

# 161

**Letting June 12, 2020**

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



**Contract No. 60X94  
COOK County  
Section 2014-015R&B-R  
Route FAI 90/94  
Project NHPP-J7VU(032)  
District 1 Construction Funds**

Prepared by

Checked by

F

(Printed by authority of the State of Illinois)



- 1. TIME AND PLACE OF OPENING BIDS.** Electronic bids are to be submitted to the electronic bidding system (iCX-Integrated Contractors Exchange). All bids must be submitted to the iCX system prior to 12:00 p.m. June 12, 2020 at which time the bids will be publicly opened from the iCX SecureVault.
- 2. DESCRIPTION OF WORK.** The proposed improvement is identified and advertised for bids in the Invitation for Bids as:

**Contract No. 60X94  
COOK County  
Section 2014-015R&B-R  
Project NHPP-J7VU(032)  
Route FAI 90/94  
District 1 Construction Funds**

**Reconstruction of Adams St & Jackson Blvd bridges over I-90/94 including reconstruction of entrance and exit ramps, construction of 5 prop. Conc. Retaining walls and rehab of one existing retaining wall, signing, ITS, lighting and urban enhancements.**

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

By Order of the  
Illinois Department of Transportation

Omer Osman,  
Acting Secretary

INDEX  
 FOR  
 SUPPLEMENTAL SPECIFICATIONS  
 AND RECURRING SPECIAL PROVISIONS

Adopted January 1, 2020

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

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

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RECURRING SPECIAL PROVISIONS

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

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## STATE OF ILLINOIS

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### SPECIAL PROVISIONS

The following Special Provisions supplement the "Standard Specifications for Road and Bridge Construction" adopted April 1, 2016, the latest edition of the "Manual of Uniform Traffic Control Devices for Streets and Highways, the "Manual of Test Procedures for Materials" in effect on the date of invitation for bids, and the Supplemental Specifications and Recurring Special Provisions indicated on the Check Sheets included herein which apply to and govern the construction of FAI Route 90/94, Project NHPP-J7VU(032), Section 2014-015R&B-R, Cook County, Contract No. 60X94 and in case of conflict with any part or parts of said specifications, the said special provisions shall take precedence and shall govern.

### LOCATION OF PROJECT

The project is located along Adams Street and Jackson Boulevard from Halsted Street to N. Des Plaines Street in the City of Chicago, Cook County, Illinois. The gross and net length of the project is 1064 feet (0.202 miles).

### DESCRIPTION OF PROJECT

The work consists of the construction of the Adams Street Bridge (SN 016-1701) and Jackson Boulevard Bridge (SN 016-1702) over Interstate 90/94 and construction of proposed retaining walls #8 (SN 016-1727), #24 (SN 016-Z016), #36 (SN 016-1825), #37 (SN 016-1826), #51(016-Z048) and removal or modifications of existing retaining walls #16, #17, #18 (SN 016-W989).

Work includes bridge construction, retaining wall construction, roadway reconstruction, erosion control and protection, utility relocation of existing storm sewers, non-special waste excavation, special waste excavation, earth excavation and embankment, noise wall construction, removal of existing improvements, miscellaneous storm sewers, pavements, pavement marking and signage, roadway lighting, ITS, traffic control and protection, urban enhancements and all incidental and collateral work necessary to complete the improvements as shown on the Plans and as described herein.

## **SOILS INFORMATION**

Soil boring logs and generalized soil profiles are shown in the Plans for SN 016-1701, SN 016-1702, SN016-1727, SN 016-Z016, SN 016-1825, SN 016-1826, and SN 016-Z048.

The reports below are available for inspection at IDOT District 1, 201 W. Center Court, Schaumburg, Illinois.

Structure Geotechnical Report  
Circle Interchange Reconstruction  
Adams Street (F.A.U. 1421) Bridge  
Existing SN 016-0589 Proposed SN 016-1701  
FAU Route 1421, Section 2014-015 R&B-R  
IDOT D-91-227-13, PTB 163/ITEM 001  
Cook County, Illinois  
Prepared by: Wang Engineering, Inc.  
Original: March 8, 2017  
Revised: August 11, 2017

Technical Memorandum  
Jane Byrne (Circle) Interchange Reconstruction  
Top of Weathered/Sound Bedrock Clarification – West Abutment Drilled Shafts  
Approved SGR for Adams Street Bridge over I-90/94  
Proposed SN 016-1701  
Cook County, Illinois  
Prepared by: Wang Engineering, Inc.  
Original: February 21, 2020

Structure Geotechnical Report  
Circle Interchange Reconstruction  
Jackson Boulevard (F.A.U.1422) Bridge over Interstate 90/94 (Kennedy Expressway)  
Existing SN 016-0588, Proposed SN 016-1702  
Section 2015-020B  
IDOT D-91-227-13, PTB 163/ITEM 001  
Cook County, Illinois  
Prepared by: Wang Engineering, Inc.  
Original: January 30, 2017  
Revised: August 3, 2017

Structure Geotechnical Report  
Circle Interchange Reconstruction  
Retaining Wall 8 (Proposed SN 016-1727)  
Jackson Exit Ramp  
F.A.I Route 90/94, (Kennedy Expressway)  
IDOT D-91-227-13, PTB 163/ITEM 001  
Cook County, Illinois  
Prepared by: Wang Engineering, Inc.  
Original: December 7, 2018  
Revised: N/A

Circle Interchange Reconstruction  
Retaining Wall 24 (Proposed SN 016-Z016)  
NB C-D Road  
F.A.I. Route 90/94, (Kennedy Expressway)  
IDOT D-91-227-13, PTB 163/ITEM 001  
Cook County, Illinois  
Prepared by: Wang Engineering, Inc.  
Original: January 5, 2018  
Revised: January 2, 2019

Structure Geotechnical Report  
Circle Interchange Reconstruction  
Retaining Wall 36 (Proposed SN 016-1825)  
Adams Exit Ramp  
F.A.I. Route 90/94, (Kennedy Expressway)  
IDOT D-91-227-13, PTB 163/ITEM 001  
Cook County, Illinois  
Prepared by: Wang Engineering, Inc.  
Original: November 29, 2017  
Revised: January 2, 2019

Structure Geotechnical Report  
Circle Interchange Reconstruction  
Retaining Wall 37 (Proposed SN 016-1826)  
Jackson Exit Ramp  
F.A.I. Route 90/94, (Kennedy Expressway)  
IDOT D-91-227-13, PTB 163/ITEM 001  
Cook County, Illinois  
Prepared by: Wang Engineering, Inc.  
Original: November 29, 2017  
Revised: January 2, 2019

Structure Geotechnical Report  
Circle Interchange Reconstruction  
Retaining Wall 51 (Proposed SN 016-Z048)  
Existing SN 016-Z048  
FAU Route 1421, Section 2014-015 R&B-R  
IDOT D-91-227-13, PTB 163/ITEM 001  
Cook County, Illinois  
Prepared by: Wang Engineering, Inc.  
Original: January 24, 2018  
Revised: December 3, 2018

Technical Memorandum  
Retaining Wall 51 (Proposed SN 016-Z048)  
Existing SN 016-Z048  
FAU Route 1421, Section 2014-015 R&B-R)  
IDOT D-91-227-13, PTB 163/ITEM 001  
Cook County, Illinois  
Prepared by: Wang Engineering, Inc.  
Original: December 20, 2019

Geotechnical Letter Report  
Jane Byrne Interchange, Contract 60X94  
High Mast Towers  
Cook County, Illinois  
Prepared by Wang Engineering, Inc.  
Original: October 15, 2019

Roadway Geotechnical Report  
Jane Byrne Interchange Reconstruction  
I-90/94 and Connecting Ramps  
62A76, 62A77 and 60X94  
Section 2015-020B and 2014-015R&B-R  
Cook County, Illinois  
Prepared by Wang Engineering, Inc.  
Original: October 28, 2019  
Revised: January 28, 2020



## **PERMITS**

In accordance with Article 107.04 – Permits and Licenses, of the Standard Specifications for Road and Bridge Construction dated January 1, 2016, the Contractor shall procure all permits and licenses, pay all charges and fees, and give all notices necessary and incident to the due and lawful prosecution of the work. These permits may include, but are not limited to, the Chicago Department of Transportation’s Public Right of Way Permit, Chicago Department of Transportation’s Office of Underground Coordination (OUC) and others.

CDOT’s Public Right of Way Permit Office is responsible for issuing permits for the use or work in the public way. Some of the applications and permits that are attainable through the office are: Athletic Events Applications; Parade Applications; Public Assembly Notifications; Commercial Refuse Containers Permits; Deep Foundation Permits; Driveway Permits; Public Way Opening Permits; and Public Right of Way Use Permits.

The CDOT Office of Underground Coordination (OUC) is responsible for all requests regarding existing utility information and the review/approval of construction work in or adjacent to the Public Way and all excavations and/or penetrations, such as foundations (piles, caisson, etc.), earth retention systems or major piping installations, deeper than 12 feet. The work in this contract shall follow the Office of Underground Coordination (OUC) submittal guidelines and procedures outlined in Section 3.3 of the Chicago Department of Transportation (CDOT) “Rules and Regulation for Construction in the Public Way” manual in effect on the date of invitation of bids.

The Contractor may not start work on any element of work requiring a City of Chicago or any other permit until such permit has been received. All costs related to the permit requirements will be included in the cost of the contract.

