall collect soil samples from the bottom and sidewalls of the excavated area in accordance with 35 Ill. Admin. Code Part 734.210(h) after the required backfill has been removed during the initial response action, to determine the level of contamination remaining in the ground, regardless if a release is confirmed or not by the OSFM on-site inspector.

In the event the UST is designated a leaking underground storage tank (LUST) by the OSFM's inspector, or confirmation by analytical results, the Contractor shall notify the Engineer and the District Environmental Studies Unit (DESU). Upon confirmation of a release of contaminants and notifications to the Engineer and DESU, the Contractor shall report the release to the Illinois Emergency Management Agency (IEMA) (e.g., by telephone or electronic mail) and provide them with whatever information is available ("owner" or "operator" shall be stated as the past registered "owner" or "operator", or the IDOT District in which the tank is located and the DESU Manager).

The Contractor shall perform the following initial response actions if a release is indicated by the OSFM inspector:

- (a) Take immediate action to prevent any further release of the regulated substance to the environment, which may include removing, at the Engineer's discretion, and disposing of up to 4 ft (1.2 m) of the contaminated material, as measured from the outside dimension of the tank;
- (b) Identify and mitigate fire, explosion and vapor hazards;
- (c) Visually inspect any above ground releases or exposed below ground releases and prevent further migration of the released substance into surrounding soils and groundwater; and
- (d) Continue to monitor and mitigate any additional fire and safety hazards posed by vapors and free product that have migrated from the tank excavation zone and entered into subsurface structures (such as sewers or basements).

The tank excavation shall be backfilled according to applicable portions of Sections 205, 208, and 550 with a material that will compact and develop stability. All uncontaminated concrete and soil removed during tank extraction may be used to backfill the excavation, at the discretion of the Engineer.

After backfilling the excavation, the site shall be graded and cleaned.

**669.09 Regulated Substances Final Construction Report.** Not later than 90 days after completing this work, the Contractor shall submit a “Regulated Substances Final Construction Report (RSFCR)” to the Engineer using form BDE 2733 and required attachments. The form shall be signed by an Illinois licensed Professional Engineer or Professional Geologist.

**669.10 Method of Measurement.** Non-special waste, special waste, and hazardous waste soil will be measured for payment according to Article 202.07(b) when performing earth excavation, Article 502.12(b) when excavating for structures, or by computing the volume of the trench using the maximum trench width permitted and the actual depth of the trench.

Groundwater containerized and transported off-site for management, storage, and disposal will be measured for payment in gallons (liters).

Backfill plugs will be measured in cubic yards (cubic meters) in place, except the quantity for which payment will be made shall not exceed the volume of the trench, as computed by using the maximum width of trench permitted by the Specifications and the actual depth of the trench, with a deduction for the volume of the pipe.

Engineered Barriers will be measured for payment in square yards (square meters).

**669.11 Basis of Payment.** The work of preparing, submitting and administering a Regulated Substances Pre-Construction Plan will be paid for at the contract lump sum price for REGULATED SUBSTANCES PRE-CONSTRUCTION PLAN.

Regulated substances monitoring, including completion of form BDE 2732 for each day of work, will be paid for at the contract unit price per calendar day, or fraction thereof to the nearest 0.5 calendar day, for REGULATED SUBSTANCES MONITORING.

The installation of engineered barriers will be paid for at the contract unit price per square yard (square meter) for ENGINEERED BARRIER.

The work of UST removal, soil excavation, soil and content sampling, the management of excavated soil and UST content, and UST disposal, will be paid for at the contract unit price per each for UNDERGROUND STORAGE TANK REMOVAL.

The transportation and disposal of soil and other materials from an excavation determined to be contaminated will be paid for at the contract unit price per cubic yard (cubic meter) for

**NON-SPECIAL WASTE DISPOSAL, SPECIAL WASTE DISPOSAL, or HAZARDOUS WASTE DISPOSAL.**

The transportation and disposal of groundwater from an excavation determined to be contaminated will be paid for at the contract unit price per gallon (liter) for SPECIAL WASTE GROUNDWATER DISPOSAL or HAZARDOUS WASTE GROUNDWATER DISPOSAL. When groundwater is discharged to a sanitary or combined sewer by permit, the cost will be paid for according to Article 109.05.

