



The Following Recurring Special Provisions Indicated By An "X" Are Applicable To This Contract And Are Included By Reference:

Recurring Special Provisions

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The Following Local Roads And Streets Recurring Special Provisions Indicated By An "X" Are Applicable To This Contract And Are Included By Reference:

Local Roads And Streets Recurring Special Provisions

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**BDE SPECIAL PROVISIONS**  
For the August 3 and September 21, 2018 Lettings

The following special provisions indicated by an "x" are applicable to this contract and will be included by the Project Development and Implementation Section of the BD&E. An \* indicates a new or revised special provision for the letting.

| <u>File Name</u> | <u>#</u> | <u>Special Provision Title</u>                                                       | <u>Effective</u> | <u>Revised</u> |
|------------------|----------|--------------------------------------------------------------------------------------|------------------|----------------|
| 80099            | 1        | Accessible Pedestrian Signals (APS)                                                  | April 1, 2003    | Jan. 1, 2014   |
| 80382            | 2        | Adjusting Frames and Grates                                                          | April 1, 2017    |                |
| 80274            | 3        | Aggregate Subgrade Improvement                                                       | April 1, 2012    | April 1, 2016  |
| 80192            | 4        | Automated Flagger Assistance Device                                                  | Jan. 1, 2008     |                |
| 80173            | 5        | Bituminous Materials Cost Adjustments                                                | Nov. 2, 2006     | Aug. 1, 2017   |
| 80241            | 6        | Bridge Demolition Debris                                                             | July 1, 2009     |                |
| 5026I            | 7        | Building Removal-Case I (Non-Friable and Friable Asbestos)                           | Sept. 1, 1990    | April 1, 2010  |
| 5048I            | 8        | Building Removal-Case II (Non-Friable Asbestos)                                      | Sept. 1, 1990    | April 1, 2010  |
| 5049I            | 9        | Building Removal-Case III (Friable Asbestos)                                         | Sept. 1, 1990    | April 1, 2010  |
| 5053I            | 10       | Building Removal-Case IV (No Asbestos)                                               | Sept. 1, 1990    | April 1, 2010  |
| 80366            | 11       | Butt Joints                                                                          | July 1, 2016     |                |
| 80386            | 12       | Calcium Aluminate Cement for Class PP-5 Concrete Patching                            | Nov. 1, 2017     |                |
| 80396            | 13       | Class A and B Patching                                                               | Jan. 1, 2018     |                |
| 80384            | 14       | Compensable Delay Costs                                                              | June 2, 2017     |                |
| 80198            | 15       | Completion Date (via calendar days)                                                  | April 1, 2008    |                |
| 80199            | 16       | Completion Date (via calendar days) Plus Working Days                                | April 1, 2008    |                |
| 80293            | 17       | Concrete Box Culverts with Skews > 30 Degrees and Design Fills ≤ 5 Feet              | April 1, 2012    | July 1, 2016   |
| 80311            | 18       | Concrete End Sections for Pipe Culverts                                              | Jan. 1, 2013     | April 1, 2016  |
| 80277            | 19       | Concrete Mix Design – Department Provided                                            | Jan. 1, 2012     | April 1, 2016  |
| 80261            | 20       | Construction Air Quality – Diesel Retrofit                                           | June 1, 2010     | Nov. 1, 2014   |
| 80387            | 21       | Contrast Preformed Plastic Pavement Marking                                          | Nov. 1, 2017     |                |
| * 80029          | 22       | Disadvantaged Business Enterprise Participation                                      | Sept. 1, 2000    | April 2, 2018  |
| 80378            | 23       | Dowel Bar Inserters                                                                  | Jan. 1, 2017     | Jan. 1, 2018   |
| 80388            | 24       | Equipment Parking and Storage                                                        | Nov. 1, 2017     |                |
| 80229            | 25       | Fuel Cost Adjustment                                                                 | April 1, 2009    | Aug. 1, 2017   |
| 80304            | 26       | Grooving for Recessed Pavement Markings                                              | Nov. 1, 2012     | Nov. 1, 2017   |
| * 80246          | 27       | Hot-Mix Asphalt – Density Testing of Longitudinal Joints                             | Jan. 1, 2010     | Aug. 1, 2018   |
| * 80398          | 28       | Hot-Mix Asphalt – Longitudinal Joint Sealant                                         | Aug. 1, 2018     |                |
| * 80399          | 29       | Hot-Mix Asphalt – Oscillatory Roller                                                 | Aug. 1, 2018     |                |
| * 80347          | 30       | Hot-Mix Asphalt – Pay for Performance Using Percent Within Limits – Jobsite Sampling | Nov. 1, 2014     | Aug. 1, 2018   |
| 80383            | 31       | Hot-Mix Asphalt – Quality Control for Performance                                    | April 1, 2017    | Nov. 1, 2017   |
| 80376            | 32       | Hot-Mix Asphalt – Tack Coat                                                          | Nov. 1, 2016     |                |
| 80392            | 33       | Lights on Barricades                                                                 | Jan. 1, 2018     |                |
| 80336            | 34       | Longitudinal Joint and Crack Patching                                                | April 1, 2014    | April 1, 2016  |
| * 80393          | 35       | Manholes, Valve Vaults, and Flat Slab Tops                                           | Jan. 1, 2018     | March 2, 2018  |
| * 80400          | 36       | Mast Arm Assembly and Pole                                                           | Aug. 1, 2018     |                |
| 80045            | 37       | Material Transfer Device                                                             | June 15, 1999    | Aug. 1, 2014   |
| 80394            | 38       | Metal Flared End Section for Pipe Culverts                                           | Jan. 1, 2018     | April 1, 2018  |
| 80165            | 39       | Moisture Cured Urethane Paint System                                                 | Nov. 1, 2006     | Jan. 1, 2010   |
| 80349            | 40       | Pavement Marking Blackout Tape                                                       | Nov. 1, 2014     | April 1, 2016  |
| 80371            | 41       | Pavement Marking Removal                                                             | July 1, 2016     |                |
| 80390            | 42       | Payments to Subcontractors                                                           | Nov. 2, 2017     |                |
| 80377            | 43       | Portable Changeable Message Signs                                                    | Nov. 1, 2016     | April 1, 2017  |
| 80389            | 44       | Portland Cement Concrete                                                             | Nov. 1, 2017     |                |
| 80359            | 45       | Portland Cement Concrete Bridge Deck Curing                                          | April 1, 2015    | Nov. 1, 2017   |
| * 80401          | 46       | Portland Cement Concrete Pavement Connector for Bridge Approach                      | Aug. 1, 2018     |                |

| File Name | #  | Special Provision Title                                                                                                        | Effective     | Revised       |
|-----------|----|--------------------------------------------------------------------------------------------------------------------------------|---------------|---------------|
|           |    | Slab                                                                                                                           |               |               |
| 80385     | 47 | Portland Cement Concrete Sidewalk                                                                                              | Aug. 1, 2017  |               |
| 80300     | 48 | Preformed Plastic Pavement Marking Type D - Inlaid                                                                             | April 1, 2012 | April 1, 2016 |
| 80328     | 49 | Progress Payments                                                                                                              | Nov. 2, 2013  |               |
| 3426I     | 50 | Railroad Protective Liability Insurance                                                                                        | Dec. 1, 1986  | Jan. 1, 2006  |
| 80157     | 51 | Railroad Protective Liability Insurance (5 and 10)                                                                             | Jan. 1, 2006  |               |
| 80306     | 52 | Reclaimed Asphalt Pavement (RAP) and Reclaimed Asphalt Shingles (RAS)                                                          | Nov. 1, 2012  | Jan. 1, 2018  |
| 80395     | 53 | Sloped Metal End Section for Pipe Culverts                                                                                     | Jan. 1, 2018  |               |
| 80340     | 54 | Speed Display Trailer                                                                                                          | April 2, 2014 | Jan. 1, 2017  |
| 80127     | 55 | Steel Cost Adjustment                                                                                                          | April 2, 2004 | Aug. 1, 2017  |
| * 80397   | 56 | Subcontractor and DBE Payment Reporting                                                                                        | April 2, 2018 |               |
| 80391     | 57 | Subcontractor Mobilization Payments                                                                                            | Nov. 2, 2017  |               |
| 80317     | 58 | Surface Testing of Hot-Mix Asphalt Overlays                                                                                    | Jan. 1, 2013  | April 1, 2016 |
| 80298     | 59 | Temporary Pavement Marking (NOTE: This special provision was previously named "Pavement Marking Tape Type IV".)                | April 1, 2012 | April 1, 2017 |
| 20338     | 60 | Training Special Provisions                                                                                                    | Oct. 15, 1975 |               |
| 80318     | 61 | Traversable Pipe Grate for Concrete End Sections (NOTE: This special provision was previously named "Traversable Pipe Grate".) | Jan. 1, 2013  | Jan. 1, 2018  |
| 80288     | 62 | Warm Mix Asphalt                                                                                                               | Jan. 1, 2012  | April 1, 2016 |
| 80302     | 63 | Weekly DBE Trucking Reports                                                                                                    | June 2, 2012  | April 2, 2015 |
| 80071     | 64 | Working Days                                                                                                                   | Jan. 1, 2002  |               |