## **CONTRACTOR COOPERATION**

The Contractor's attention is directed to the fact that other separate contracts may be under construction during the duration of this Contract. Adjacent contracts may consist of, but are not limited to projects near:

Contract 62A74	Water Main Relocation/Rehabilitation and Retaining Wall Near UIC (Jane Byrne Interchange)
Contract 60X79	Ramp EN (Jane Byrne Interchange)
Contract 60X93	Interchange Ramp Completions
Contract 62A76	Northbound I-90/94 from Roosevelt Rd to Lake St/Madison St
Contract 62A77	Southbound I-90/94 from Roosevelt Rd to Lake St/Madison St
Contract 62J31	Advance Jackson Boulevard
Contract 60Y00	Interchange High Mast Lighting and Interchange Intelligent Transportation Systems

University of Illinois at Chicago – Miscellaneous Projects  
City of Chicago Department of Transportation Projects

The Contractor will be governed by Article 105.08 of the Standard Specifications.

The Contractor will be required to attend a weekly coordination meeting at a time and location to be determined by the Department.

The Contractor will coordinate proposed project start dates and sequence of construction with the Engineer and other Contractors to present an effective and timely schedule for successful completion of the project.

The cooperation between work under this contract, Contracts 62A76, 62A77, 60X79, 62J31 and 60X93 is essential due to the adjacent limits of construction and shared maintenance of traffic responsibilities along I-90/94. All traffic staging configurations and changes to staging along I-90/94 and associated ramps shall be coordinated with the contractor performing work under Contracts 60X79, 62J31, 60X93, 62A76, and 62A77, except the full lane closures necessary for beam placement will be coordinated by 60X94.

Contracts 62A76, 62A77, and 62J31 and this contract include a number of adjacent and overlapping work zones and in numerous locations, one contract includes improvements that will allow proposed work to proceed in the other contract or one contract includes active traffic that may prevent work in the other contract from occurring for a period of time. Cooperation between these contracts and contractors is critical.

## **PROGRESS SCHEDULE**

Description. Time is of the essence in this Contract. It may be necessary for the Contractor to work longer hours, use additional crews, and work during weekends in order to complete the work within the required time limit. The Contractor shall submit a Critical Path Method (CPM) Progress Schedule as described below for the Engineer's approval before the work can be started.

The Contractor will not be allowed any compensation for working longer hours or using extra shifts; and working on weekends or during Holidays; working during winter months, etc. to meet the specified Completion Date.

This work shall consist of preparing, revising and updating a detailed progress schedule based upon the Critical Path Method (CPM). This work shall also consist of performing time impact analysis of the progress schedule based upon the various revisions and updates as they occur.

Requirements. The software shall produce an electronic progress schedule for submission to the department that is 100% compatible with Primavera SureTrak 3.0 Project Manager, published by Primavera Systems, Inc.

Format. The electronic schedule format shall contain the following:

- a. Project Name: (Optional).
- b. Template: Construction.
- c. Type: SureTrak: Native file format for stand-alone contracts.
- d. Planning Unit: Days (calendar working).
- e. Number/Version: Original or updated number.
- f. Start Date: Not later than ten days after execution of the contract.
- g. Must Finish Date: Completion date for completion date contracts.
- h. Project Title: Contract number.
- i. Company Name: Contractor's name.

### Calendars.

- a. Completion Date Contracts. The base calendar shall show the proposed working days of the week and the proposed number of work hours per day.

Schedule Development. The detailed schedule shall incorporate the entire contract time. The minimum number of activities shown on the schedule shall represent the work incorporating the pay items whose aggregate contract value constitutes 80 percent of the total contract value. These pay items shall be determined by starting with the pay item with the largest individual contract value and adding subsequent pay item contract values in descending order until 80 percent of the contract value has been attained. Any additional activities required to maintain the continuity of the schedule logic shall also be shown.

The following shall be depicted in the schedule for each activity:

- a. Activity Identification (ID) Numbers. The Contract shall utilize numerical designations to identify each activity. Numbering of activities shall be in increments of not less than ten digits.
- b. A description of the work represented by the activity (maximum forty-five characters). The use of descriptions referring to a percentage of a multi-element item (i.e., construct deck 50%) shall not be used. Separate activities shall be included to represent different elements of multi-element items (i.e., forms, reinforcing, concrete, etc.). Multiple activities with the same work description shall include a location as part of the description.
- c. Proposed activity duration shall be shown in whole days. The Contractor shall provide production rates to justify the activity duration. Schedule duration shall be contiguous and not interruptible.

The schedule shall indicate the sequence and interdependence of activities required for the prosecution of the work. The schedule logic shall not be violated.

Activities should be broken down such that each activity encompasses a single operation or tightly-integrated operations in a single, contiguous and continuous area of the project, with no activity exceeding \$200,000 without the consent of the Engineer.

Total Float shall be calculated as finish float. The schedule shall be calculated using retained logic. The Contractor shall not sequester float by calendar manipulations or extended duration. Float is not for the exclusive use or benefit of either the Department or the Contractor.

Tabular Reports.

- a. The following tabular reports will be required with each schedule submission:
  1. Classic Gantt
  2. Pert with Time Scale
- b. The heading of each tabular report shall include, but not be limited to, the project name, contract number, Contractor name, report date, data date, report title and page number.
- c. Each of the tabular reports shall also contain the following minimum information for each activity.
  1. Activity ID
  2. Activity Description
  3. Original Duration (calendar day/working day)
  4. Remaining Duration (calendar day/working day)
  5. Activity Description
  6. Early Start Date
  7. Late Start Date
  8. Early Finish Date
  9. Late Finish Date
  10. Percent Complete
  11. Total Float
  12. Calendar ID
  13. Work performed by DBE Subcontractors and Trainees shall be shown in the Gantt Report.
- d. Reports shall be printed in color on 11 in. x 17 in. (minimum) size sheets. The Classic Gantt shall show all columns, bars, column headings at the top, time scale at the top and shall show relationships.

Submission Requirements. The initial schedule shall be submitted prior to starting work but no later than five calendar days after execution of the contract. Updated schedules shall be submitted according to Article 108.02 except that as a minimum, updated schedules will be required at the 25, 50, and 75 percent completion points of the contract.

Updating.

- a. The Contractor shall not make any changes to the original duration, activity relationships, constraints, costs, add or delete activities, or alter the schedule's logic when updating the schedule.
- b. The originally approved baseline CPM schedule will be designated as the "Target Schedule" and shall only be changed based on a Change Order that extends the Contract duration. All updates will be plotted against the "Target Schedule." If the Contractor believes any such changes result in an overall increase in the contract time, the Contractor will immediately submit a request for extension of time along with the changed progress schedule and a detailed justification for the time extension request in accordance with Article 108.08.
- c. The updated information will include the original schedule detail and the following additional information:
  1. Actual start dates
  2. Actual finish dates
  3. Activity percent completion
  4. Remaining duration of activities in progress
  5. Identified or highlighted critical activities
- d. The Contractor shall submit scheduling documents in the same formats and number as indicated in this section.
- e. The Engineer shall withhold progress payments if the Contractor does not submit scheduled updates as required.
- f. Upon receipt of the CPM schedule update, the Engineer will review the schedule for conformance with the Contract Documents and degree of detail. The Engineer, within fourteen (14) Days after receipt of the Updated CPM Schedule and supporting documents, will approve or reject it with written comments. If the Updated CPM schedule is rejected, the Contractor must submit a Revised Updated CPM Schedule within seven (7) Days after the date of rejection.
- g. The updated progress schedule must accurately represent the Project's current status.

Contractor Changes to the Schedule.

The Contractor shall comply with the following requirements regarding proposed changes to the approved baseline CPM schedule:

- a. If the Contractor proposes to make any changes in the approved baseline CPM schedule, the Contractor shall notify the Engineer in writing, stating the reasons for the change, identifying each changed activity (including duration and interrelationships between activities) and providing a diskette of the proposed changed schedule. Every effort must be made by the Contractor to retain the original Activity ID numbers.
- b. The Engineer has the authority to approve or disapprove the proposed change in the baseline CPM schedule and shall do so in writing within ten (10) Days after receipt to the Contractor's submission.
- c. If the Engineer approves the change in the baseline. All monthly updates will be plotted against the new "Target Schedule".
- d. If the Engineer approves a portion of the change to the baseline CPM schedule, the Contractor shall submit a revised CPM schedule incorporating such change(s) within ten (10) Days after approval along with a written description of the change(s) to the schedule.

Recovery Schedule.

- a. The Contractor shall maintain an adequate work force and the necessary materials, supplies and equipment to meet the current approved baseline CPM schedule. In the event that the Contractor, in the judgment of the Engineer, is failing to meet the approved CPM schedule including any Contract milestones, the Contractor shall submit a recovery schedule.
- b. The recovery schedule shall set forth a plan to eliminate the schedule slippage (negative float). The plan must be specific to show the methods to achieve the recovery of time, i.e. increasing manpower, working overtime, weekend work, employing multiple shifts. All costs associated with implementing the recovery schedule shall be borne by the Contractor.
- c. Upon receipt of the CPM recovery schedule, the Engineer will review the schedule for conformance with the Contract Documents and degree of detail. The Engineer will approve the schedule or reject it with written comments within fourteen (14) Days of receipt of the recovery schedule and supporting documents. If the detailed CPM recovery schedule is rejected, the Contractor must submit a revised CPM recovery schedule within seven (7) Days of the date of rejection.

Revised Schedule.

The Engineer may direct the Contractor to revise the approved CPM schedule. Reasons for such direction may include, but are limited to, the following: (1) changes in the Work, (2) rephrasing of the Project or any phase, (3) a change in the duration of the Project or phase, and (4) acceleration of the Project or phase.