Backfill plugs will be paid for at the contract unit price per cubic yard (cubic meter) for BACKFILL PLUGS.

Payment for temporary staging of soil classified according to Articles 669.05(a)(1), (a)(3), (a)(4), (a)(5), (a)(6), or (b)(2) will be paid for according to Article 109.04. The Department will not be responsible for any additional costs incurred, if mismanagement of the staging area, storage containers, or their contents by the Contractor results in excess cost expenditure for disposal or other material management requirements.

Payment for accumulated stormwater removal and disposal will be according to Article 109.04. Payment will only be allowed if appropriate stormwater and erosion control methods were used.

Payment for decontamination, labor, material, and equipment for monitoring areas beyond the specified areas, with the Engineer's prior written approval, will be according to Article 109.04.

When the waste material for disposal requires sampling for landfill disposal acceptance, the samples shall be analyzed for TCLP VOCs, SVOCs, RCRA metals, pH, ignitability, and paint filter test. The analysis will be paid for at the contract unit price per each for SOIL DISPOSAL ANALYSIS using EPA Methods 1311 (extraction), 8260B for VOCs, 8270C for SVOCs, 6010B and 7470A for RCRA metals, 9045C for pH, 1030 for ignitability, and 9095A for paint filter.

The work of preparing, submitting and administering a Regulated Substances Final Construction Report will be paid for at the contract lump sum price REGULATED SUBSTANCES FINAL CONSTRUCTION REPORT."

80407



## **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.”

80397

## **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%”

80391

**TEMPORARY PAVEMENT MARKING (BDE)**

Effective: April 1, 2012

Revised: April 1, 2017

Revise Article 703.02 of the Standard Specifications to read:

**“703.02 Materials.** Materials shall be according to the following.

- (a) Pavement Marking Tape, Type I and Type III ..... 1095.06
- (b) Paint Pavement Markings ..... 1095.02
- (c) Pavement Marking Tape, Type IV ..... 1095.11”

Revise the second paragraph of Article 703.05 of the Standard Specifications to read:

“Type I marking tape or paint shall be used at the option of the Contractor, except paint shall not be applied to the final wearing surface unless authorized by the Engineer for late season applications where tape adhesion would be a problem. Type III or Type IV marking tape shall be used on the final wearing surface when the temporary pavement marking will conflict with the permanent pavement marking such as on tapers, crossovers and lane shifts.”

Revise Article 703.07 of the Standard Specifications to read:

**“703.07 Basis of Payment.** This work will be paid for as follows.

- a) Short Term Pavement Marking. Short term pavement marking will be paid for at the contract unit price per foot (meter) for SHORT TERM PAVEMENT MARKING. Removal of short term pavement markings will be paid for at the contract unit price per square foot (square meter) for SHORT TERM PAVEMENT MARKING REMOVAL.
- b) Temporary Pavement Marking. Where the Contractor has the option of material type, temporary pavement marking will be paid for at the contract unit price per foot (meter) for TEMPORARY PAVEMENT MARKING of the line width specified, and at the contract unit price per square foot (square meter) for TEMPORARY PAVEMENT MARKING LETTERS AND SYMBOLS.

Where the Department specifies the use of pavement marking tape, the Type III or Type IV temporary pavement marking will be paid for at the contract unit price per foot (meter) for PAVEMENT MARKING TAPE, TYPE III or PAVEMENT MARKING TAPE, TYPE IV of the line width specified and at the contract unit price per square feet (square meter) for PAVEMENT MARKING TAPE, TYPE III - LETTERS AND SYMBOLS or PAVEMENT MARKING TAPE, TYPE IV – LETTERS AND SYMBOLS.

Removal of temporary pavement markings will be paid for at the contract unit price per square foot (square meter) for TEMPORARY PAVEMENT MARKING REMOVAL.

When temporary pavement marking is shown on the Standard, the cost of the temporary pavement marking and its removal will be included in the cost of the Standard.”

Add the following to Section 1095 of the Standard Specifications:

**“1095.11 Pavement Marking Tape, Type IV.** The temporary, preformed, patterned markings shall consist of a white or yellow tape with wet retroreflective media incorporated to provide immediate and continuing retroreflection during both wet and dry conditions. The tape shall be manufactured without the use of heavy metals including lead chromate pigments or other similar, lead-containing chemicals.