The following special provisions are in the 2018 Supplemental Specifications and Recurring Special Provisions.

| File Name | Special Provision Title                                         | New Location                                 | Effective     | Revised       |
|-----------|-----------------------------------------------------------------|----------------------------------------------|---------------|---------------|
| 80368     | Light Tower                                                     | Article 1069.08                              | July 1, 2016  |               |
| 80369     | Mast Arm Assembly and Pole                                      | Article 1077.03(a)(1)                        | July 1, 2016  |               |
| 80338     | Portland Cement Concrete Partial Depth Hot-Mix Asphalt Patching | Recurring CS #35                             | April 1, 2014 | April 1, 2016 |
| 80379     | Steel Plate Beam Guardrail                                      | Articles 630.02, 630.05, 630.06, and 630.08  | Jan. 1, 2017  |               |
| 80381     | Traffic Barrier Terminal, Type 1 Special                        | Article 631.04                               | Jan. 1, 2017  |               |
| 80380     | Tubular Markers                                                 | Articles 701.03, 701.15, 701.18, and 1106.02 | Jan. 1, 2017  |               |

The following special provisions require additional information from the designer. The additional information needs to be submitted as a separate document. The Project Development and Implementation section will then include the information in the applicable special provision. The Special Provisions are:

- Bridge Demolition Debris
- Building Removal - Case I
- Building Removal - Case II
- Building Removal - Case III
- Building Removal-Case IV
- Completion Date
- Completion Date Plus Working Days
- DBE Participation
- Material Transfer Device
- Railroad Protective Liability Insurance
- Training Special Provisions
- Working Days

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## **STATE OF ILLINOIS**

### **SPECIAL PROVISIONS**

The following Special Provisions supplement the "Standard Specifications for Road and Bridge Construction", adopted January 1, 2016, the latest edition of the "Manual on Uniform Traffic Control Devices for Streets and Highways", and the "Manual of Test Procedures of Materials" in effect on the date of invitation of bids, and the "Supplemental Specifications and Recurring Special Provisions" indicated on the Check Sheet included herein which apply to and govern the construction of FAP 360 (Kirk Road); Section 16-00477-00-SP; in Kane County, Contract XXXXX and in case of conflict with any parts, or parts of said Specifications, the said Special Provisions shall take precedence and shall govern.

### **LOCATION OF PROJECT**

This project is located on and along Kirk Road from north of Illinois Route 56 (Butterfield Road) to south of Cherry Lane in Kane County.

### **DESCRIPTION OF PROJECT**

This project is a Highway Safety Improvement Project and includes implementing several safety countermeasures along Kirk Road between Illinois Route 56 (Butterfield Road) and Cherry Lane. The project shall install high-friction surface treatments, dynamic speed display signs, wider and reflective pavement markings, centerline rumble strips, traffic signal head upgrades, and American with Disabilities Act (ADA) complaint sidewalk ramps.

### **MAINTENANCE OF ROADWAYS**

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.

### **RESTRICTION ON WORKING DAYS AFTER A COMPLETION DATE**

Effective: January 21, 2003

Revised: January 1, 2007

All temporary lane closures during the period governed by working days after a completion date will not be permitted during the hours of 6:00 a.m. to 9:00 a.m. and 3:00 p.m. to 6:00 p.m. Monday through Friday.

All lane closure signs shall not be erected any earlier than one-half (1/2) hour before the starting hours listed above. Also, these signs should be taken down within one-half (1/2) hour after the closure is removed.

Failure to Open Traffic Lanes to Traffic: Should the Contractor fail to completely open and keep open all the traffic lanes to traffic in accordance with the limitations specified above, the Contractor shall be liable and shall pay to the Department the amount of \$250 per lane blocked, not as a penalty but as liquidated and ascertained damages, for each and every 15 minute interval or a portion thereof that a lane is blocked outside the allowable time limitations. The Department may deduct such damages from any monies due the Contractor. These damages shall apply during the period governed by working days after a completion date and any extensions of that contract time.

### **COMPLETION DATE PLUS WORKING DAYS**

Effective: September 30, 1985

Revised: January 1, 2007

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

"When a completion date plus working days is specified, the Contractor shall complete all contract items and safely open all roadways to traffic by 11:59 PM on **September 30, 2019** except as specified herein.

The Contractor will be allowed to complete all clean-up work and punch list items within 10 working days after the completion date for opening the roadway to traffic. Under extenuating circumstances the Engineer may direct that certain items of work, not affecting the safe opening of the roadway to traffic, may be completed within the working days allowed for clean-up work and punch list items. Temporary lane closures for this work may be allowed at the discretion of the Engineer.

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

## **TRAFFIC CONTROL AND PROTECTION (ARTERIALS)**

Effective: February 1, 1996

Revised: March 1, 2011

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.

## **TRAFFIC CONTROL PLAN**

Effective: September 30, 1985

Revised: January 1, 2007

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

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

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

### Standards:

|           |                                                                                      |
|-----------|--------------------------------------------------------------------------------------|
| 424026-02 | Entrance / Alley Pedestrian Crossing                                                 |
| 701421-08 | Lane Closure, Multilane, Day Operations Only, for Speeds $\geq$ 45 MPH to 55 MPH     |
| 701426-09 | Lane Closure, Multilane, Intermittent or Moving Operations, for Speeds $\geq$ 45 MPH |
| 701701-10 | Urban Lane Closure, Multilane Intersection                                           |
| 701801-06 | Sidewalk, Corner of Crosswalk Closure                                                |
| 701901-07 | Traffic Control Devices                                                              |

### Details:

|       |                                                                            |
|-------|----------------------------------------------------------------------------|
| TC-10 | Traffic Control and Protection for Side Roads, Intersections and Driveways |
| TC-11 | Raised Reflective Pavement Markers (Snow Plow Resistant)                   |
| TC-13 | District One Typical Pavement Markings                                     |
| TC-14 | Traffic Control and Protection at Turn Bays (To Remain Open to Traffic)    |
| TC-16 | Short-Term Pavement Marking Letters and Symbols                            |
| TC-26 | Driveway Entrance Signing                                                  |

Special Provisions:

Maintenance of Roadway  
Public Convenience and Safety (District 1)

BDE Special Provisions:

Lights on Barricades  
Pavement Marking Removal

**ADJUSTMENTS AND RECONSTRUCTIONS**

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.”

## **CONSTRUCTION LAYOUT SPECIAL FOR RESURFACING WITH ADA AND STAND ALONE ADA (D-1)**

Effective: January 1, 2017

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

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

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

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

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

### Responsibility of the Department.

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

The Department will make all measurements for the various pay items.

Where the Contractor, in setting construction stakes, discovers discrepancies, the Department will check to determine their nature and make whatever revisions are necessary to the plans. Any

additional restaking required by the Engineer will be the responsibility of the Contractor. The additional restaking done by the Contractor will be paid for according to Article 109.04 of the Standard Specifications.

The Department will accept responsibility for the accuracy of the initial reference points shown on the plans.

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

Responsibility of the Contractor.

The Contractor shall establish from the given survey points and contract plan information, all the control points or reference points necessary to layout the ADA Ramp elements. The Contractor shall furnish and place the layout stakes. The Contractor shall notify the Engineer when the stakes are complete and available for review and approval by the Engineer as least 7 days in advance of the actual construction.

The Contractor shall assure that all underground utilities are marked in the field prior to staking the ADA ramp layout.

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

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

**DRAINAGE AND INLET PROTECTION UNDER TRAFFIC (DISTRICT 1)**

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.”

**FRICTION AGGREGATE (D-1)**

Effective: January 1, 2011

Revised: April 29, 2016

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

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

**PUBLIC CONVENIENCE AND SAFETY (DIST 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.”

**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.”

## **GENERAL ELECTRICAL REQUIREMENTS**

Effective: June 1, 2016

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<br>(discipline) | Item                                                                                                                                            |
|------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------|
| All Electrical Work          | Electric Service Metering<br>Emergency Standby System<br>Transformers<br>Cable<br>Unit Duct<br>Splices<br>Conduit<br>Surge Suppression System   |
| Lighting                     | Tower<br>Pole<br>Luminaire<br>Foundation<br>Breakaway Device<br>Controllers<br>Control Cabinet and Peripherals                                  |
| ITS                          | Controller Cabinet and Peripherals<br>CCTV Cameras<br>Camera Structures<br>Ethernet Switches<br>Detectors<br>Detector Loop<br>Fiber Optic Cable |

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.

**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 seven (7) 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 304.8 mm (one (1) foot) 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."