- a. The Engineer will direct the Contractor to provide a revised CPM schedule in writing.
- b. The Contractor will provide the revised CPM schedule within ten (10) Days of receipt of the Engineer's written direction.
- c. The Engineer has the authority, in its sole discretion, to approve or reject the revised CPM schedule and will do so in writing within ten (10) Days after receipt of the Contractor's submission. If the Engineer approves the revised schedule, such schedule will be designated the new "Target Schedule".

The schedule shall be submitted in the Sorted by Activity Layout (SORT4). The activities on the schedule shall be plotted using early start, late start, early finish, late finish and total finish.

For every schedule submission, the Contractor shall submit to the Engineer, four Windows XP compatible compact disks of all schedule data. Included on the disks shall be all of the tabular and graphic reports, network diagrams and bar chart data. Two copies shall be submitted on CD/R disks and two copies shall be submitted on CDD/RW disks. In addition, four plots of the CD/R disks will be approved initial or revised progress schedule for the contract. The approval will be documented by the Engineer on a corresponding plot of the schedule and returned to the Contractor.

Four copies of each schedule submission shall be printed in color on 11 in. x 17 in. (minimum) size sheets showing all columns, bars, column headings at the top, time scale at the top and showing relationships.

The schedule shall indicate the critical path to contract completion. Only one controlling item shall be designated at any point in time on the schedule.

Acceptance or approval of any progress schedule by the Engineer shall not be construed to imply approval of any particular method of construction, sequence of construction, any implied or stated rate of production. Acceptance will not act as a waiver of the obligation of the Contractor to complete the work in accordance with the contract proposal, Plans and Specifications, modify any rights or obligations of the Department as set forth in the contract, nor imply any obligation of a third party. Acceptance shall not be construed to modify or amend the contract or the time limit(s) therein. Acceptance shall not relieve the Contractor of the responsibility for the accuracy of any of the information included on the schedule. Failure of the Contractor to include in the schedule any element of work required for the performance of the contract, any sequence of work required by the contract, or any known or anticipated condition affecting the work shall not excuse the Contractor from completing all work required within the time limit(s) specified in the contract notwithstanding acceptance of the schedule by the Engineer.

Basis of Payment. This work will not be paid for separately, but shall be considered as included in the costs of the various items of work in the contract.



## **WINTER WORK**

No adjustment will be made in the contract unit prices for any concrete if winter work is necessary to meet the required completion dates specified in the contract.

## **SUBMITTALS**

There are elements of construction that may require long lead times between order and delivery to the project site for installation. The Contractor must prioritize timely submittals of shop drawings to minimize any delays in project execution.

The Contractor shall provide notice to the Engineer concerning shop drawing submittal schedules and when shop drawing submittal deadlines may be delayed.

## **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**

All temporary lane closures *on arterial streets* 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 COMPLETE THE WORK ON TIME**

Effective: September 30, 1985

Revised: January 1, 2007

Should the Contractor fail to complete the work on or before the completion date as specified in the Special Provision for "Completion Date Plus Working Days", or within such extended time as may have been allowed by the Department, the Contractor shall be liable to the Department in the amount of **\$10,000**, not as a penalty but as liquidated damages, for each calendar day or a portion thereof of overrun in the contract time or such extended time as may have been allowed.

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

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

## **COMPLETION DATE PLUS WORKING DAYS**

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 **November 30, 2022.**

The Jackson Boulevard Bridge, Jackson Boulevard SB Exit Ramp, Adams Street Bridge and Adams Street SB Exit Ramp work shall be completed to the satisfaction of the engineer and opened to traffic on or before September 30, 2022.

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.

## **STORM SEWER AND SEWER CONNECTION TO CITY OF CHICAGO SEWERS**

Effective: September 30, 1985

Revised: January 1, 2007

This work consists of constructing storm sewers or sewer connections to City of Chicago sewers, in accordance with Section 550 of the Standard Specifications and the details shown in the plans at the locations shown on the plans.

All storm sewers and sewer connections 21 inches (525 mm) in diameter and smaller shall be best quality tile socket pipe conforming to the specifications for Extra Strength Clay Pipe, ASTM C 700, except as otherwise specified on the plans. Sewer pipes shall be gasketed in such a manner as to produce a compression type joint conforming to the requirements of ASTM C 425.

All storm sewer 24 inches (600 mm) in diameter or larger shall be reinforced concrete pipe conforming to the requirements of C-76, Class-III, wall "B" with "O-Ring" joints. Joints for catch basin and inlet connections shall be packed with oakum, caulked and beveled off with portland cement mortar.

Basis of Payment. This work will be measured and paid for at the contract unit price per foot (meter) for STORM SEWER in accordance with Articles 550.09 and 550.10 of the Standard Specifications.

**AGGREGATE FOR CONCRETE BARRIER (D-1)**

Effective: February 11, 2004

Revised: January 24, 2008

Add the following paragraph to Article 637.02 of the Standard Specifications:

“The coarse aggregate to be used in the concrete barrier walls shall conform to the requirement for coarse aggregate used in Class BS concrete according to Article 1004.01(b), paragraph 2.”

**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

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: 701001, 701006, 701101, 701106, 701400, 701401, 701411, 701427, 701428, 701446, 701601, 701606, 701801, 701901, 704001, 720001, 720006, and 782006.

DETAILS: Maintenance of Traffic – General Notes, Narrative, Stages 0B, 1, 2, 3, 4A, 4B, 5, and 6 and TC-08, TC-09, TC-10, TC-11, TC-12, TC-16, TC-17, TC-18, TC-21, TC-22 and TC-24.

### **SPECIAL PROVISIONS:**

- Work Zone Public Information Signs (Recurring SP #20)
- Equipment parking and Storage (BDE)
- Lights on Barricades (BDE)
- Pavement Marking Removal (BDE)
- Public Convenience and Safety (Dist. 1)
- Keeping the Expressway Open to Traffic
- Failure to Open Traffic Lanes to Traffic
- Traffic Control and Protection (Expressways)
- Temporary Information Signing
- Traffic Control for Work Zone Areas
- Speed Display Trailer (D-1)
- Sign Shop Drawing Submittal
- Maintenance of Roadways
- Traffic Control and Protection (Arterials)
- Staging and Interchange Restrictions
- Available Work Areas and Sequencing Requirements
- Road Construction Reporting and Signing for Vehicle Width Restrictions
- Temporary Pavement Marking (BDE)
- Traffic Control Devices – Cones (BDE)
- Traffic Spotters (BDE)
- Work Zone Traffic Control Devices (BDE)

## **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.”

**AGGREGATE SUBGRADE IMPROVEMENT (D-1)**

Effective: February 22, 2012

Revised: April 1, 2016

Add the following Section to the Standard Specifications:

**“SECTION 303. AGGREGATE SUBGRADE IMPROVEMENT**

**303.01 Description.** This work shall consist of constructing an aggregate subgrade improvement.

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

Item	Article/Section
(a) Coarse Aggregate .....	1004.07
(b) Reclaimed Asphalt Pavement (RAP) (Notes 1, 2 and 3) .....	1031

Note 1. Crushed RAP, from either full depth or single lift removal, may be mechanically blended with aggregate gradation CS 01 but shall not exceed 40 percent by weight of the total product. The top size of the Coarse RAP shall be less than 4 in. (100 mm) and well graded.

Note 2. RAP having 100 percent passing the 1 1/2 in (37.5 mm) sieve and being well graded, may be used as capping aggregate in the top 3 in. (75 mm) when aggregate gradation CS 01 is used in lower lifts. When RAP is blended with any of the coarse aggregates, the blending shall be done with mechanically calibrated feeders. The final product shall not contain more than 40 percent by weight of RAP.

Note 3. The RAP used for aggregate subgrade improvement shall be according to the current Bureau of Materials and Physical Research Policy Memorandum, “Reclaimed Asphalt Pavement (RAP) for Aggregate Applications”.

**303.03 Equipment.** The vibratory machine shall be according to Article 1101.01, or as approved by the Engineer. The calibration for the mechanical feeders shall have an accuracy of  $\pm 2.0$  percent of the actual quantity of material delivered.

**303.04 Soil Preparation.** The stability of the soil shall be according to the Department’s Subgrade Stability Manual for the aggregate thickness specified.

**303.05 Placing Aggregate.** The maximum nominal lift thickness of aggregate gradation CS 01 shall be 24 in. (600 mm).

**303.06 Capping Aggregate.** The top surface of the aggregate subgrade shall consist of a minimum 3 in. (75 mm) of aggregate gradations CA 06 or CA 10. When Reclaimed Asphalt Pavement (RAP) is used, it shall be crushed and screened where 100 percent is passing the 1 1/2 in. (37.5 mm) sieve and being well graded. RAP that has been fractionated to size will not be permitted for use in capping. Capping aggregate will not be required when the aggregate subgrade improvement is used as a cubic yard pay item for undercut applications. When RAP is blended with any of the coarse aggregates, the blending shall be done with mechanically calibrated feeders.

**303.07 Compaction.** All aggregate lifts shall be compacted to the satisfaction of the Engineer. If the moisture content of the material is such that compaction cannot be obtained, sufficient water shall be added so that satisfactory compaction can be obtained.

**303.08 Finishing and Maintenance of Aggregate Subgrade Improvement.** The aggregate subgrade improvement shall be finished to the lines, grades, and cross sections shown on the plans, or as directed by the Engineer. The aggregate subgrade improvement shall be maintained in a smooth and compacted condition.