The white and yellow Type IV marking tape shall meet the Type III requirements of Article 1095.06 and the following.

- (a) Composition. The retroreflective pliant polymer pavement markings shall consist of a mixture of high-quality polymeric materials, pigments and glass beads distributed throughout its base cross-sectional area, with a layer of wet retroreflective media bonded to a durable polyurethane topcoat surface. The patterned surface shall have approximately 40% ± 10% 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 beads or particles.
- (b) Retroreflectance. The white and yellow markings shall meet the following for initial dry and wet retroreflectance.
  - (1) Dry Retroreflectance. Dry retroreflectance shall be measured under dry conditions according to ASTM D 4061 and meet the values described in Article 1095.06 for Type III tape.
  - (2) Wet Retroreflectance. Wet retroreflectance shall be measured under wet conditions according to ASTM E 2177 and meet the values shown in the following table.

**Wet Retroreflectance, Initial R<sub>L</sub>**

Color	R <sub>L</sub> 1.05/88.76
White	300
Yellow	200

- (c) Color. The material 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 a 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 minimum
*Yellow	36-59

\*Shall match Federal 595 Color No. 33538 and the chromaticity limits as follows.

x	0.490	0.475	0.485	0.530
y	0.470	0.438	0.425	0.456

- (d) Skid Resistance. The surface of the markings shall provide an average minimum skid resistance of 50 BPN when tested according to ASTM E 303.
- (e) Sampling, Testing, Acceptance, and Certification. Prior to approval and use of the wet reflective, temporary, removable 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 certification test report shall state the lot tested, manufacturer's name, and date of manufacture.

After approval by the Department, samples and certification by the manufacturer shall be submitted for each batch 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, manufacturer's name, and date of manufacture.

All costs of testing (other than tests conducted by the Department) shall be borne by the manufacturer."

80298

## **TRAFFIC CONTROL DEVICES - CONES (BDE)**

Effective: January 1, 2019

Revise Article 701.15(a) of the Standard Specifications to read:

“(a) Cones. Cones are used to channelize traffic. Cones used to channelize traffic at night shall be reflectorized; however, cones shall not be used in nighttime lane closure tapers or nighttime lane shifts.”

Revise Article 1106.02(b) of the Standard Specifications to read:

“(b) Cones. Cones shall be predominantly orange. Cones used at night that are 28 to 36 in. (700 to 900 mm) in height shall have two white circumferential stripes. If non-reflective spaces are left between the stripes, the spaces shall be no more than 2 in. (50mm) in width. Cones used at night that are taller than 36 in. (900 mm) shall have a minimum of two white and two fluorescent orange alternating, circumferential stripes with the top stripe being fluorescent orange. If non-reflective spaces are left between the stripes, the spaces shall be no more than 3 in. (75 mm) in width.

The minimum weights for the various cone heights shall be 4 lb for 18 in. (2 kg for 450 mm), 7 lb for 28 in. (3 kg for 700 mm), and 10 lb for 36 in. (5 kg for 900 mm) with a minimum of 60 percent of the total weight in the base. Cones taller than 36 in. shall be weighted per the manufacturer’s specifications such that they are not moved by wind or passing traffic.”

80409

**TRAINING SPECIAL PROVISIONS (BDE)** 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 2 . In the event the contractor subcontracts a portion of the contract work, he 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 insure 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 employed by him 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 that he 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 has successfully completed a training course leading to journeyman status or in which he 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, Manpower Administration, Bureau of Apprenticeship and Training 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 will provide for the maintenance of records and furnish periodic reports documenting his performance under this Training Special Provision.

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.

20338

## **WARM MIX ASPHALT (BDE)**

Effective: January 1, 2012

Revised: April 1, 2016

Description. This work shall consist of designing, producing and constructing Warm Mix Asphalt (WMA) in lieu of Hot Mix Asphalt (HMA) at the Contractor's option. Work shall be according to Sections 406, 407, 408, 1030, and 1102 of the Standard Specifications, except as modified herein. In addition, any references to HMA in the Standard Specifications, or the special provisions shall be construed to include WMA.