**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.

**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.

**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.

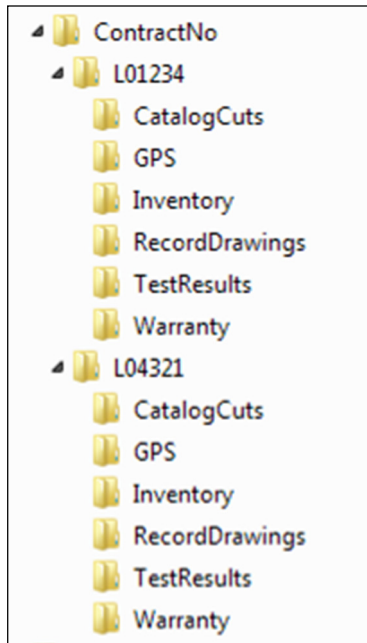
**Prior to the collection of data, the contractor shall provide a sample data collection of at least six data points of known locations to be reviewed and verified by the Engineer to be accurate within 20 feet.** Upon verification, data collection can begin. Data collection can be made as construction 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.

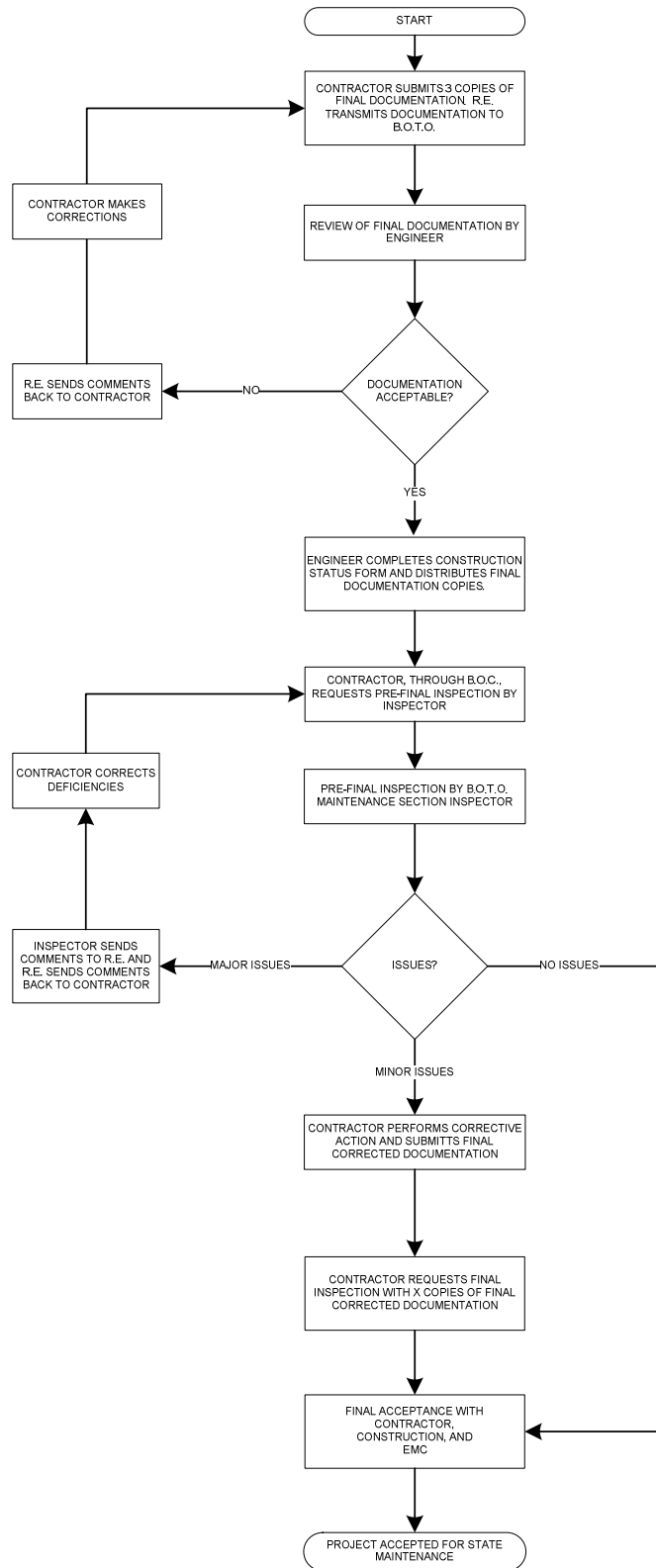
The Final Acceptance Documentation Checklist shall be completed and is contained elsewhere herein.

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<br>(Verify)                                                                                                                   | Resident Engineer<br>(Verify)                                                                                                            |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Record Drawings</b><br>-Four hardcopies (11" x 17")<br>-Scanned to two CD-ROMs                                                                                                     | <input type="checkbox"/><br><input type="checkbox"/>                                                                                     | <input type="checkbox"/><br><input type="checkbox"/>                                                                                     |
| <b>Field Inspection Tests</b><br>-Voltage<br>-Amperage<br>-Cable Insulation Resistance<br>-Continuity<br>-Controller Ground Rod Resistance<br>(Four Hardcopies & scanned to two CD's) | <input type="checkbox"/><br><input type="checkbox"/><br><input type="checkbox"/><br><input type="checkbox"/><br><input type="checkbox"/> | <input type="checkbox"/><br><input type="checkbox"/><br><input type="checkbox"/><br><input type="checkbox"/><br><input type="checkbox"/> |
| <b>GPS Coordinates</b><br>-Excel file<br>(Check Special Provisions, Excel file scanned to two CD's)                                                                                   | <input type="checkbox"/>                                                                                                                 | <input type="checkbox"/>                                                                                                                 |
| <b>Job Warranty Letter</b><br>(Four Hardcopies & scanned to two CD's)                                                                                                                 | <input type="checkbox"/>                                                                                                                 | <input type="checkbox"/>                                                                                                                 |
| <b>Catalog Cut Submittals</b><br>-Approved & Approved as Noted<br>(Scanned to two CD's)                                                                                               | <input type="checkbox"/>                                                                                                                 | <input type="checkbox"/>                                                                                                                 |
| <b>Lighting Inventory Form</b><br>(Four Hardcopies & scanned to two CD's)                                                                                                             | <input type="checkbox"/>                                                                                                                 | <input type="checkbox"/>                                                                                                                 |
| <b>Lighting Controller Inventory Form</b><br>(Four Hardcopies & scanned to two CD's)                                                                                                  | <input type="checkbox"/>                                                                                                                 | <input type="checkbox"/>                                                                                                                 |
| <b>Light Tower Inspection Form</b><br>(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.

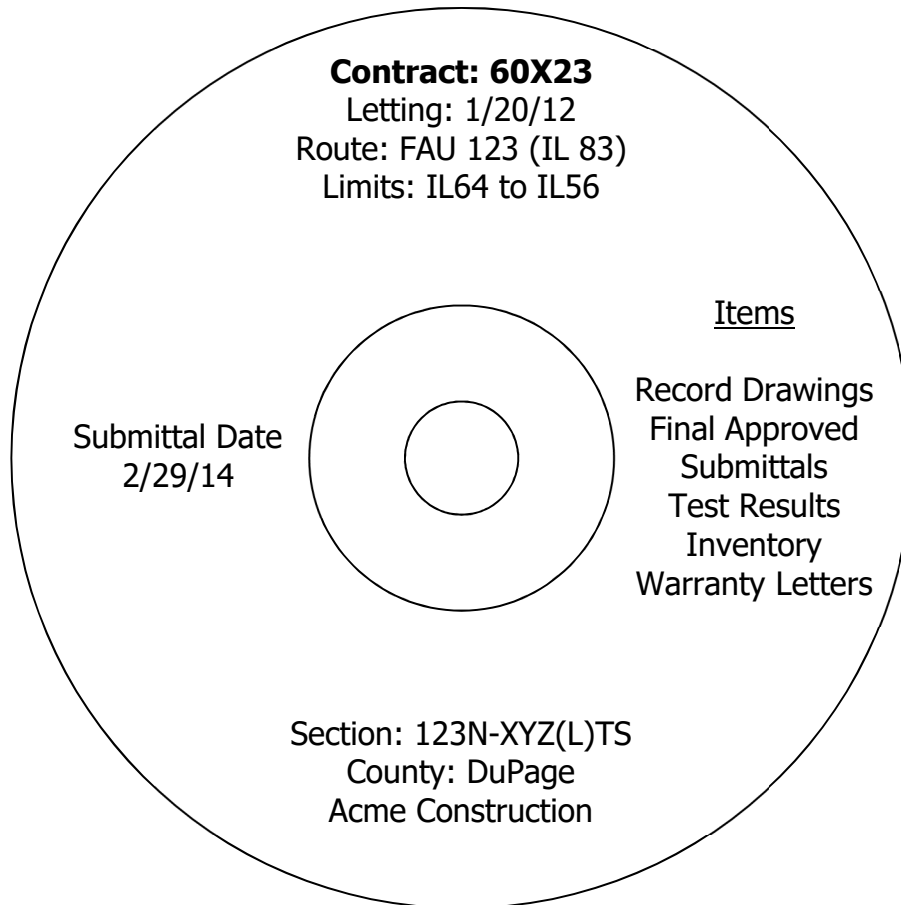
Lighting Inventory Form – Inventory form should include only proposed light poles, proposed light towers, proposed combination (traffic/light pole) lighting and proposed underpass luminaires.