**303.09 Method of Measurement.** This work will be measured for payment according to Article 311.08.

**303.10 Basis of Payment.** This work will be paid for at the contract unit price per cubic yard (cubic meter) for AGGREGATE SUBGRADE IMPROVEMENT or at the contract unit price per square yard (square meter) for AGGREGATE SUBGRADE IMPROVEMENT, of the thickness specified.



Add the following to Section 1004 of the Standard Specifications:

**“1004.07 Coarse Aggregate for Aggregate Subgrade Improvement.** The aggregate shall be according to Article 1004.01 and the following.

- (a) Description. The coarse aggregate shall be crushed gravel, crushed stone, or crushed concrete. The top 12 inches of the aggregate subgrade improvement shall be 3 inches of capping material and 9 inches of crushed gravel, crushed stone or crushed concrete. In applications where greater than 36 inches of subgrade material is required, rounded gravel, meeting the CS01 gradation, may be used beginning at a depth of 12 inches below the bottom of pavement.
- (b) Quality. The coarse aggregate shall consist of sound durable particles reasonably free of deleterious materials. Non-mechanically blended RAP may be allowed up to a maximum of 5.0 percent.
- (c) Gradation.
  - (1) The coarse aggregate gradation for total subgrade thicknesses of 12 in. (300 mm) or greater shall be CS 01.

COARSE AGGREGATE SUBGRADE GRADATIONS					
Grad No.	Sieve Size and Percent Passing				
	8"	6"	4"	2"	#4
CS 01	100	97 ± 3	90 ± 10	45 ± 25	20 ± 20

COARSE AGGREGATE SUBGRADE GRADATIONS (Metric)					
Grad No.	Sieve Size and Percent Passing				
	200 mm	150 mm	100 mm	50 mm	4.75 mm
CS 01	100	97 ± 3	90 ± 10	45 ± 25	20 ± 20

- (2) The 3 in. (75mm) capping aggregate shall be gradation CA 6 or CA 10.

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

Effective: November 1, 2011

Revised: November 1, 2013

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

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

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

**DRAINAGE AND INLET PROTECTION UNDER TRAFFIC (D- 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)..... 1030
- (j) Temporary Rubber Ramps (Note 2)

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

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

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

Revise Article 603.07 of the Standard Specifications to read:

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

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

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

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

Placement shall be according to the manufacturer’s specifications.

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

## **EMBANKMENT I**

Effective: March 1, 2011

Revised: November 1, 2013

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

Material. All material shall be approved by the District Geotechnical Engineer. The proposed material must meet the following requirements.

- a) The laboratory Standard Dry Density shall be a minimum of 90 lb/cu ft (1450 kg/cu m) when determined according to AASHTO T 99 (Method C).
- b) The organic content shall be less than ten percent determined according to AASHTO T 194 (Wet Combustion).
- c) Soils which demonstrate the following properties shall be restricted to the interior of the embankment and shall be covered on both the sides and top of the embankment by a minimum of 3 ft (900 mm) of soil not considered detrimental in terms of erosion potential or excess volume change.
  - 1) A grain size distribution with less than 35 percent passing the number 75 um (#200) sieve.
  - 2) A plasticity index (PI) of less than 12.
  - 3) A liquid limit (LL) in excess of 50.
- d) Reclaimed asphalt shall not be used within the ground water table or as a fill if ground water is present.
- e) The RAP used shall be according to the current Bureau of Materials and Physical Research Policy Memorandum, "Reclaimed Asphalt Pavement (RAP) for Aggregate Applications". Gradation deleterious count shall not exceed 10% of total RAP and 5% of other by total weight.

## CONSTRUCTION REQUIREMENTS

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

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

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

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

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

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

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

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

**ENGINEER'S FIELD OFFICE TYPE A (SPECIAL)**

Effective: December 1, 2011

Revised: May 1, 2013

Revise the first paragraph of Article 670.02 to read:

670.02 Engineer's Field Office Type A (Special). Type A (Special) field offices shall have a ceiling height of not less than 7 feet and a floor space of not less than 4000 square feet with a minimum of two separate offices. The office shall also have a separate storage room capable of being locked for the storage of the nuclear measuring devices. The office shall be provided with sufficient heat, natural and artificial light, and air conditioning. Doors and windows shall be equipped with locks approved by the Engineer.

Revise the first sentence of the second paragraph of Article 670.02 to read:

An electronic security system that will respond to any breach of exterior doors and windows with an on-site alarm shall be provided.

Revise the last sentence of the third paragraph of Article 670.02 to read:

Adequate all-weather parking space shall be available to accommodate a minimum of sixteen vehicles. These parking spaces shall be exclusively for Phase III consultant staff use.

Revise the fifth paragraph of Article 670.02 to read:

Sanitary facilities shall include hot and cold potable running water, lavatory and toilet as an integral part of the office where available. Solid waste disposal consisting of seven waste baskets and an outside trash container of sufficient size to accommodate a weekly provided pick-up service. A weekly cleaning service for the office shall be provided.

Revise subparagraph (a) of Article 670.02 to read:

- (a) Twenty-four desks with minimum working surface 42 inch x 30 inch each and twelve non-folding chairs with upholstered seats and backs.

Revise the first sentence of subparagraph (c) of Article 670.02 to read:

- (c) Two four-post drafting tables with minimum top size of 37-½ inch x 48 inch.

Revise subparagraph (d) of Article 670.02 to read:

- (d) Eight free standing four-drawer legal size file cabinets with lock and an underwriters' laboratories insulated file device 350 degrees one hour rating.

Revise subparagraph (e) of Article 670.02 to read:

- (e) Twenty folding chairs and two conference tables with minimum top size of 44 inch x 96 inch.

Revise subparagraph (h) of Article 670.02 to read:

- (h) Three electric desk type tape printing calculator and two pocket scientific notation calculators with a 1000 hour battery life or with a portable recharger.

Revise subparagraph (i)(2) of Article 670.02 to read:

- (i)(2) Telephones lines. Five separate telephone lines including one line for the fax machine, and two lines for the exclusive use of the Engineer. All telephone lines shall include long distance service and all labor and materials necessary to install the phone lines at the locations directed by the Engineer. The TELCOM company shall configure ROLL/HUNT features as specified by the engineer.

Revise subparagraph (j) of Article 670.02 to read:

- (j) Two plain paper network multi-function printer/copier/scanner machines capable of reproducing prints up to 11 inch x 17 inch within automatic feed tray capable of sorting 30 sheets of paper. Letter size and 11 inch x 17 inch paper shall be provided. The contractor shall provide the multi-function machines with IT support for setup and maintenance.

Revise subparagraph (k) of Article 670.02 to read:

- (k) One plain paper fax machine including maintenance and supplies.

Revise subparagraph (l) of Article 670.02 to read:

- (l) Six four-line telephones, with touch tone, where available, and two digital answering machines, for exclusive use by the Engineer.



Revise subparagraph (m) of Article 670.02 to read:

- (m) One electric water cooler dispenser including water service.

Add the following subparagraphs to Article 670.02:

- (s) One 4 foot x 6 foot chalkboard or dry erase board.
- (t) One 4 foot x 6 foot framed cork board.

Add the following to Article 670.07 Basis of Payment.

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

**FRICITION AGGREGATE (D-1)**

Effective: January 1, 2011

Revised: November 1, 2019

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

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

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

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

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

Use	Mixture	Aggregates Allowed	
		75% Dolomite <sup>2/</sup>	Crushed Sandstone, Crushed Slag (ACBF), Crushed Steel Slag, or Crystalline Crushed Stone
		75% Crushed Gravel <sup>2/</sup> or Crushed Concrete <sup>3/</sup>	Crushed Sandstone, Crystalline Crushed Stone, Crushed Slag (ACBF), or Crushed Steel Slag
HMA High ESAL	F Surface IL-9.5  SMA Ndesign 80 Surface	<u>Allowed Alone or in Combination</u> <sup>5/ 6/</sup> :  Crystalline Crushed Stone Crushed Sandstone Crushed Slag (ACBF) Crushed Steel Slag No Limestone.	
		<u>Other Combinations Allowed:</u>	
		<i>Up to...</i>	<i>With...</i>
		50% Crushed Gravel <sup>2/</sup> , Crushed Concrete <sup>3/</sup> , or Dolomite <sup>2/</sup>	Crushed Sandstone, Crushed Slag (ACBF), Crushed Steel Slag, or Crystalline Crushed Stone

- 1/ Crushed steel slag allowed in shoulder surface only.
- 2/ Carbonate crushed stone (limestone) and/or crushed gravel shall not be used in SMA Ndesign 80. In SMA Ndesign 50, carbonate crushed stone shall not be blended with any of the other aggregates allowed alone in Ndesign 50 SMA binder or Ndesign 50 SMA surface.
- 3/ Crushed concrete will not be permitted in SMA mixes.
- 4/ Crushed steel slag shall not be used as leveling binder.
- 5/ When combinations of aggregates are used, the blend percent measurements shall be by volume.”
- 6/ Combining different types of aggregate will not be permitted in SMA Ndesign 80.”