WMA is an asphalt mixture which can be produced at temperatures lower than allowed for HMA utilizing approved WMA technologies. WMA technologies are defined as the use of additives or processes which allow a reduction in the temperatures at which HMA mixes are produced and placed. WMA is produced by the use of additives, a water foaming process, or combination of both. Additives include minerals, chemicals or organics incorporated into the asphalt binder stream in a dedicated delivery system. The process of foaming injects water into the asphalt binder stream, just prior to incorporation of the asphalt binder with the aggregate.

Approved WMA technologies may also be used in HMA provided all the requirements specified herein, with the exception of temperature, are met. However, asphalt mixtures produced at temperatures in excess of 275 °F (135 °C) will not be considered WMA when determining the grade reduction of the virgin asphalt binder grade.

### Equipment.

Revise the first paragraph of Article 1102.01 of the Standard Specifications to read:

**"1102.01 Hot-Mix Asphalt Plant.** The hot-mix asphalt (HMA) plant shall be the batch-type, continuous-type, or dryer drum plant. The plants shall be evaluated for prequalification rating and approval to produce HMA according to the current Bureau of Materials and Physical Research Policy Memorandum, "Approval of Hot-Mix Asphalt Plants and Equipment". Once approved, the Contractor shall notify the Bureau of Materials and Physical Research to obtain approval of all plant modifications. The plants shall not be used to produce mixtures concurrently for more than one project or for private work unless permission is granted in writing by the Engineer. The plant units shall be so designed, coordinated and operated that they will function properly and produce HMA having uniform temperatures and compositions within the tolerances specified. The plant units shall meet the following requirements."

Add the following to Article 1102.01(a) of the Standard Specifications.

"(11) Equipment for Warm Mix Technologies.

- a. Foaming. Metering equipment for foamed asphalt shall have an accuracy of  $\pm 2$  percent of the actual water metered. The foaming control system shall be electronically interfaced with the asphalt binder meter.

- b. Additives. Additives shall be introduced into the plant according to the supplier's recommendations and shall be approved by the Engineer. The system for introducing the WMA additive shall be interlocked with the aggregate feed or weigh system to maintain correct proportions for all rates of production and batch sizes."

#### Mix Design Verification.

Add the following to Article 1030.04 of the Standard Specifications.

"(e) Warm Mix Technologies.

- (1) Foaming. WMA mix design verification will not be required when foaming technology is used alone (without WMA additives). However, the foaming technology shall only be used on HMA designs previously approved by the Department.
- (2) Additives. WMA mix designs utilizing additives shall be submitted to the Engineer for mix design verification."

#### Construction Requirements.

Revise the second paragraph of Article 406.06(b)(1) of the Standard Specifications to read:

"The HMA shall be delivered at a temperature of 250 to 350 °F (120 to 175 °C).  
WMA shall be delivered at a minimum temperature of 215 °F (102 °C)."

#### Basis of Payment.

This work will be paid at the contract unit price bid for the HMA pay items involved. Anti-strip will not be paid for separately, but shall be considered as included in the cost of the work.

80288

## **WEEKLY DBE TRUCKING REPORTS (BDE)**

Effective: June 2, 2012

| Revised: April 2, 2015

| The Contractor shall submit a weekly report of Disadvantaged Business Enterprise (DBE) trucks hired by the Contractor or subcontractors (i.e. not owned by the Contractor or subcontractors) that are used for DBE goal credit.

| The report shall be submitted to the Engineer on Department form "SBE 723" within ten business days following the reporting period. The reporting period shall be Monday through Sunday for each week reportable trucking activities occur.

Any costs associated with providing weekly DBE trucking reports shall be considered as included in the contract unit prices bid for the various items of work involved and no additional compensation will be allowed.

80302

## REQUIRED CONTRACT PROVISIONS FEDERAL-AID CONSTRUCTION CONTRACTS

- I. General
- II. Nondiscrimination
- III. Nonsegregated 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. Compliance with Governmentwide Suspension and Debarment Requirements
- XI. Certification Regarding Use of Contract Funds for Lobbying

### 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 (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).

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.

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). 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 bid proposal or request for proposal 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).

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.