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.**



## **ELECTRIC SERVICE INSTALLATION**

Effective: January 1, 2012

Description. This item shall consist of all material and labor required to extend, connect or modify the electric services, as indicated or specified, which is over and above the work performed by the utility. Unless otherwise indicated, the cost for the utility work, if any, will be reimbursed to the Contractor separately under ELECTRIC UTILITY SERVICE CONNECTION. This item may apply to the work at more than one service location and each will be paid separately.

Materials. Materials shall be in accordance with the Standard Specifications.

### **CONSTRUCTION REQUIREMENTS**

General. The Contractor shall ascertain the work being provided by the electric utility and shall provide all additional material and work not included by other contract pay items required to complete the electric service work in complete compliance with the requirements of the utility.

No additional compensation will be allowed for work required for the electric service, even though not explicitly shown on the Drawings or specified herein

Method of Measurement. Electric Service Installation shall be counted, each.

Basis of Payment. This work will be paid for at the contract unit price each for ELECTRIC SERVICE INSTALLATION which shall be payment in full for the work specified herein.

## **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<br>AWG     | Stranding | Average<br>Insulation<br>Thickness |                | Minimum<br>Size<br>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.”

## TEMPORARY INFORMATION SIGNING

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:

|     | <u>Item</u>             | <u>Article/Section</u> |
|-----|-------------------------|------------------------|
| 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 SIGNAL GENERAL REQUIREMENTS**

Effective: May 22, 2002

Revised: March 25, 2016

800.01TS

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

- All material furnished shall be new unless otherwise noted herein.
- Traffic signal construction and maintenance work shall be performed by personnel holding current 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 IDOT District One approved traffic signal controllers and other related equipment. The Equipment Supplier shall be located within IDOT District One and shall:

- Be full service with on-site facilities to assemble, test and trouble-shoot traffic signal controllers and cabinet assemblies.
- Maintain an inventory of IDOT District One approved controllers and cabinets.
- 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 electronically through the District's SharePoint System unless directed otherwise by the Engineer. 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 the date of the preconstruction meeting. A list of major traffic signal items can be found in Article 801.05. Material or equipment which is similar or identical shall be the product of the same manufacturer, unless necessary for system continuity. Traffic signal materials and equipment shall bear the U.L. label whenever such labeling is available.
2. Product data and shop drawings shall be assembled by pay item. Only the top sheet of each pay item submittal will be stamped by the Department with the review status, except shop drawings for mast arm pole assemblies and the like will be stamped with the review status on each sheet.
3. Original manufacturer published product data and shop drawing sheets with legible dimensions and details shall be submitted for review.
4. When hard copy submittals are necessary, four complete copies of the manufacturer's descriptive literatures and technical data for the traffic signal materials shall be submitted. For hard copy or electronic submittals, the descriptive literature and technical data shall be adequate for determining whether the materials meet the requirements of the plans and specifications. If the literature contains more than one item, the Contractor shall indicate which item or items will be furnished.
5. When hard copy submittals are necessary for structural elements, four complete copies of the shop drawings for the mast arm assemblies and poles, and the combination mast arm assemblies and poles showing, in detail, the fabrication thereof and the certified mill

- analyses of the materials used in the fabrication, anchor rods, and reinforcing materials shall be submitted.
6. Partial or incomplete submittals will be returned without review.
  7. Certain non-standard mast arm poles and special structural elements will require additional review from IDOT's Central Office. Examples include ornamental/decorative, non-standard length mast arm pole assemblies and monotube structures. The Contractor shall account for the additional review time in his schedule.
  8. The contract number or permit 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.
  9. Where certifications and/or warranties are specified, the information submitted for approval shall include certifications and warranties. Certifications involving inspections, and/or tests of material shall be complete with all test data, dates, and times.
  10. After the Engineer reviews the submittals for conformance with the design concept of the project, the Engineer will stamp the drawings indicating their status as 'Approved', 'Approved-As-Noted', 'Disapproved', or 'Incomplete'. Since the Engineer's review is for conformance with the design concept only, it is the Contractor's responsibility to coordinate the various items into a working system as specified. The Contractor shall not be relieved from responsibility for errors or omissions in the shop, working, layout drawings, or other documents by the Department's approval thereof. The Contractor must still be in full compliance with contract and specification requirements.
  11. The Contractor shall secure approved materials in a timely manner to assure construction schedules are not delayed.
  12. All submitted items reviewed and marked 'APPROVED AS NOTED', 'DISAPPROVED', or 'INCOMPLETE' are to be resubmitted in their entirety, unless otherwise indicated within the submittal comments, with a disposition of previous comments to verify contract compliance at no additional cost to the contract.
  13. Exceptions to and deviations from the requirements of the Contract Documents will not be allowed. It is the Contractor's responsibility to note any deviations from Contract requirements at the time of submittal and to make any requests for deviations in writing to the Engineer. In general, substitutions will not be acceptable. Requests for substitutions must demonstrate that the proposed substitution is superior to the material or equipment required by the Contract Documents. No exceptions, deviations or substitutions will be permitted without the approval of the Engineer.
  14. 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 in District One. 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 Engineer, Area Traffic Signal Maintenance and Operations Engineer, IDOT ComCenter and the Department's 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 both the Area Traffic Signal Maintenance and Operations Engineer at (847) 705-4424 and the Department's 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 full-fill 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 Department's 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 may inspect any signalizing device on the Department's highway system 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 District One traffic signal specifications and provided by the Contractor at no additional cost to the Contract and/or owner of the traffic signal system, all as approved by the Engineer. Final replacement of damaged equipment must meet the approval of the Engineer prior to or at the time of final inspection 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 Area Traffic Signal Maintenance and Operations Engineer at (847) 705-4424 a minimum of seven (7) working days prior to the time of the requested inspection. The Department will attempt to full-fill the Contractor's turn-on and inspection date request(s), however workload and other conditions may prevent the Department from accommodating specific dates or times. The Contractor shall not be entitled to any other compensation if the requested turn-on and inspection date(s) cannot be scheduled by the Department. The Department will not grant a field inspection until written or electronic notification is provided from the Contractor that the equipment has been field tested and the intersection is operating according to Contract requirements. The Contractor must invite local fire department personnel to the turn-on when Emergency Vehicle Preemption (EVP) is included in the project. When the contract includes the item RE-OPTIMIZE TRAFFIC SIGNAL SYSTEM, OPTIMIZE TRAFFIC SIGNAL SYSTEM, or TEMPORARY TRAFFIC SIGNAL TIMINGS, the Contractor must notify the SCAT Consultant of the turn-on/detour implementation schedule, as well as stage changes and phase changes during construction.

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

The Contractor shall provide a representative from the 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 here-in.

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 Contactor 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. 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.

### **GROUNDING OF TRAFFIC SIGNAL SYSTEMS**

Effective: May 22, 2002

Revised: July 1, 2015

806.01TS

Revise Section 806 of the Standard Specifications to read:

#### General.

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

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

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

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

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

#### **COILABLE NON-METALLIC CONDUIT**

Effective: May 22, 2002

Revised: July 1, 2015

810.01TS

##### Description.

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

##### General.

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

Add the following to Article 810.03 of the Standard Specifications:

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

Add the following to Article 811.03 of the Standard Specifications:

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

##### Basis of Payment.

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

## **UNDERGROUND RACEWAYS**

Effective: May 22, 2002

Revised: July 1, 2015

810.02TS

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.”

**MAINTENANCE OF EXISTING TRAFFIC SIGNAL AND FLASHING BEACON INSTALLATION**

Effective: May 22, 2002

Revised: July 1, 2015

850.01TS

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 Department 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 District One traffic signal specifications and provided by the Contractor at no additional cost to the Contract and/or owner of the traffic signal system, all as approved by the Engineer. Final replacement of damaged equipment must meet the approval of the Engineer prior to or at the time of final inspection 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.

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

Effective: January 1, 2013

Revised: July 1, 2015

873.03TS

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

Basis of Payment.

This work will be paid for at the contract unit price per each for RELOCATE EXISTING EMERGENCY VEHICLE PRIORITY SYSTEM, COMPLETE, which price shall be payment in full for furnishing, installing and making all electrical connections necessary for proper operations.

**TRAFFIC SIGNAL POST**

Effective: May 22, 2002

Revised: July 01, 2015

875.01TS

Add the following to Article 1077.01 (c) of the Standard Specifications:

Washers for post bases shall be the same size or larger than the nut.

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

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

**MAST ARM ASSEMBLY AND POLE**

Effective: May 22, 2002

Revised: July 01, 2015

877.01TS

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

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

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

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

## **CONCRETE FOUNDATIONS**

Effective: May 22, 2002

Revised: July 01, 2015

878.01TS

Add the following to Article 878.03 of the Standard Specifications:

All anchor bolts shall be according to Article 1006.09, with all anchor bolts hot dipped galvanized a minimum of 12 in. (300 mm) at the threaded end.

Foundations used for Combination Mast Arm Poles shall provide an extra 2-1/2 inch (65 mm) raceway.

No foundation is to be poured until the Resident Engineer gives his/her approval as to the depth of the foundation.

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

The price shall include a concrete apron in front of the cabinet and UPS as shown in the plans or as directed by the engineer.