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

Effective: June 29, 2006

Revised: April 1, 2016

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

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

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

Note 1. GTR shall be produced from processing automobile and/or light truck tires by the ambient grinding method. GTR shall not exceed 1/16 in. (2 mm) in any dimension and shall contain no free metal particles or other materials. A mineral powder (such as talc) meeting the requirements of AASHTO M 17 may be added, up to a maximum of four percent by weight of GTR to reduce sticking and caking of the GTR particles. When tested in accordance with Illinois modified AASHTO T 27, a 50 g sample of the GTR shall conform to the following gradation requirements:

Sieve Size	Percent Passing
No. 16 (1.18 mm)	100
No. 30 (600 µm)	95 ± 5
No. 50 (300 µm)	> 20

Add the following to the end of Note 1. of article 1030.03 of the Standard Specifications:

“A dedicated storage tank for the Ground Tire Rubber (GTR) modified asphalt binder shall be provided. This tank must be capable of providing continuous mechanical mixing throughout by continuous agitation and recirculation of the asphalt binder to provide a uniform mixture. The tank shall be heated and capable of maintaining the temperature of the asphalt binder at 300 °F to 350 °F (149 °C to 177 °C). The asphalt binder metering systems of dryer drum plants shall be calibrated with the actual GTR modified asphalt binder material with an accuracy of ± 0.40 percent.”

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

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

Add the following note to 1030.02 of the Standard Specifications:

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

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

Effective: November 1, 2019

Revised: February 2, 2020

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

Materials. Revise Article 1004.03(c) to read:

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

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

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

2/ The coarse aggregates used shall be capable of being combined with stone sand, slag sand, or steel slag sand meeting the FA/FM 20 gradation and mineral filler to meet the approved mix design and the mix requirements noted herein.

3/ The specified coarse aggregate gradations may be blended.

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

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

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

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

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

Revise Article 1030.02 of the Standard Specifications and Supplemental Specifications to read:

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

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

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

Note 2. The asphalt binder shall be an SBS PG 76-28 when the SMA is used on a full-depth asphalt pavement and SBS PG 76-22 when used as an overlay, except where modified herein. The asphalt binder shall be a SBS PG 76-22 for IL-4.75, except where modified herein. The elastic recovery shall be a minimum of 80.

Note 3. A stabilizing additive such as cellulose or mineral fiber shall be added to the SMA mixture according to Illinois Modified AASHTO M 325. The stabilizing additive shall meet the Fiber Quality Requirements listed in Illinois Modified AASHTO M 325. Prior to approval and use of fibers, the Contractor shall submit a notarized certification by the producer of these materials stating they meet these requirements. Reclaimed Asphalt Shingles (RAS) may be used in Stone Matrix Asphalt (SMA) mixtures designed with an SBA polymer modifier as a fiber additive if the mix design with RAS included meets AASHTO T305 requirements. The RAS shall be from a certified source that produces either Type I or Type 2. Material shall meet requirements noted herein and the actual dosage rate will be determined by the Engineer.

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



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

High ESAL, MIXTURE COMPOSITION (% PASSING) <sup>1/</sup>										
Sieve Size	IL-19.0 mm		SMA 12.5		SMA 9.5		IL-9.5mm		IL-4.75 mm	
	min	max	min	max	min	max	min	max	min	max
1 1/2 in. (37.5 mm)										
1 in. (25 mm)		100								
3/4 in. (19 mm)	90	100		100						
1/2 in. (12.5 mm)	75	89	80	100		100		100		100
3/8 in. (9.5 mm)				65	90	100	90	100		100
#4 (4.75 mm)	40	60	20	30	36	50	34	69	90	100
#8 (2.36 mm)	20	42	16	24 <sup>4/</sup>	16	32 <sup>4/</sup>	34 <sup>5/</sup>	52 <sup>2/</sup>	70	90
#16 (1.18 mm)	15	30					10	32	50	65
#30 (600 μm)			12	16	12	18				
#50 (300 μm)	6	15					4	15	15	30
#100 (150 μm)	4	9					3	10	10	18
#200 (75 μm)	3	6	7.0	9.0 <sup>3/</sup>	7.5	9.5 <sup>3/</sup>	4	6	7	9 <sup>3/</sup>
#635 (20 μm)			≤ 3.0		≤ 3.0					
Ratio Dust/Asphalt Binder		1.0		1.5		1.5		1.0		1.0

1/ Based on percent of total aggregate weight.

2/ The mixture composition shall not exceed 44 percent passing the #8 (2.36 mm) sieve for surface courses with N<sub>design</sub> = 90.

3/ Additional minus No. 200 (0.075 mm) material required by the mix design shall be mineral filler, unless otherwise approved by the Engineer.

4/ When establishing the Adjusted Job Mix Formula (AJMF) the percent passing the #8 (2.36 mm) sieve shall not be adjusted above the percentage stated on the table.

5/ When establishing the Adjusted Job Mix Formula (AJMF) the percent passing the #8 (2.36 mm) sieve shall not be adjusted below 34 percent.

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

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

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

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

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

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

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

- 1/ Maximum draindown shall be 0.3 percent. The draindown shall be determined at the JMF asphalt binder content at the mixing temperature plus 30 °F.
- 2/ Applies when specific gravity of coarse aggregate is ≥ 2.760.
- 3/ Applies when specific gravity of coarse aggregate is < 2.760.
- 4/ Blending of different types of aggregate will not be permitted. For surface course, the coarse aggregate can be crushed steel slag, crystalline crushed stone or crushed sandstone. For binder course, coarse aggregate shall be crushed stone (dolomite), crushed gravel, crystalline crushed stone, or crushed sandstone.

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

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

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

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

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

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

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

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

- a. Confined Edge. Each confined edge density shall be represented by a one-minute nuclear density reading or a core density and shall be included in the average of density readings or core densities taken across the mat which represents the Individual Test.
- b. Unconfined Edge. Each unconfined edge joint density shall be represented by an average of three one-minute density readings or a single core density at the given density test location and shall meet the density requirements specified herein. The three one-minute readings shall be spaced 10 ft (3 m) apart longitudinally along the unconfined pavement edge and centered at the random density test location.

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

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

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

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

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

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

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

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

Construction Requirements.

Add the following to Article 406.03 of the Standard Specifications:

“(j) Oscillatory Roller ..... 1101.01”

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

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

Revise Article 406.05(c) to read.

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

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

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

Revise Article 406.06(d) to read:

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

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

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

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

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

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

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

- “O<sub>T</sub> - Oscillatory roller, tangential impact mode. Maximum speed is 3.0 mph (4.8 km/h) or 264 ft/min (80 m/min).
- O<sub>B</sub> - Oscillatory roller, tangential and vertical impact mode, operated at a speed to produce not less than 10 vertical impacts/ft (30 impacts/m).”

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

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

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

- (a.) Sufficient collected dust (baghouse) is available for production of the SMA mix for the entire project.
- (b.) A mix design was prepared based on collected dust (baghouse).

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

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

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

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

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

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

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

Note: For SMA Designs (N-80) the maximum rut depth is 6.0 mm at 20,000 repetitions.  
For IL 4.75mm Designs (N-50) the maximum rut depth is 9.0mm at 15,000 repetitions.

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

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

"(a) High ESAL, IL-4.75, WMA, and SMA Mixtures. For each contract, a 300 ton (275 metric tons) test strip, except for SMA mixtures it will be 400 ton (363 metric ton), will be required at the beginning of HMA production for each mixture at the beginning of each construction year according to the Manual of Test Procedures for Materials "Hot Mix Asphalt Test Strip Procedures". At the request of the Producer, the Engineer may waive the test strip if previous construction during the current construction year has demonstrated the constructability of the mix using Department test results."

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

"The Hamburg Wheel test shall also be conducted on all HMA mixtures from a sample taken within the first 500 tons (450 metric tons) on the first day of production or during start up with a split reserved for the Department. The mix sample shall be tested according to the Illinois Modified AASHTO T 324 and shall meet the requirements specified herein. Mix production shall not exceed 1500 tons (1350 metric tons) or one day's production, whichever comes first, until the testing is completed and the mixture is found to be in conformance. The requirement to cease mix production may be waived if the plant produced mixture demonstrates conformance prior to start of mix production for a contract.

If the mixture fails to meet the Hamburg Wheel criteria, no further mixture will be accepted until the Contractor takes such action as is necessary to furnish a mixture meeting the criteria"

Method of Measurement:

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

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



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

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

**LIGHTWEIGHT CELLULAR CONCRETE FILL (D-1)**

Effective: November 11, 2001

Revised: June 18, 2018

**General:** This work consists of providing lightweight cellular concrete fill (LCCF) at the locations(s) and according to the dimensions shown in the contract plans, and as directed by the Engineer.

**Submittals:** Within 45 calendar days prior to proposed installation, the Contractor shall submit the following:

- (a) The name of the subcontractor providing and installing the light weight cellular fill. The Contractor shall present an organization chart including names, telephone numbers, current certifications and/ or titles, and roles and responsibilities of all those involved in the manufacturing and installation of the lightweight cellular fill.
- (b) Manufacturer's specifications, catalog cuts, and other product data needed to demonstrate compliance with specified requirements. These shall include reports and test results from laboratories.
- (c) The subcontractor installing the lightweight fill shall be certified in writing by the Manufacturer of the lightweight fill. The certified applicator shall be regularly engaged in the placement of lightweight fill of a similar nature including the completion of mass fills having a minimum of 13,000 cu yd (9,950 cu m) in the past five years.

(d) A description of the proposed installation procedure. The procedure shall address the following.

- (1) Proposed construction sequence and schedule.
- (2) Location of the equipment and batching areas.
- (3) Type of equipment and tools to be used.

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

Item	Article/Section
(a) Portland Cement (Note 1) .....	1001
(b) Water .....	1002
(c) Fine Aggregate.....	1003
(d) Concrete Admixtures.....	1021
(e) Foaming Agent (Note 2)	

Note 1. Pozzolans and finely divided minerals will not be permitted.