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. The term Federal-aid highway does not include roadways functionally classified as local roads or rural minor collectors.

#### II. NONDISCRIMINATION

The provisions of this section related to 23 CFR Part 230 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 60, 29 CFR 1625-1627, Title 23 USC Section 140, the Rehabilitation Act of 1973, as amended (29 USC 794), Title VI of the Civil Rights Act of 1964, as amended, 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 60, and 29 CFR 1625-1627. The contracting agency and the FHWA have the authority and the responsibility to ensure compliance with Title 23 USC Section 140, the Rehabilitation Act of 1973, as amended (29 USC 794), and Title VI of the Civil Rights Act of 1964, as amended, 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 230, 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 (28 CFR 35, 29 CFR 1630, 29 CFR 1625-1627, 41 CFR 60 and 49 CFR 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 35 and 29 CFR 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.

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, 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 who 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.

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, national origin, age or disability. The following procedures shall be followed:

a. The contractor will conduct periodic inspections of project sites to insure 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. 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, 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, 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 there under. 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, 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 and 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. Assurance Required by 49 CFR 26.13(b):**

a. The requirements of 49 CFR Part 26 and the State DOT's U.S. DOT-approved DBE program are incorporated by reference.

b. The contractor 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 contracting agency deems appropriate.

**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 \$10,000 or more.

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, 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). The requirements apply to all projects located within the right-of-way of a roadway that is functionally classified as Federal-aid highway. This excludes roadways functionally classified as local roads or rural minor collectors, which are exempt. Contracting agencies may elect to apply these requirements to other projects.

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**

a. All laborers and mechanics employed or working upon the site of the work, 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 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.

Contributions made or costs reasonably anticipated for bona fide fringe benefits under section 1(b)(2) of the Davis-Bacon Act on behalf of laborers or mechanics are considered wages paid to such laborers or mechanics, subject to the provisions of paragraph 1.d. 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 shall be paid the appropriate wage rate and fringe benefits on the wage determination for the classification of work actually performed, without regard to skill, except as provided in 29 CFR 5.5(a)(4). 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 classification and wage rates conformed under paragraph 1.b. of this section) and the Davis-Bacon poster (WH-1321) shall 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. (1) The contracting officer shall 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 shall be classified in conformance with the wage determination. The contracting officer shall approve an additional classification and wage rate and fringe benefits therefore 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 utilized 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) 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 shall be sent by the contracting officer to the Administrator of the Wage and Hour Division, Employment Standards Administration, U.S. Department of Labor, Washington, DC 20210. 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.

(3) 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 shall refer the questions, including the views of all interested parties and the recommendation of the contracting officer, to the Wage and Hour Administrator for determination. The Wage and Hour 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.

(4) The wage rate (including fringe benefits where appropriate) determined pursuant to paragraphs 1.b.(2) or 1.b.(3) of this section, shall 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.

c. 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 shall either pay the benefit as stated in the wage determination or shall pay another bona fide fringe benefit or an hourly cash equivalent thereof.

d. 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, 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.

## 2. Withholding

The contracting agency shall upon its own action or upon written request of an authorized representative of the Department of Labor, withhold or cause to be withheld from the contractor under this contract, or any other Federal contract with the same prime contractor, or any other federally-assisted contract subject to Davis-Bacon prevailing wage requirements, which is held by the same prime contractor, so much of the accrued payments or advances as may be considered necessary to pay laborers and mechanics, including apprentices, trainees, and helpers, employed by the contractor or any subcontractor the full amount of wages required by the contract. In the event of failure to pay any laborer or mechanic, including any apprentice, trainee, or helper, employed or working on the site of the work, all or part of the wages required by the contract, the contracting agency may, 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.