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

Effective: May 22, 2002

Revised: July 1, 2015

880.01TS

### Materials.

Add the following to Section 1078 of the Standard Specifications:

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

3. All signal heads shall provide 12" (300 mm) displays with glossy yellow or black polycarbonate housings. All head housings shall be the same color (yellow or black) at the intersection. For new signalized intersections and existing signalized intersections where all signals heads are being replaced, the proposed head housings shall be black. Where only selected heads are being replaced, the proposed head housing color (yellow or black) shall match existing head housings. Connecting hardware and mounting brackets shall be polycarbonate (black). A corrosion resistant anti-seize lubricant shall be applied to all metallic mounting bracket joints, and shall be visible to the inspector at the signal turn-on. Post top mounting collars are required on all posts, and shall be constructed of the same material as the brackets.
4. The LED signal modules shall be replaced or repaired if an LED signal module fails to function as intended due to workmanship or material defects within the first 7 years from the date of traffic signal TURN-ON. LED signal modules which exhibit luminous intensities less than the minimum values specified in Table 1 of the ITE Vehicle Traffic Control Signal Heads: Light Emitting Diode (LED) Circular Signal Supplement (June 27, 2005) [VTSCH], or applicable successor ITE specifications, or show signs of entrance of moisture or contaminants within the first 7 years of the date of traffic signal TURN-ON shall be replaced or repaired. The vendor's written warranty for the LED signal modules shall be dated, signed by a vendor's representative and included in the product submittal to the State.

(a) Physical and Mechanical Requirements

1. Modules can be manufactured under this specification for the following faces:
  - a. 12 inch (300 mm) circular, multi-section
  - b. 12 inch (300 mm) arrow, multi-section
2. The maximum weight of a module shall be 4 lbs. (1.8 kg).
3. Each module shall be a sealed unit to include all parts necessary for operation (a printed circuit board, power supply, a lens and gasket, etc.), and shall be weather proof after installation and connection.
5. The lens of the module shall be tinted with a wavelength-matched color to reduce sun phantom effect and enhance on/off contrast. The tinting shall be uniform across the lens face. Polymeric lens shall provide a surface coating or chemical surface treatment applied to provide abrasion resistance. The lens of the module shall be integral to the unit, convex with a smooth outer surface and made of plastic. The lens shall have a textured surface to reduce glare.
6. The use of tinting or other materials to enhance ON/OFF contrasts shall not affect chromaticity and shall be uniform across the face of the lens.
7. Each module shall have a symbol of the type of module (i.e. circle, arrow, etc.) in the color of the module. The symbol shall be 1 inch (25.4 mm) in diameter. Additionally, the color shall be written out in 1/2 inch (12.7mm) letters next to the symbol.

(b) Photometric Requirements

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

(c) Electrical

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

(d) Retrofit Traffic Signal Module

1. The following specification requirements apply to the Retrofit module only. All general specifications apply unless specifically superseded in this section.
2. Retrofit modules can be manufactured under this specification for the following faces:
  - a. 12 inch (300 mm) circular, multi-section
  - b. 12 inch (300 mm) arrow, multi-section
3. Each Retrofit module shall be designed to be installed in the doorframe of a standard traffic signal housing. The Retrofit module shall be sealed in the doorframe with a one-piece EPDM (ethylene propylene rubber) gasket.
4. The maximum weight of a Retrofit module shall be 4 lbs. (1.8 kg).
5. Each Retrofit module shall be a sealed unit to include all parts necessary for operation (a printed circuit board, power supply, a lens and gasket, etc.), and shall be weather proof after installation and connection.
6. Electrical conductors for modules, including Retrofit modules, shall be 39.4 inches (1m) in length, with quick disconnect terminals attached.
7. The lens of the Retrofit module shall be integral to the unit, shall be convex with a smooth outer surface and made of plastic or of glass.

(e) The following specification requirements apply to the 12 inch (300 mm) arrow module only. All general specifications apply unless specifically superseded in this section.

1. The arrow module shall meet specifications stated in Section 9.01 of the Equipment and Material Standards of the Institute of Transportation Engineers (November 1998) [ITE Standards], Chapter 2 (Vehicle Traffic Control Signal Heads) or applicable successor ITE specifications for arrow indications.
2. The LEDs arrow indication shall be a solid display with a minimum of three (3) outlining rows of LEDs and at least one (1) fill row of LEDs.

(f) The following specification requirement applies to the 12 inch (300 mm) programmed visibility (PV) module only. All general specifications apply unless specifically superseded in this section.

1. The LED module shall be a module designed and constructed to be installed in a programmed visibility (PV) signal housing without modification to the housing.

Basis of Payment.

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

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

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

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

**LIGHT EMITTING DIODE (LED) PEDESTRIAN SIGNAL HEAD**

Effective: May 22, 2002

Revised: July 1, 2015

881.01TS

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

No mixing of different types of pedestrian traffic signals or displays will be permitted.

Add the following to Article 881.03 of the Standard Specifications:

(a) Pedestrian Countdown Signal Heads.

- (1) Pedestrian Countdown Signal Heads shall not be installed at signalized intersections where traffic signals and railroad warning devices are interconnected.

- (2) Pedestrian Countdown Signal Heads shall be 16 inch (406mm) x 18 inch (457mm), for single units with glossy yellow or black polycarbonate housings. All pedestrian head housings shall be the same color (yellow or black) at the intersection. For new signalized intersections and existing signalized intersections where all pedestrian heads are being replaced, the proposed head housings shall be black. Where only selected heads are being replaced, the proposed head housing color (yellow or black) shall match existing head housings. Connecting hardware and mounting brackets shall be polycarbonate (black). A corrosion resistant anti-seize lubricant shall be applied to all metallic mounting bracket joints, and shall be visible to the inspector at the signal turn-on.
- (3) Each pedestrian signal LED module shall be fully MUTCD compliant and shall consist of double overlay message combining full LED symbols of an Upraised Hand and a Walking Person. "Egg Crate" type sun shields are not permitted. Numerals shall measure 9 inches (229mm) in height and easily identified from a distance of 120 feet (36.6m).

Materials.

Add the following to Article 1078.02 of the Standard Specifications:

General.

1. The module shall operate in one mode: Clearance Cycle Countdown Mode Only. The countdown module shall display actual controller programmed clearance cycle and shall start counting when the flashing clearance signal turns on and shall countdown to "0" and turn off when the steady Upraised Hand (symbolizing Don't Walk) signal turns on. Module shall not have user accessible switches or controls for modification of cycle.
2. At power on, the module shall enter a single automatic learning cycle. During the automatic learning cycle, the countdown display shall remain dark.
3. The module shall re-program itself if it detects any increase or decrease of Pedestrian Timing. The counting unit will go blank once a change is detected and then take one complete pedestrian cycle (with no counter during this cycle) to adjust its buffer timer.
4. If the controller preempts during the Walking Person (symbolizing Walk), the countdown will follow the controller's directions and will adjust from Walking Person to flashing Upraised Hand. It will start to count down during the flashing Upraised Hand.
5. If the controller preempts during the flashing Upraised Hand, the countdown will continue to count down without interruption.
6. The next cycle, following the preemption event, shall use the correct, initially programmed values.
7. If the controller output displays Upraised Hand steady condition and the unit has not arrived to zero or if both the Upraised Hand and Walking Person are dark for some reason, the unit suspends any timing and the digits will go dark.
8. The digits will go dark for one pedestrian cycle after loss of power of more than 1.5 seconds.

9. The countdown numerals shall be two (2) "7 segment" digits forming the time display utilizing two rows of LEDs.

10. The LED module shall meet the requirements of the Institute of Transportation Engineers (ITE) LED purchase specification, "Pedestrian Traffic Control Signal Indications - Part 2: LED Pedestrian Traffic Signal Modules," or applicable successor ITE specifications, except as modified herein.

11. The LED modules shall provide constant light output under power. Modules with dimming capabilities shall have the option disabled or set on a non-dimming operation.

12. In the event of a power outage, light output from the LED modules shall cease instantaneously.

13. The LEDs utilized in the modules shall be AlInGaP technology for Portland Orange (Countdown Numerals and Upraised Hand) and GaN technology for Lunar White (Walking Person) indications.

14. The individual LEDs shall be wired such that a catastrophic loss or the failure of one or more LED will not result in the loss of the entire module.

Basis of Payment.

Add the following to the first paragraph of Article 881.04 of the Standard Specifications:

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

Add the following to Article 881.04 of the Standard Specifications:

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

**TRAFFIC SIGNAL BACKPLATE**

Effective: May 22, 2002

Revised: July 1, 2015

882.01TS

Delete 1<sup>st</sup> sentence of Article 1078.03 of the Standard Specifications and add "All backplates shall be louvered, formed ABS plastic".

Add the following to the third paragraph of Article 1078.03 of the Standard Specifications. The retroreflective backplate shall not contain louvers.

Delete second sentence of the fourth paragraph of Article 1078.03 the Standard Specifications.

Add the following to the fourth paragraph of Article 1078.03 of the Standard Specifications:

When retro reflective sheeting is specified, it shall be Type ZZ sheeting according to Article 1091.03 and applied in preferred orientation for the maximum angularity according to the vendor's recommendations. The retroreflective sheeting shall be installed under a controlled environment at the vendor/equipment supplier before shipment to the contractor. The formed plastic backplate shall be prepared and cleaned, following recommendations of the retroreflective sheeting manufacturer.