Note 2. The foaming agent shall be according to ASTM C 869, and shall be listed on the Department's Approved/Qualified Product List of Foaming Agents for Cellular Concrete. The manufacturer shall provide an infrared spectrophotometer trace no more than five years old. When the infrared spectrophotometer trace is more than seven years old, a new one shall be provided.

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

Item	Article/Section
(a) Concrete Mixers and Trucks .....	1103.01
(b) Batching and Weighing Equipment .....	1103.02
(c) Automatic and Semi-Automatic Batching Equipment.....	1103.03
(d) Water Supply Equipment.....	1103.11
(e) Mobile Portland Cement Concrete Plants.....	1103.04
(f) Foam Generator (Notes 1 & 3)	
(g) Mobile Site Batch Plant (Notes 2 & 3)	

Note 1. Foam generating equipment shall be calibrated daily to produce an accurate volume of foam.

Note 2. Mobile site batch plants shall be capable of mixing and pumping cellular concrete, and shall have a minimum 1 cu yd (0.76 cu m) capacity. Mobile site plants shall be calibrated before the start of the project, and then during the project as determined by the Engineer.

Note 3. Foam generators and mobile site batch plants shall be certified in writing by the manufacturer of the lightweight cellular concrete and approved by the Engineer.

**Lightweight Cellular Concrete Classes.** The four general classes of lightweight cellular concrete delineated by as-cast density and minimum compressive strength are given in Table 1. If the class of lightweight cellular concrete is not specified in the contract, the class to use shall be as directed by the Engineer.

Table 1. CLASSES OF LIGHTWEIGHT CELLULAR CONCRETE				
Class	Maximum Lift Height	As-Cast Density	Minimum Compressive Strength	
			Psi (kPa)	
			Days	
			7	28
I	4 (1.2)	24 - 32 (384 - 513)	30 (205)	40 (275)
II	4 (1.2)	30 - 38 (481 - 609)	60 (415)	80 (550)
III	2.5 (0.76)	36 - 44 (577 - 705)	90 (620)	120 (825)
IV	2.5 (0.76)	44 - 52 (705 - 833)	115 (795)	150 (1035)

**Other Lightweight Cellular Concrete Criteria.** The lightweight cellular concrete shall be according to the following.

- (a) Proportioning and Mix Design. For all Classes of lightweight cellular concrete, it shall be the Contractor's responsibility to determine the mix design material proportions and to proportion each batch. The Contractor shall provide the mix designs a minimum of 45 calendar days prior to production. The Engineer will verify the mix design submitted by the Contractor.

For a new mix design to be verified, the Engineer will require the Contractor to provide a trial batch at no cost to the Department. The trial batch shall be scheduled a minimum of 30 calendar days prior to anticipated use and shall be performed in the presence of the Engineer. A minimum of 1 cu yd (0.75 cu m) trial batch shall be produced and placed offsite. The trial batch shall be produced with the equipment, materials, and methods intended for construction. The trial batch will be evaluated and tested by the Contractor and Engineer via split samples for as-cast density and compressive strength according to the sampling and testing requirements specified herein. The lightweight cellular concrete will also be evaluated and tested by the Engineer according to Illinois Test Procedure 501, as applicable.

Verification of the mix design will include trial batch test results and other criteria as determined by the Engineer. The Contractor will be notified in writing of verification. Verification of a mix design shall in no manner be construed as acceptance of any mixture produced. Tests performed at the jobsite will determine if a mix design can meet specifications.

- (b) Admixtures. Admixture use shall be according to Article 1020.05(b).
- (c) Temperature. The air temperature at the time of placement and for 24 hours thereafter shall be a minimum of 35 °F (2 °C). The temperature of the lightweight cellular concrete at point of discharge shall be a minimum of 45 °F (7 °C) and a maximum of 95 °F (35 °C).

**Curing.** Curing may be required for applications with significant surface area exposed (least width dimension of minimum 80 ft (24 m)) to the elements if rapid drying conditions are expected during placement, as determined by the Engineer. When curing is required, each lift shall be cured with a method recommended by the manufacturer of the lightweight cellular concrete. If curing compound is used, it shall be compatible with other construction materials it may interact with, and shall not inhibit bond of subsequent lifts.

**Quality Control Sampling and Testing by the Contractor.** The Contractor shall sample and test the lightweight cellular concrete as follows:

- (a) As-Cast Density. The first batch placed each day and a minimum rate of one per hour thereafter shall be sampled and tested as described for “experimental density of the concrete after pumping” according to ASTM C 796, except the hose length shall be that used for jobsite placement. The as-cast density shall be the average of at least two tests. Additional tests shall be done if adjustments are made to the materials. These tests shall be documented.

If the average as-cast density is outside the specified tolerance from Table 1, the Contractor shall reject the batch or make an adjustment to the mix before placement. Adjustments to the mix shall be accomplished by either increasing or decreasing the foam only.

- (b) Compressive Strength. First batch placed each day and every 200 cu yd (155 cu m) thereafter shall be sampled according to ASTM C 495, except that samples shall not be oven dried at any time before testing. The minimum number of batches sampled per day shall be two. Eight 3 in. x 6 in. (75 mm x 150 mm) cylindrical test specimens shall be molded from each sample.

A compressive strength test is defined as the average of four cylinder breaks. For each sample, tests shall be conducted at 7 and 28 days.

**Quality Assurance Sampling and Testing by the Engineer.** The Engineer will sample and test the lightweight cellular concrete for quality assurance on independent and split samples. An independent sample is a field sample obtained and tested by only one party. A split sample is one of two equal portions of a field sample, where two parties each receive one portion for testing. The Engineer may request the Contractor to obtain a split sample. Any failing strength test specimen shall be retained until permission is given by the Engineer for disposal. The results of all quality assurance tests by the Engineer will be made available to the Contractor. However, Contractor split sample test results shall be provided to the Engineer before Department test results are revealed. The Engineer’s quality assurance independent sample and split sample testing for placement or acceptance will be as follows:

- (a) As-Cast Density. One independent or split sample test for the first batch placed each day and as determined by the Engineer thereafter.
- (b) Compressive Strength. One independent or split sample for the first batch placed each day and as determined by the Engineer thereafter.

**Comparing Test Results.** Differences between the Engineer's and the Contractor's split sample test results will be considered reasonable if within the following limits.

Test Parameter	Acceptable Limits of Precision
Compressive Strength	5 psi (34.5 kPa)
Density	1 lb/cu ft (16 kg/cu m)

Action shall be taken when either the Engineer's or the Contractor's test results are not within specification limits for strength or density. Action may include, but is not limited to, the Contractor being required to replace or repair test equipment as determined by the Engineer.

Placed material that fails in compressive strength will be considered unacceptable.

**Acceptance by the Engineer.** Final acceptance will be based on the Standard Specifications and the following:

- (a) Validation of Contractor quality control test results using split samples. Any quality control or quality assurance test determined to be flawed may be declared invalid only when reviewed and approved by the Engineer. The Engineer will declare a test result invalid only if it is proven that improper sampling or testing occurred. The test result is to be recorded and the reason for declaring the test invalid will be provided by the Engineer.
- (b) Comparison of the Engineer's quality assurance test results with specification limits using samples independently obtained by the Engineer.

The Engineer may suspend mixture production, reject materials, or take other appropriate action if the Contractor does not control the quality of lightweight cellular concrete. The decision will be determined according to (a) or (b).

**Installation.** Prior to installation, the ground surface shall be cleared of organic top soils, debris, sharp objects, and trees. Tree stumps shall be either removed or cut to the level of the ground surface. All wheel tracks or ruts in excess of 3 in. (75 mm) in depth shall be graded smooth or otherwise filled with soil to provide a reasonable smooth surface.

If a geotechnical fabric for ground stabilization or geomembrane is specified in conjunction with the LCCF, it shall be furnished and installed as specified elsewhere in the Contract and shall be in place prior to placing the LCCF.

The lightweight cellular concrete fill shall be placed according to the approved installation procedures provided by the manufacturer.

There shall be no standing water in the area to be filled. If necessary, dewatering shall be continuous during the time the lightweight cellular concrete fill is constructed. Lightweight cellular concrete fill shall not be placed during or when periods of precipitation are expected unless placed in an enclosed, covered area and the ground water is diverted away from the LCCF.

If any items are to be encased in the fill, the items shall be set to the final location both horizontally and vertically prior to installation of the LCCF.

Mixing and placement of the LCCF shall be done as follows:

- (a) After mixing, the materials shall be promptly placed in the final location.
- (b) No mechanical vibration of the LCCF shall be permitted.
- (c) The material shall be placed to prevent segregation. Intermediate lifts shall be placed horizontal while only the top lift shall be sloped to grade. The final surface elevation of the lightweight cellular concrete fill shall be within  $\pm 1.5$  inches ( $\pm 38$  mm) of the plan elevation.
- (d) Limit the area of placement to the volume that can be placed within 1 hour, up to the maximum lift height. Stagger placements such that the vertical joints are at least 10 ft (3 m) apart.
- (e) The cellular concrete shall be placed with a hose. The discharge hose length shall not exceed 800 ft (244 m) in length. Discharge from the hose shall not be allowed to flow more than 30 ft (9 m) from where it is deposited to its final position.  
  