## 3. Payrolls and basic records

a. Payrolls and basic records relating thereto shall be maintained by the contractor during the course of the work and preserved for a period of three years thereafter for all laborers and mechanics working at the site of the work. Such records shall contain the name, address, and social security number of each such worker, his or her correct classification, 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 section 1(b)(2)(B) of the Davis-Bacon Act), daily and weekly number of hours worked, deductions made and actual wages paid. Whenever the Secretary of Labor has found under 29 CFR 5.5(a)(1)(iv) 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 section 1(b)(2)(B) of the Davis-Bacon Act, the contractor shall 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. Contractors employing apprentices or trainees under approved programs shall maintain written evidence of the registration of apprenticeship programs and certification of trainee programs, the registration of the apprentices and trainees, and the ratios and wage rates prescribed in the applicable programs.

b. (1) The contractor shall submit weekly for each week in which any contract work is performed a copy of all payrolls to the contracting agency. The payrolls submitted shall set out accurately and completely all of the information required to be maintained under 29 CFR 5.5(a)(3)(i), except that full social security numbers and home addresses shall not be included on weekly transmittals. Instead the payrolls shall only need to include an individually identifying number for each employee ( e.g. , the last four digits of the employee's social security number). The required weekly payroll information may be submitted in any form desired. Optional Form WH-347 is available for this purpose from the Wage and Hour Division Web site at <http://www.dol.gov/esa/whd/forms/wh347instr.htm> or its successor site. The prime contractor is responsible for the submission of copies of payrolls by all subcontractors. Contractors and subcontractors shall maintain the full social security number and current address of each covered worker, and shall provide them upon request to the contracting agency for transmission to the State DOT, the FHWA or the Wage and Hour Division of the Department of Labor for purposes of an investigation or audit of compliance with prevailing wage requirements. It is not a violation of this section for a prime contractor to require a subcontractor to provide addresses and social security numbers to the prime contractor for its own records, without weekly submission to the contracting agency..



(2) Each payroll submitted shall be accompanied by a "Statement of Compliance," signed by the contractor or subcontractor or his or her agent who pays or supervises the payment of the persons employed under the contract and shall certify the following:

(i) That the payroll for the payroll period contains the information required to be provided under §5.5 (a)(3)(ii) of Regulations, 29 CFR part 5, the appropriate information is being maintained under §5.5 (a)(3)(i) of Regulations, 29 CFR part 5, and that such information is correct and complete;

(ii) That each laborer or mechanic (including each helper, apprentice, and trainee) employed 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 Regulations, 29 CFR part 3;

(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 of work performed, as specified in the applicable wage determination incorporated into the contract.

(3) The weekly submission of a properly executed certification set forth on the reverse side of Optional Form WH-347 shall satisfy the requirement for submission of the "Statement of Compliance" required by paragraph 3.b.(2) of this section.

(4) The falsification of any of the above certifications may subject the contractor or subcontractor to civil or criminal prosecution under section 1001 of title 18 and section 231 of title 31 of the United States Code.

c. The contractor or subcontractor shall make the records required under paragraph 3.a. of this section available for inspection, copying, or transcription by authorized representatives of the contracting agency, the State DOT, the FHWA, or the Department of Labor, and shall permit such representatives to interview employees during working hours on the job. If the contractor or subcontractor fails to submit the required records or to make them available, the FHWA may, after written notice to the contractor, the contracting agency or the State DOT, 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 may be grounds for debarment action pursuant to 29 CFR 5.12.

#### 4. Apprentices and trainees

##### a. Apprentices (programs of the USDOL).

Apprentices will be permitted to work at less than the predetermined rate for the work they performed 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 Training, Employer and Labor Services, or with a State Apprenticeship Agency recognized by the Office, or if a person is employed in his or her first 90 days of probationary employment as an apprentice in such an apprenticeship program, who is not individually registered in the program, but who has been certified by the Office of Apprenticeship Training, Employer and Labor Services or a State Apprenticeship Agency (where appropriate) to be eligible for probationary employment as an apprentice.

The allowable ratio of apprentices to journeymen on the job site in any craft classification shall not be greater than the ratio permitted to the contractor as to the entire work force under the registered program. Any worker listed on a payroll at an apprentice wage rate, who is not registered or otherwise employed as stated above, shall 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 the registered program shall be paid not less than the applicable wage rate on the wage determination for the work actually performed. Where a contractor is performing construction on a project in a locality other than that in which its program is registered, the ratios and wage rates (expressed in percentages of the journeyman's hourly rate) specified in the contractor's or subcontractor's registered program shall be observed.

Every apprentice must be paid at not less than the rate specified in the registered program for the apprentice's level of progress, expressed as a percentage of the journeymen hourly rate specified in the applicable wage determination. Apprentices shall 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, fringes shall be paid in accordance with that determination.