## **DETECTOR LOOP**

Effective: May 22, 2002

Revised: January 5, 2016

886.01TS

### Procedure.

A minimum of seven (7) working days prior to the Contractor cutting loops, the Contractor shall mark the proposed loop locations and contact the Area Traffic Signal Maintenance and Operations Engineer (847) 705-4424 to inspect and approve the layout. When preformed detector loops are installed, the Contractor shall have them inspected and approved prior to the pouring of the Portland cement concrete surface, using the same notification process as above.

### Installation.

Revise Article 886.04 of the Standard Specifications to read:

Loop detectors shall be installed according to the requirements of the "District One Standard Traffic Signal Design Details." Saw-cuts (homeruns on preformed detector loops) from the loop to the edge of pavement shall be made perpendicular to the edge of pavement when possible in order to minimize the length of the saw-cut (homerun on preformed detector loops) unless directed otherwise by the Engineer or as shown on the plan.

The detector loop cable insulation shall be labeled with the cable specifications.

Each loop detector lead-in wire shall be labeled in the handhole using a water proof tag, from an approved vendor, secured to each wire with nylon ties.

Resistance to ground shall be a minimum of 100 mega-ohms under any conditions of weather or moisture. Inductance shall be more than 50 and less than 700 microhenries. Quality readings shall be more than 5.

- (a) Type I. All loops installed in new asphalt pavement shall be installed in the binder course and not in the surface course. The edge of pavement, curb and handhole shall be cut with a 1/4 inch (6.3 mm) deep x 4 inches (100 mm) saw cut to mark location of each loop cable.
- (b) Loop sealant shall be two-component thixotropic chemically cured polyurethane from an approved vendor. The sealant shall be installed 1/8 inch (3 mm) below the pavement surface. If installed above the surface the excess shall be removed immediately.
- (c) Preformed. This work shall consist of furnishing and installing a rubberized or cross linked polyethylene heat resistant preformed traffic signal loop in accordance with the Standard Specifications, except for the following:

- (d) Preformed detector loops shall be installed in new pavement constructed of Portland cement concrete using mounting chairs or tied to re-bar or the preformed detector loops may be placed in the sub-base. Loop lead-ins shall be extended to a temporary protective enclosure near the proposed handhole location. The protective enclosure shall provide sufficient protection from other construction activities and may be buried for additional protection.
- (e) Handholes shall be placed next to the shoulder or back of curb when preformed detector loops enter the handhole. CNC, included in this pay item, shall be used to protect the preformed lead-ins from back of curb to the handhole.
- (f) Preformed detector loops shall be factory assembled with ends capped and sealed against moisture and other contaminants. The loop configurations and homerun lengths shall be assembled for the specific application. The loop and homerun shall be constructed using 11/16 inch (17.2 mm) outside diameter (minimum), 3/8 inch (9.5 mm) inside diameter (minimum) Class A oil resistant synthetic cord reinforced hydraulic hose with 250 psi (1,720 kPa) internal pressure rating or a similarly sized XLPE cable jacket. Hose for the loop and homerun assembly shall be one continuous piece. No joints or splices shall be allowed in the hose except where necessary to connect homeruns to the loops. This will provide maximum wire protection and loop system strength. Hose tee connections shall be heavy duty high temperature synthetic rubber. The tee shall be of proper size to attach directly to the hose, minimizing glue joints. The tee shall have the same flexible properties as the hose to insure that the whole assembly can conform to pavement movement and shifting without cracking or breaking. For XLPE jacketed preformed loops, all splice connections shall be soldered, sealed, and tested before being sealed in a high impact glass impregnated plastic splice enclosure. The wire used shall be #16 THWN stranded copper. The number of turns in the loop shall be application specific. Homerun wire pairs shall be twisted a minimum of four turns per foot. No wire splices will be allowed in the preformed loop assembly. The loop and homeruns shall be filled and sealed with a flexible sealant to insure complete moisture blockage and further protect the wire. The preformed loops shall be constructed to allow a minimum of 6.5 feet of extra cable in the handhole.

Method of Measurement.

Add the following to Article 886.05 of the Standard Specifications:

Preformed detector loops will be measured along the detector loop embedded in the pavement, rather than the actual length of the wire. Detector loop measurements shall include the saw cut and the length of the detector loop wire to the edge of pavement. The detector loop wire, including all necessary connections for proper operations, from the edge of pavement to the handhole, shall be included in the price of the detector loop. CNC, trench and backfill, and drilling of pavement or handholes shall be included in detector loop quantities.

Basis of Payment.

This work shall be paid for at the contract unit price per foot (meter) for DETECTOR LOOP, TYPE I or PREFORMED DETECTOR LOOP as specified in the plans, which price shall be payment in full for furnishing and installing the detector loop and all related connections for proper operation.

**RELOCATE EXISTING EMERGENCY VEHICLE PRIORITY SYSTEM, DETECTOR UNIT**

Effective: January 1, 2002  
Revised: July 1, 2015  
887.02TS

This item shall consist of relocating the existing emergency vehicle priority system, detector unit (single channel or dual channel) from its existing location to a new traffic signal post or mast arm assembly and pole, and connecting it to an emergency vehicle priority system, phasing unit. If the existing Emergency Vehicle Priority System, Detector Unit Assembly includes a Confirmation Beacon, the Confirmation Beacon shall also be relocated and connected to the Emergency Vehicle Priority System, Detector Unit and shall be included at no cost in this item.

The emergency vehicle system is not to be inoperative for more than 8 hours and the Contractor must notify the Municipality or Fire Protection District 72 hours prior to the disconnection of the equipment.

Basis of Payment.

This item will be paid for at the contract unit price each for RELOCATE EXISTING EMERGENCY VEHICLE PRIORITY SYSTEM, COMPLETE.

**RELOCATE EXISTING EMERGENCY VEHICLE PRIORITY SYSTEM, PHASING UNIT**

Effective: January 1, 2002  
Revised: July 1, 2015  
887.03TS

This item shall consist of relocating the existing emergency vehicle priority system phasing unit from an existing traffic signal controller cabinet to a new traffic signal controller cabinet, as indicated in the plans or as directed by the Engineer.

The work shall include disconnecting the emergency vehicle priority system phasing unit(s) and reconnecting it into the new traffic signal controller cabinet.

The emergency vehicle system is not to be inoperative for more than 8 hours and the Contractor must notify the Municipality or Fire Protection District 72 hours prior to the disconnection of the equipment. The Contractor must demonstrate to the satisfaction of the Engineer that the emergency vehicle system operates properly.

Basis of Payment.

This item will be paid for at the contract unit price each for RELOCATE EXISTING EMERGENCY VEHICLE PRIORITY SYSTEM, COMPLETE.

**MODIFY EXISTING CONTROLLER CABINET**

Effective: May 22, 2002

Revised: July 1, 2015

895.01TS

The work shall consist of modifying an existing controller cabinet as follows:

- (a) Uninterruptable Power Supply (UPS). The addition of uninterruptable power supply (UPS) to an existing controller cabinet could require the relocation of the existing controller cabinet items to allow for the installation of the uninterruptable power supply (UPS) components inside the existing controller cabinet as outlined under Sections 862 and 1074.04 of the Standard Specifications and the wiring of UPS alarms.
- (b) Light Emitting Diode (LED) Signal Heads, Light Emitting Diode (LED) Optically Programmed Signal Heads and Light Emitting Diode (LED) Pedestrian Signal Heads. The contractor shall verify that the existing load switches meet the requirements of Section 1074.03(b)(2) of the Standard Specifications and the recommended load requirements of the light emitting diode (LED) signal heads that are being installed at the existing traffic signal. If any of the existing load switches do not meet these requirements, they shall be replaced, as directed by the Engineer.
- (c) Light Emitting Diode (LED), Signal Head, Retrofit. The contractor shall verify that the existing load switches meet the requirements of Section 1074.03(b)(2) of the Standard Specifications and the recommended load requirements of light emitting diode (LED) traffic signal modules, pedestrian signal modules, and pedestrian countdown signal modules as specified in the plans. If any of the existing load switches do not meet these requirements, they shall be replaced, as directed by the Engineer.
- (d) This item shall include the upgrade of all non-railroad controller software to the latest version available at the time of the signal TURN-ON.

Basis of Payment.

Modifying an existing controller cabinet will be paid for at the contract unit price per each for MODIFY EXISTING CONTROLLER CABINET. This shall include all material and labor required to complete the work as described above, the removal and disposal of all items removed from the controller cabinet, as directed by the Engineer. The equipment for the Uninterruptable Power Supply (UPS) and labor to install it in the existing controller cabinet shall be included in the pay item Uninterruptable Power Supply, Special or Uninterruptable Power Supply, Ground Mounted.

## **REMOVE EXISTING TRAFFIC SIGNAL EQUIPMENT**

Effective: May 22, 2002

Revised: July 1, 2015

895.02TS

Add the following to Article 895.01 of the Standard Specifications:

This work shall also include the removal of the lighting mast arm, luminaire, and all hardware associated with the roadway lighting unit attached to the traffic signal pole.