Heavy construction equipment or other unusual loading of the lightweight cellular concrete fill shall not be permitted.
- (f) Construction activities on any recently placed lift will not be permitted until at least 12 hours has elapsed and a minimum compressive strength of 8 psi (50 kPa) has been achieved. However, if any work on the recently placed LCCF results in cracking or indentations of more than an 0.125 inch (3 mm), the contractor shall discontinue construction, revise their wait time, mix strength or equipment used and submit to the Engineer for approval.
- (g) Sawing or ripping of the lightweight cellular concrete fill for utilities, drains or other conflicts will be by methods approved by the Engineer and lightweight cellular concrete fill Manufacturer.

**Method of Measurement.** Lightweight cellular fill shall be measured for payment in cubic yards (cubic meters) according to Article 202.07.

**Basis of Payment.** This work will be paid for at the contract unit price per cubic yards (cubic meter) for LIGHTWEIGHT CELLULAR CONCRETE FILL.



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

Effective: May 1, 2012

Revised: July 15, 2012

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

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

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

“The length of Holiday Period for Thanksgiving shall be from 5:00 AM the Wednesday prior to 11:59 PM the Sunday after”

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

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

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

Effective: November 1, 2012

Revise: November 1, 2019

Revise Section 1031 of the Standard Specifications to read:

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

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

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

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

- (a) RAP Stockpiles. The Contractor shall construct individual, sealed RAP stockpiles meeting one of the following definitions. Additional processed RAP (FRAP) shall be stockpiled in a separate working pile, as designated in the QC Plan, and only added to the sealed stockpile when test results for the working pile are complete and are found to meet tolerances specified herein for the original sealed FRAP stockpile. Stockpiles shall be sufficiently separated to prevent intermingling at the base. All stockpiles (including unprocessed RAP and FRAP) shall be identified by signs indicating the type as listed below (i.e. "Non- Quality, FRAP -#4 or Type 2 RAS", etc...).
- (1) Fractionated RAP (FRAP). FRAP shall consist of RAP from Class I, HMA (High and Low ESAL) or equivalent mixtures. The coarse aggregate in FRAP shall be crushed aggregate and may represent more than one aggregate type and/or quality, but shall be at least C quality. All FRAP shall be processed prior to testing and sized into fractions with the separation occurring on or between the #4 (4.75 mm) and 1/2 in. (12.5 mm) sieves. Agglomerations shall be minimized such that 100 percent of the RAP in the coarse fraction shall pass the maximum sieve size specified for the mixture composition of the mix design.
  - (2) Restricted FRAP (B quality) stockpiles shall consist of RAP from Class I, HMA (High ESAL), or HMA (High ESAL). If approved by the Engineer, the aggregate from a maximum 3.0 in. (75 mm) single combined pass of surface/binder milling will be classified as B quality. All millings from this application will be processed into FRAP as described previously.
  - (3) Conglomerate. Conglomerate RAP stockpiles shall consist of RAP from Class I, HMA (High and Low ESAL) or equivalent mixtures. The coarse aggregate in this RAP shall be crushed aggregate and may represent more than one aggregate type and/or quality, but shall be at least C quality. This RAP may have an inconsistent gradation and/or asphalt binder content prior to processing. All conglomerate RAP shall be processed (FRAP) prior to testing. Conglomerate RAP stockpiles shall not contain steel slag or other expansive material as determined by the Department.
  - (4) Conglomerate "D" Quality (DQ). Conglomerate DQ RAP stockpiles shall consist of RAP from HMA shoulders, bituminous stabilized subbases or HMA (Low ESAL)/HMA (Low ESAL) IL-19.0L binder mixture. The coarse aggregate in this RAP may be crushed or round but shall be at least D quality. This RAP may have an inconsistent gradation and/or asphalt binder content. Conglomerate DQ RAP stockpiles shall not contain steel slag or other expansive material as determined by the Department.

- (5) Non-Quality. RAP stockpiles that do not meet the requirements of the stockpile categories listed above shall be classified as “Non-Quality”.

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

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

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

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

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

- (a) FRAP Testing. When used in HMA, the FRAP shall be sampled and tested either during processing or after stockpiling. It shall also be sampled during HMA production.
- (1) During Stockpiling. For testing during stockpiling, washed extraction samples shall be run at the minimum frequency of one sample per 500 tons (450 metric tons) for the first 2000 tons (1800 metric tons) and one sample per 2000 tons (1800 metric tons) thereafter. A minimum of five tests shall be required for stockpiles less than 4000 tons (3600 metric tons).
  - (2) Incoming Material. For testing as incoming material, washed extraction samples shall be run at a minimum frequency of one sample per 2000 tons (1800 metric tons) or once per week, whichever comes first.
  - (3) After Stockpiling. For testing after stockpiling, the Contractor shall submit a plan for approval to the District proposing a satisfactory method of sampling and testing the RAP/FRAP pile either in-situ or by restockpiling. The sampling plan shall meet the minimum frequency required above and detail the procedure used to obtain representative samples throughout the pile for testing.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

The Engineer will notify the Contractor of observed deficiencies.

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

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

1/ Based on washed extraction.



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

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

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

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

(1) RAP from Class I, HMA (High ESAL), or (Low ESAL) IL-9.5L surface mixtures are designated as containing Class B quality coarse aggregate.

(2) RAP from HMA (Low ESAL) IL-19.0L binder mixture is designated as Class D quality coarse aggregate.

(3) RAP from Class I, HMA (High ESAL) binder mixtures, bituminous base course mixtures, and bituminous base course widening mixtures are designated as containing Class C quality coarse aggregate.

(4) RAP from bituminous stabilized subbase and BAM shoulders are designated as containing Class D quality coarse aggregate.

- (b) FRAP. If the Engineer has documentation of the quality of the FRAP aggregate, the Contractor shall use the assigned quality provided by the Engineer.

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

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

- (a) FRAP. The use of FRAP in HMA shall be as follows.
- (1) Coarse Aggregate Size (after extraction). The coarse aggregate in all FRAP shall be equal to or less than the nominal maximum size requirement for the HMA mixture to be produced.
  - (2) Steel Slag Stockpiles. FRAP stockpiles containing steel slag or other expansive material, as determined by the Department, shall be homogeneous and will be approved for use in HMA (High ESAL and Low ESAL) mixtures regardless of lift or mix type.
  - (3) Use in HMA Surface Mixtures (High and Low ESAL). FRAP stockpiles for use in HMA surface mixtures (High and Low ESAL) shall have coarse aggregate that is Class B quality or better. FRAP shall be considered equivalent to limestone for frictional considerations unless produced/screened to minus 3/8 inch.
  - (4) Use in HMA Binder Mixtures (High and Low ESAL), HMA Base Course, and HMA Base Course Widening. FRAP stockpiles for use in HMA binder mixtures (High and Low ESAL), HMA base course, and HMA base course widening shall be FRAP in which the coarse aggregate is Class C quality or better.
  - (5) Use in Shoulders and Subbase. FRAP stockpiles for use in HMA shoulders and stabilized subbase (HMA) shall be FRAP, Restricted FRAP, conglomerate, or conglomerate DQ.
- (b) RAS. RAS meeting Type 1 or Type 2 requirements will be permitted in all HMA applications as specified herein.

- (c) FRAP and/or RAS Usage Limits. Type 1 or Type 2 RAS may be used alone or in conjunction with FRAP in HMA mixtures up to a maximum of 5.0 percent by weight of the total mix.

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

Maximum Asphalt Binder Replacement (ABR) for FRAP with RAS Combination

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

1/ For Low ESAL HMA shoulder and stabilized subbase, the percent asphalt binder replacement shall not exceed 50 % of the total asphalt binder in the mixture.

2/ When the binder replacement exceeds 15 % for all mixes, except for SMA and IL-4.75, the high and low virgin asphalt binder grades shall each be reduced by one grade (i.e. 25 % binder replacement using a virgin asphalt binder grade of PG64-22 will be reduced to a PG58-28). When constructing full depth HMA and the ABR is less than 15 %, the required virgin asphalt binder grade shall be PG64-28.

3/ When the ABR for SMA or IL-4.75 is 15 % or less, the required virgin asphalt binder shall be SBS PG76-22 and the elastic recovery shall be a minimum of 80. When the ABR for SMA or IL-4.75 exceeds 15%, the virgin asphalt binder grade shall be SBS PG70-28 and the elastic recovery shall be a minimum of 80.

4/ When FRAP or RAS is used alone, the maximum percent asphalt binder replacement designated on the table shall be reduced by 10 %.

5/ When the mix has Illinois Flexibility Index Test (I-FIT) requirements, the maximum percent asphalt binder replacement designated on the table may be increased by 5%.

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

- (a) FRAP and/or RAS. FRAP and /or RAS mix designs shall be submitted for verification. If additional FRAP or RAS stockpiles are tested and found to be within tolerance, as defined under "Evaluation of Tests" herein, and meet all requirements herein, the additional FRAP or RAS stockpiles may be used in the original design at the percent previously verified.
- (b) RAS. Type 1 and Type 2 RAS are not interchangeable in a mix design.

The RAP, FRAP and RAS stone specific gravities ( $G_{sb}$ ) shall be according to the "Determination of Aggregate Bulk (Dry) Specific Gravity ( $G_{sb}$ ) of Reclaimed Asphalt Pavement (RAP) and Reclaimed Asphalt Shingles (RAS)" procedure in the Department's Manual of Test Procedures for Materials.

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

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

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

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

(c) HMA Plant Requirements. HMA plants utilizing FRAP and/or RAS shall be capable of automatically recording and printing the following information.

(1) Dryer Drum Plants.