In the event the Office of Apprenticeship Training, Employer and Labor Services, or a State Apprenticeship Agency recognized by the Office, withdraws approval of an apprenticeship program, the contractor will no longer be permitted to utilize apprentices at less than the applicable predetermined rate for the work performed until an acceptable program is approved.

##### b. Trainees (programs of the USDOL).

Except as provided in 29 CFR 5.16, trainees will not be permitted to work at less than the predetermined rate for the work performed unless they are employed pursuant to and individually registered in a program which has received prior approval, evidenced by formal certification by the U.S. Department of Labor, Employment and Training Administration.

The ratio of trainees to journeymen on the job site shall not be greater than permitted under the plan approved by the Employment and Training Administration.

Every trainee must be paid at not less than the rate specified in the approved program for the trainee's level of progress, expressed as a percentage of the journeyman hourly rate specified in the applicable wage determination. Trainees shall be paid fringe benefits in accordance with the provisions of the trainee program. If the trainee program does not mention fringe benefits, trainees shall be paid the full amount of fringe benefits listed on the wage determination unless the Administrator of the Wage and Hour Division determines that there is an apprenticeship program associated with the corresponding journeyman wage rate on the wage determination which provides for less than full fringe benefits for apprentices. Any employee listed on the payroll at a trainee rate who is not registered and participating in a training plan approved by the Employment and Training Administration shall be paid not less than the applicable wage rate on the wage determination for the classification of work actually performed. In addition, any trainee performing work on the job site in excess of the ratio permitted under the registered program shall be paid not less than the applicable wage rate on the wage determination for the work actually performed.

In the event the Employment and Training Administration withdraws approval of a training program, the contractor will no longer be permitted to utilize trainees at less than the applicable predetermined rate for the work performed until an acceptable program is approved.

c. Equal employment opportunity. The utilization of apprentices, trainees and journeymen under this part shall be in conformity with the equal employment opportunity requirements of Executive Order 11246, as amended, and 29 CFR part 30.

##### d. 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. 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 journeymen 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.

**6. Subcontracts.** The contractor or subcontractor shall insert Form FHWA-1273 in any subcontracts and also require the subcontractors to include Form FHWA-1273 in any lower tier subcontracts. The prime contractor shall be responsible for the compliance by any subcontractor or lower tier subcontractor with all the contract clauses in 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.

**9. Disputes concerning labor standards.** 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 he or she) 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 section 3(a) of the Davis-Bacon Act or 29 CFR 5.12(a)(1).

b. No part of this contract shall be subcontracted to any person or firm ineligible for award of a Government contract by virtue of section 3(a) of the Davis-Bacon Act or 29 CFR 5.12(a)(1).

c. The penalty for making false statements is prescribed in the U.S. Criminal Code, 18 U.S.C. 1001.

#### **V. CONTRACT WORK HOURS AND SAFETY STANDARDS ACT**

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 watchmen 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.

**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. 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 watchmen and guards, employed in violation of the clause set forth in paragraph (1.) of this section, in the sum of \$10 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.

**3. Withholding for unpaid wages and liquidated damages.** The FHWA or the contracting agency shall upon its own action or upon written request of an authorized representative of the Department of Labor withhold or cause to be withheld, from any moneys payable on account of work performed by the contractor or subcontractor under any such contract or 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, which is held by the same prime contractor, such sums as may be determined to be necessary to satisfy any liabilities of such contractor or subcontractor for unpaid wages and liquidated damages as provided in the clause set forth in paragraph (2.) of this section.

**4. Subcontracts.** The contractor or subcontractor shall insert in any subcontracts the clauses set forth in paragraph (1.) through (4.) of this section and also a clause requiring the subcontractors to include these clauses in any lower tier subcontracts. The prime contractor shall be responsible for compliance by any subcontractor or lower tier subcontractor with the clauses set forth in paragraphs (1.) through (4.) of this section.

#### **VI. SUBLETTING OR ASSIGNING THE CONTRACT**

This provision is applicable to all Federal-aid construction contracts on the National Highway System.

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" 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:

(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.

2. 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. 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.