Add the following to Article 895.05 of the Standard Specifications:

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

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

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

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

- (e) Existing lighting equipment. The existing lighting equipment attached to the traffic signal pole shall be removed and disposed of as listed in the plans and as directed by the Engineer. The Contractor shall be responsible for repairing or replacing any items of equipment damaged during the process to the satisfaction of the Engineer. All equipment shall be disposed

The lighting equipment which is to be removed and is to become the property of the Contractor shall be disposed of outside the right-of-way at the Contractor's expense.

## HIGH-FRICTION SURFACE TREATMENT (BMPR/BSE)

Effective: January 1, 2014

Description. This work shall consist of constructing a High-Friction Surface Treatment (HFST) on a hot-mix asphalt or portland cement concrete pavement surface to restore or enhance the skid resistance. The HFST shall be composed of calcined bauxite aggregate bound with a polymeric resin. A list of potential firms, known to IDOT, that can complete HFST work is included in Attachment 1.

RETURN WITH BID (N/A if firm is on Attachment 1)

\_\_\_\_ (firm name)  
\_\_\_\_ (firm address)  
\_\_\_\_ (contact name, telephone & e-mail)

Materials. Materials shall be according to the following requirements.

- (a) General. The Contractor shall provide certification for both the polymeric resin binder and aggregate that states the material meets the requirements listed in Tables 1 and 2 at least 60 days prior to construction. Laboratory testing for third party certification shall be performed by an accredited laboratory for properties identified in Tables 1 and 2. The aggregate certification shall reflect that testing was performed within 12 months of the project letting date.

Independent assurance samples of the polymeric resin binder (boxed storage – 1 boxed unit; tank storage – 2 gal (8 L) of each component) and aggregate (two 40-lb (18-kg) bags) shall be submitted to the Bureau of Materials and Physical Research 60 days prior to construction.

Materials shall be stored in a clean, dry environment and in accordance to the manufacturer's recommendations.

Material Safety Data Sheet (MSDS), Product Data Sheet, and other information pertaining to the safe practices for the storage, handling, and disposal of the materials, and to their health hazards shall be obtained from the manufacturer and posted at storage areas. A copy of such information shall be provided to the Engineer.

- (b) Polymeric Resin Binder. The polymeric resin binder shall consist of a two part thermosetting polymer resin compound which holds the aggregate firmly in position, and conforms to the requirements of Table 1.

Table 1 – Polymeric Resin Binder Material Properties Requirements

| Property                       | Test Method           | Requirements                                |
|--------------------------------|-----------------------|---------------------------------------------|
| Viscosity, Poises              | ASTM D 2556           | 7 - 30                                      |
| Ultimate Tensile Strength, psi | AASHTO M 235, Class C | 2,500 - 5,000                               |
| Compressive Strength, psi      | ASTM C 579            | 1,000 min. (3 hours)<br>5,000 min. (7 days) |
| Gel Time, minutes              | AASHTO M 235, Class C | 10 min.                                     |
| Water Absorption, %            | AASHTO M 235          | 1 max.                                      |
| Durometer Hardness (Shore D)   | ASTM D 2240           | 60 - 80                                     |

|                                     |                                                                                    |                                    |
|-------------------------------------|------------------------------------------------------------------------------------|------------------------------------|
| Cure Rate (Dry through time), hours | ASTM D 1640,<br>55 mil wet thickness @ 75 °F                                       | 3 max.                             |
| Elongation at Break Point, %        | AASHTO M 235                                                                       | 30 - 70                            |
| Mixing Ratio                        | Provide manufacturer's recommendations a minimum of 60 days prior to construction. | Per Manufacturer                   |
| Adhesion Strength, psi @ 24 hrs     | ASTM D 4541                                                                        | 250 min. or 100% substrate failure |

- (c) Aggregate. The aggregate shall be calcined bauxite that is clean, dry, free from foreign matter, and conforms to the requirements in Table 2. Deliver the calcined bauxite to the construction site in clearly labeled super sacks weighing at least 2,200 lb (1,000 kg). When hand applications are necessary, 55 lb (25 kg) bags of material may be substituted. A list of potential producers/suppliers, known to IDOT, is included in Attachment 2.

RETURN WITH BID (N/A if producer/supplier is on Attachment 2)

\_\_\_\_ (Producer/Supplier name)  
\_\_\_\_ (Producer/Supplier address)  
\_\_\_\_ (contact name, telephone & e-mail)

Table 2 – Aggregate Material Properties Requirements

| Property                                                                                        | Test Method              | Requirements                                                  |
|-------------------------------------------------------------------------------------------------|--------------------------|---------------------------------------------------------------|
| Gradation<br><u>Sieve Designation</u><br>No. 4 (4.75 mm)<br>No. 6 (3.35 mm)<br>No. 16 (1.18 mm) | AASHTO T 27              | <u>Percent Passing (min.)</u><br>100<br>95.0-100.0<br>0.0-5.0 |
| Moisture Content, %                                                                             | AASHTO T 255             | 0.2 max.                                                      |
| Aluminum Oxide, %                                                                               | ASTM C 25                | 87 min.                                                       |
| LA Abrasion Test, %                                                                             | AASHTO T 96, (D grading) | 20 max.                                                       |

Equipment. Equipment shall be according to the following.

- (a) Truck Mounted Application Machine. Use an approved self-propelled truck mounted application machine capable of continuously and thoroughly mixing polymeric resin binder components to the ratio recommended by the polymeric resin manufacturer at a minimum coverage rate of 15 gal/min (57 L/min). The machine shall include an aggregate drop spreader capable of mechanically continuously spreading bauxite aggregate at a minimum rate of 13 lb/sq yd (7 kg/sq m) in varying widths of up to 12 ft (3.6 m), with a minimum height from spreader to pavement surface of 24 in. (600 mm) to achieve proper spread of aggregate.
- (b) Portable Shot Blast Equipment. Use approved portable shot blast equipment meeting the requirements of Article 1101.13 to remove curing compound and prepare portland cement concrete surfaces prior to application of the polymeric resin.
- (c) Regenerative Air Sweeper (RAS). Use a self-propelled Regenerative Air Sweeper (RAS) with power brooms capable of cleaning the existing pavement and removing loose aggregate

without dislodging the bonded HFST aggregate. The vacuum head shall have a minimum width of 6 ft (2 m) and blast re-circulated, filtered air at a minimum rate of 20,000 cu ft/min (565 cu m/min). The RAS must be capable of recycling loose aggregate into clean, uncontaminated, and dry aggregate. The RAS must be capable of being used without water for dust suppression to ensure a dry surface will be maintained.

### CONSTRUCTION REQUIREMENTS.

Qualifications. The Contractor that is placing the HFST shall provide documentation showing HFST or equivalent experience on at least three projects with similar state highway agencies.

Quality Control (QC) Plan. Submit a QC Plan to the District Materials Engineer for approval at least 60 days prior to the placement. The QC Plan shall show proposed methods to control the equipment, materials, mixing, and paving operations to ensure conformance with these Specifications. Discuss the QC Plan requirements at the pre-construction, pre-pave, and progress meetings. The QC Plan shall contain at a minimum the following information.

- (a) Key Personnel and contact information.
- (b) Polymeric resin production plants, location of plants, personnel qualifications, inspection and record keeping methods, equipment calibration records, and accreditation certificates.
- (c) Aggregate production plant locations, personnel qualifications, inspection and record keeping methods, equipment calibration records, and accreditation certificates.
- (d) Moisture control methods of aggregate.
- (e) List of manufacturer recommendations for storage of material, weather restrictions, curing time, and opening to traffic.
- (f) Cleaning and maintenance schedule for truck mounted application machine, including metering and monitoring devices.
- (g) Corrective actions that will be taken for unsatisfactory construction practices and deviations from specifications.
- (h) A technical expert representative from the polymeric resin manufacturer shall be present at the construction site to train construction personnel prior to placing the HFST and shall remain on the project for the first two days of paving. After the first two days, the representative shall be available during HFST application as necessary.

The QC Plan shall designate a QC Manager, who shall have full authority to institute any action necessary for the successful operation of the QC Plan. The QC Manager shall be on the jobsite at all times during placement of the HFST.

A field technician shall be present at the job site unless otherwise approved in the QC Plan. The field technician shall be responsible for the required field quality control sampling and testing in conformance with the approved quality control plan and contract documents. All sampling shall be performed in the presence of and in locations as directed by the Engineer. Maintain and make available upon request complete records of sampling, testing, actions taken to correct problems,

and quality control inspection results. Any deviation from the approved QC Plan shall be cause for immediate suspension of operations.

Weather Restrictions. The polymeric resin binder material shall be applied on dry surfaces (including no condensation moisture from construction vehicles in front of binder application), when the ambient temperature is 55 °F (13 °C) and rising, unless the polymeric resin manufacturer can provide test data to support installations at lower temperatures; and below 105 °F (40 °C), or when the anticipated weather conditions or pavement surface temperature would prevent the proper application of the surface treatment in accordance with the manufacturer's recommendations. Ensure the polymeric resin components are capable of being mixed at lower than ambient temperatures in the event that the components are stored outdoors.

HFST materials shall not be placed when rain is forecast within 24 hours of application.

There shall be no visible moisture present on the surface of the pavement at the time of application of the HFST. A plastic sheet left taped in place for a minimum of two hours, according to ASTM D 4263, shall be used to identify moisture in the pavement.

Preparation. Perform roadway patching in accordance with Section 442 of the Standard Specifications. Clean and fill all inadequately sealed joints and cracks 1/4 to 1-3/4 in. (6 to 43 mm) wide with a sealant approved by the polymeric resin manufacturer, which will bond to the specified polymeric resin binder. Crack sealing shall be performed in accordance with Section 451 or 452 of the Standard Specifications, except the crack shall be only filled flush with no "band-aid" effect. Where HFST will be applied on either new asphalt or new concrete surface or patches in a project, construct HFST a minimum of 30 days after placement of underlying and adjacent pavement. Completely remove all curing compounds on new portland cement concrete surfaces using shot blasting equipment prior to installation. Remove existing pavement markings in areas to be covered with HFST in accordance with Section 783 of the Standard Specifications. Adequately cover and protect all utilities and existing pavement markings (in areas where markings will be left in place) prior to HFST placement.

Clean existing surfaces with a RAS without dust suppression water, or by other methods approved by the QC Manager and the Engineer prior to application of the polymeric resin. Surfaces may need to be washed with a mild detergent, and then rinsed and dried using a hot compressed air lance. Receiving surfaces must be clean, dry and free of all dust, oil, debris and any other material that might interfere with the bond between the polymeric resin binder material and existing surfaces.

Test Section. Construct a test section (minimum of 200 sq yd (168 sq m)) within the project to demonstrate the truck mounted application machine has been properly calibrated. This test section shall be considered part of the HFST quantity on the project. Correct deficient areas before opening to traffic as directed at no additional cost to the Department. Open the test section to traffic after curing has completed, and no uncovered polymeric resin remains exposed.

Binder Application. Mix the binder components proportionally in accordance with the manufacturer's recommended ratio. Apply the two part polymeric resin base binder by a Truck Mounted Application Machine onto the pavement section to be treated within the temperature range specified in varying widths of up to 12 ft (3.6 m) wide at a uniform application rate of 3.5 sq yd/gal (0.75 sq m/L) with a uniform thickness of 60 mils (1.5 mm) onto the pavement. Do not allow the binder to separate in the mixing lines, cure, dry, chill, set up, or otherwise impair retention

bonding of the high friction surfacing aggregate. Ensure that no seams are visible in the middle of the traffic lanes of the finished work after application of the surface aggregate.

Hand application may be used when less than 300 sq yd (250 sq m) will be used in a project. Mix the binder components to the correct proportion within 4 percent by weight using a low speed high torque drill fitted with a helical stirrer. Hand apply the mixed components onto a prepared pavement surface using a serrated edged squeegee resulting in a minimum coverage rate of 3.5 sq yd/gal (0.75 sq m/L) with a uniform thickness of 60 mils (1.5 mm) onto the pavement.

Aggregate Application. Apply the aggregate immediately after placing the polymeric resin binder at a uniform rate of 11-15 lb/sq yd (6-8 kg/sq m). Completely cover the “wet” polymeric resin binder with aggregate to achieve a uniform surface with no exposed polymeric resin remaining visible on the surface. A Truck Mounted Application Machine aggregate drop spreader must be used unless less than 300 sq yd (250 sq m) will be applied in a project, in which case, hand application may be used. Sprinkle or vertically drop the aggregate without splashing the wet polymeric resin film during placement, whether by mechanical or manual means.

Sampling and Testing. During the first day of construction, samples of the polymeric resin binder (boxed storage – one boxed unit; tank storage – 2 gal (8 L) of each component) and aggregate (two 40-lb (18-kg) bags) shall be taken from the materials on the jobsite and submitted to the Bureau of Materials and Physical Research. The Contractor shall supply the sample containers, and sample and label the material under the direct observation of the Engineer.

Curing and Clean Up. Allow the treatment to cure in accordance with polymeric resin manufacturer recommendations. Perform three separate clean up processes by removing the excess aggregate with a RAS on the treated area and adjacent areas. Perform initial clean up before opening to traffic. Excess aggregate can be reused on the following day’s installation provided the reclaimed aggregate is clean, uncontaminated and dry. Perform secondary clean up 3 to 5 days after construction. Perform final clean up 3 to 5 weeks after construction.

Field Acceptance Testing. Ensure that the coverage rate of the retained aggregate is 11-15 lb/sq yd (6-8 kg/sq m). Remove and re-apply HFST where any patches of exposed polymeric resin exist, at no additional cost to the Department. The HFST treated area will be tested by the Department within 60 days after construction in accordance with the requirements in Table 3. Remove and replace deficient locations as directed.

Table 3 – Field Acceptance Testing Requirements

| Property                                                       | Requirements | Frequency                                                                                         | Test Method                 |
|----------------------------------------------------------------|--------------|---------------------------------------------------------------------------------------------------|-----------------------------|
| FN40R (Corrected field FN by adding the correction in Table 4) | 72 min.      | Every 0.1 mile in each lane.<br>By Department                                                     | ASTM E 274<br>(Ribbed tire) |
| Field Dynamic Friction Value (20 km/hr) (By IDOT)<br>OPTIONAL  | 0.90 min.    | 1 per each location, or<br>1 per every 1,500 lane-feet,<br>whichever is shorter.<br>By Department | ASTM E 1911                 |
| Mean Profile Depth (mm)<br>OPTIONAL                            | 1.0 min.     | 1 per each location, or<br>1 per every 1,500 lane-feet,<br>whichever is shorter.<br>By Department | ASTM E 2157                 |

Table 4 – HFST Speed Correction Factors for ASTM E 274 Testing Using a Ribbed Tire

| Test Speed<br>(mph) | FN<br>Correction | Test Speed<br>(mph) | FN<br>Correction | Test Speed<br>(mph) | FN<br>Correction |
|---------------------|------------------|---------------------|------------------|---------------------|------------------|
| 20                  | -9.3             | 30                  | -4.8             | 40                  | 0.0              |
| 21                  | -8.9             | 31                  | -4.4             | 41                  | 0.5              |
| 22                  | -8.4             | 32                  | -3.9             | 42                  | 1.0              |
| 23                  | -8.0             | 33                  | -3.4             | 43                  | 1.5              |
| 24                  | -7.6             | 34                  | -2.9             | 44                  | 2.0              |
| 25                  | -7.1             | 35                  | -2.5             | 45                  | 2.5              |
| 26                  | -6.7             | 36                  | -2.0             | 46                  | 3.1              |
| 27                  | -6.2             | 37                  | -1.5             | 47                  | 3.6              |
| 28                  | -5.8             | 38                  | -1.0             | 48                  | 4.1              |
| 29                  | -5.3             | 39                  | -0.5             | 49                  | 4.6              |

Method of Measurement. High Friction Surface Treatment will be measured for payment in square yards (sq m). The width for measurement will be the width of the top surface as shown on the plans or directed by the Engineer.

Patches will be measured for payment according to Article 442.10 of the Standard Specifications.

Pavement marking removal will be measured for payment according to Article 783.05 of the Standard Specifications.

Crack/joint sealing will be measured for payment according to Article 451.05 or 452.05 of the Standard Specifications.

Basis of Payment. High Friction Surface Treatment will be paid for at the contract unit price per square yard (square meter) for HIGH FRICTION SURFACE TREATMENT.

Patches will be paid for according to Article 442.11 of the Standard Specifications.

Pavement marking removal will be measured for payment according to Article 783.06 of the Standard Specifications.

Crack/joint sealing will be paid for according to Article 451.06 or 452.06 of the Standard Specifications.

## **ATTACHMENT 1**

### High Friction Surface Treatment Contractors (Alphabetical Order)

American Civil Constructors West Coast, Inc.  
3701 Mallard Drive  
Benicia, CA 94510  
Attention: Cliff Barber  
Office: (707) 746-8028  
Mobile: (707) 310-0225

DBI Services  
High Friction Surfacing Division /Interstate Road Management Corp 322  
Rocky Road  
Hazleton, PA 18201  
Attention: Richard J. Baker  
Office: (804) 213-0335  
Cell: (804) 539-5582

Calcined Bauxite Producers/Suppliers  
(Alphabetical Order)

CE- Minerals:  
Route 2  
Newell, WV 26050  
Phone: (304) 387-1160  
Fax: (304) 387-2205

Global Mineral Corp.  
5701 Democracy Blvd. Suite 300  
Bethesda, MD 20817  
Phone: (301) 571-2449  
Fax: (301) 571-9339

Great Lakes Minerals  
1200 Port Road  
Wurtland, KY 41144  
Phone: (606) 833-8383  
Fax: (606) 834-1106

Newport Industries:  
5201 Blue Lagoon Drive, 8th Floor  
Miami, Florida 33126  
Phone: (305) 716-4231  
Fax: (305) 629-3100