5. The 30% self-performance requirement of paragraph (1) is not applicable to design-build contracts; however, contracting agencies may establish their own self-performance requirements.

## 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 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.

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 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).

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 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 1, 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

This provision is applicable to all Federal-aid construction contracts and to all related subcontracts.

By submission of this bid/proposal or the execution of this contract, or subcontract, as appropriate, the bidder, proposer, Federal-aid construction contractor, or subcontractor, as appropriate, will be deemed to have stipulated as follows:

1. That any person who is or will be utilized in the performance of this contract is not prohibited from receiving an award due to a violation of Section 508 of the Clean Water Act or Section 306 of the Clean Air Act.

2. That the contractor agrees to include or cause to be included the requirements of paragraph (1) of this Section X in every subcontract, and further agrees to take such action as the contracting agency may direct as a means of enforcing such requirements.

## 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.

### 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.

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.

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.

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 and 1200. "First Tier Covered Transactions" refers to any covered transaction between a grantee or subgrantee 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 grantee or subgrantee 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.

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.

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. 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 Excluded Parties List System website (<https://www.epls.gov/>), which is compiled by the General Services Administration.

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. 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) 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;

(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; 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.

b. Where the prospective participant is unable to certify to any of the statements in this certification, such prospective participant shall attach an explanation to this proposal.

## **2. 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)

a. By signing and submitting this proposal, the prospective lower tier 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.

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 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 grantee or subgrantee 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 grantee or subgrantee 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.

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.

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 Excluded Parties List System website (<https://www.epls.gov/>), which is compiled by the General Services Administration.

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.

\* \* \* \* \*

#### **Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion--Lower Tier Participants:**

1. The prospective lower tier participant certifies, by submission of this proposal, that neither it nor its principals is presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from participating in covered transactions by any Federal department or agency.

2. Where the prospective lower tier participant is unable to certify to any of the statements in this certification, such prospective participant shall 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 20).

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.

**ATTACHMENT A - EMPLOYMENT AND MATERIALS PREFERENCE FOR APPALACHIAN DEVELOPMENT HIGHWAY SYSTEM OR APPALACHIAN LOCAL ACCESS ROAD CONTRACTS**

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.

## Contract Provision - Cargo Preference Requirements

In accordance with Title 46 CFR § 381.7 (b), the contractor 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.

(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 Division of National Cargo, Office of Market Development, Maritime Administration, Washington, DC 20590.

(3) To insert the substance of the provisions of this clause in all subcontracts issued pursuant to this contract.”

Provisions (1) and (2) apply to materials or equipment that are acquired solely for the project. The two provisions do not apply to goods or materials that come into inventories independent of the project, such as shipments of Portland cement, asphalt cement, or aggregates, when industry suppliers and contractors use these materials to replenish existing inventories.

**MINIMUM WAGES FOR FEDERAL AND FEDERALLY  
ASSISTED CONSTRUCTION CONTRACTS**

This project is funded, in part, with Federal-aid funds and, as such, is subject to the provisions of the Davis-Bacon Act of March 3, 1931, as amended (46 Sta. 1494, as amended, 40 U.S.C. 276a) and of other Federal statutes referred to in a 29 CFR Part 1, Appendix A, as well as such additional statutes as may from time to time be enacted containing provisions for the payment of wages determined to be prevailing by the Secretary of Labor in accordance with the Davis-Bacon Act and pursuant to the provisions of 29 CFR Part 1. The prevailing rates and fringe benefits shown in the General Wage Determination Decisions issued by the U.S. Department of Labor shall, in accordance with the provisions of the foregoing statutes, constitute the minimum wages payable on Federal and federally assisted construction projects to laborers and mechanics of the specified classes engaged on contract work of the character and in the localities described therein.

General Wage Determination Decisions, modifications and supersedes decisions thereto are to be used in accordance with the provisions of 29 CFR Parts 1 and 5. Accordingly, the applicable decision, together with any modifications issued, must be made a part of every contract for performance of the described work within the geographic area indicated as required by an applicable DBRA Federal prevailing wage law and 29 CFR Part 5. The wage rates and fringe benefits contained in the General Wage Determination Decision shall be the minimum paid by contractors and subcontractors to laborers and mechanics.