- a. Date, month, year, and time to the nearest minute for each print.
- b. HMA mix number assigned by the Department.
- c. Accumulated weight of dry aggregate (combined or individual) in tons (metric tons) to the nearest 0.1 ton (0.1 metric ton).
- d. Accumulated dry weight of RAS and FRAP in tons (metric tons) to the nearest 0.1 ton (0.1 metric ton).
- e. Accumulated mineral filler in revolutions, tons (metric tons), etc. to the nearest 0.1 unit.
- f. Accumulated asphalt binder in gallons (liters), tons (metric tons), etc. to the nearest 0.1 unit.
- g. Residual asphalt binder in the RAS and FRAP material as a percent of the total mix to the nearest 0.1 percent.
- h. Aggregate RAS and FRAP moisture compensators in percent as set on the control panel. (Required when accumulated or individual aggregate and RAS and FRAP are printed in wet condition.)
- i. When producing mixtures with FRAP and/or RAS, a positive dust control system shall be utilized.
- j. Accumulated mixture tonnage.
- k. Dust Removed (accumulated to the nearest 0.1 ton (0.1 metric ton))

(2) Batch Plants.

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

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

**1031.09 RAP in Aggregate Surface Course and Aggregate Wedge Shoulders, Type B.**

The use of RAP in aggregate surface course and aggregate shoulders shall be as follows.

- (a) Stockpiles and Testing. RAP stockpiles may be any of those listed in Article 1031.02, except "Non-Quality" and "FRAP". The testing requirements of Article 1031.03 shall not apply. RAP used shall be according to the current Central Bureau of Materials Policy Memorandum, "Reclaimed Asphalt Pavement (RAP) for Aggregate Applications".
- (c) Gradation. The RAP material shall meet the gradation requirements for CA 6 according to Article 1004.01(c), except the requirements for the minus No. 200 (75  $\mu$ m) sieve shall not apply. The sample for the RAP material shall be air dried to constant weight prior to being tested for gradation."

**HOT-MIX ASPHALT – MIXTURE DESIGN VERIFICATION AND PRODUCTION (MODIFIED FOR I-FIT DATA COLLECTION) (D-1)**

Effective: January 3, 2020

Description. This special provision requires the Illinois Flexibility Index Test (I-FIT) be used during mixture design verification and production testing for all hot-mix asphalt (HMA) mixtures.

Mixture Design. Add the following to the list of referenced standards in Article 1030.04 of the Standard Specifications:

“Illinois Modified AASHTO TP 124 Determining the Fracture Potential of Asphalt Mixtures Using the Illinois Flexibility Index Test (I-FIT)”

Add to Article 1030.04(d) of the Standard Specifications :

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

High ESAL – Required Samples for Verification Testing <sup>1/</sup>	
Mixture	I-FIT Testing
Binder	total of 3 - 160 mm tall bricks <sup>2/</sup>
Surface	total of 4 - 160 mm tall bricks <sup>2/</sup>

Low ESAL – Required Samples for Verification Testing <sup>1/</sup>	
Mixture	I-FIT Testing
Binder	1 - 160 mm tall brick <sup>2/</sup>
Surface	2 - 160 mm tall bricks <sup>2/</sup>

1/Prepared samples shall be compacted gyratory bricks yielding test specimens with 7.0 ± 1.0% air voids.

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

Add the following to Article 1030.04 (d) of Standard Specification to read:

- (3) I-FIT Flexibility Index (FI) Criteria. I-FIT testing will be according to Illinois Modified AASHTO TP 124 and the results will be for informational purposes only.

Add the following to Article 1030.06 (a) of the Standard Specifications to read:

An I-FIT shall be conducted on all HMA mixtures from a sample taken within the first 500 tons (450 metric tons) on the first day of production or during start up with an 80 lb (36 kg) split reserved for the Department. The mix sample shall be tested according to the Illinois Modified ASSHTO TP 124 Determining the Fracture Potential of Asphalt Mixtures Using the Illinois Flexibility Index Test (I-FIT). Within two working days after sampling, the Contractor shall deliver prepared samples to the District laboratory for verification testing. The required number and size of prepared samples submitted for the I-FIT testing shall be according to the "High ESAL - Required Samples for Verification Testing" table in Article 1030.04(d) above.

Mixture sampled during production for I-FIT will be tested by the Department.

Add the following to the end of Article 1030.06(b) of the Standard Specifications:

"I-FIT testing will be performed for Low ESAL mixtures (excluding Class D patches, pavement patching and incidental HMA) during mixture production. Within two working day after sampling, the Contractor shall deliver prepared samples to the District laboratory for verification testing. The required number and size of prepared samples submitted for the I-FIT testing shall be according to the "Low ESAL - Required Samples for Verification Testing" table in Article 1030.04(d) above."

#### **SLIPFORM PAVING (D-1)**

Effective: November 1, 2014

Revise Article 1020.04 Table 1, Note (5) of Standard Specifications to read:

"The slump range for slipform construction shall be 1/2 to 1 1/2 in."

Revise Article 1020.04 Table 1 (metric), Note (5) of Standard Specifications to read:

"The slump range for slipform construction shall be 13 to 40 mm."



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

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

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

### **UTILITIES TO BE ADJUSTED**

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

**Stage 0B**

STAGE / LOCATION	TYPE	DESCRIPTION	RESPONSIBLE AGENCY	DURATION OF TIME
<p>Jackson Boulevard</p> <p><i>West Abutment West Approach Roadway (Stage 6)</i></p> <p><i>Sta. 8210+83 12' LT to 8211+80, 12' LT</i></p>	<p>Gas Main</p>	<p>Peoples Gas maintains an active 2" main along the north side of the roadway.</p>	<p>Peoples Gas</p>	<p>The gas main is in conflict with construction of the west abutment. The gas main is also in conflict later in the contract in Stage 6 with construction of the roadway pavement and installation of the storm sewer and shall be retired by Peoples Gas.</p> <p><b>Estimated duration: 2 days</b></p>
<p>Jackson Boulevard</p> <p><i>Sta. 8215+04, 5'LT</i></p>	<p>Electric</p>	<p>ComEd maintains a Manhole</p>	<p>ComEd</p>	<p>The electric manhole that is in conflict with construction of the roadway pavement and shall be adjusted by ComEd.</p> <p><b>Estimated duration: 1 day</b></p>
<p>Jackson Boulevard</p> <p><i>Sta 8211+69, 11' RT</i></p>	<p>Fiber Optic</p>	<p>Crown Castle maintains a Handhole west of the Jackson Boulevard Bridge.</p>	<p>Crown Castle (formerly Lighttower Communications)</p>	<p>Crown Castle to remove handhole west of the Jackson Bridge.</p> <p><b>Estimated duration: 10 days</b></p>
<p>Jackson Boulevard</p> <p><i>Sta 8211+56, 71' LT</i></p>	<p>Fiber Optic</p>	<p>Crown Castle maintains a Handhole west of the Jackson Boulevard Bridge.</p>	<p>Crown Castle (formerly Lighttower Communications)</p>	<p>Crown Castle to adjust handhole on the north side of the Jackson west of the Jackson Bridge.</p> <p><b>Estimated duration: 10 days</b></p>

STAGE / LOCATION	TYPE	DESCRIPTION	RESPONSIBLE AGENCY	DURATION OF TIME
Jackson Boulevard  <i>Sta 8214+85 to 8215+10</i> <i>Sta 8211+56 to 8211+94</i>	Fiber Optic	Crown Castle maintains a conduits east and west of the Jackson Boulevard Bridge.	Crown Castle (formerly Lighttower Communications)	Crown Castle to extend conduits of east and west of the Jackson Bridge and connect to the new conduits on the bridge.  <b>Estimated duration: 10 days</b>
Jackson Boulevard  <i>Sta 8211+94 to 8214+85</i>	Fiber Optic	Crown Castle maintains a conduits west of the Jackson Boulevard Bridge.	Crown Castle (formerly Lighttower Communications)	Crown Castle to install hangers into hanger inserts and install 2-4" conduits across the Jackson Bridge.  <b>Estimated duration: 4 days</b>
Jackson Boulevard  <i>Sta 8211+92 to 8214+60</i>	Fiber Optic	RCN is to install a new facility across the Jackson Boulevard Bridge.	RCN	RCN to install hangers into hanger inserts and install 2-4" conduits across the Jackson Bridge  <b>Estimated duration: 4 days</b>
Jackson Boulevard  East Approach Roadway and West Approach Roadway	Fiber Optic	Contractor shall coordinate with RCN on the installation of the proposed fiber optic lines by RCN. From Halsted Street on the West to S. Des Plaines St. on the East.	RCN	RCN to install conduit lines on roadway approaches to the Jackson Bridge.  <b>Estimated duration: 7 days</b>

**Stage 2**

STAGE / LOCATION	TYPE	DESCRIPTION	RESPONSIBLE AGENCY	DURATION OF TIME
Adams Street  <i>West Approach Roadway</i>  <i>Sta. 8310+53, 16' RT, 8310+54, 22' RT</i>	Electric Manhole (2 Manholes)	ComEd maintains electric manholes along the south side of the roadway.	ComEd	The electric manholes are in conflict with construction of the roadway pavement and shall be adjusted by ComEd.  <b>Estimated duration: 2 days</b>

**Stage 5**

STAGE / LOCATION	TYPE	DESCRIPTION	RESPONSIBLE AGENCY	DURATION OF TIME
Jackson Boulevard  <i>West Approach</i>  <i>Sta. 8210+83, 27' LT</i>	Gas Valve	Peoples Gas maintains an active gas valve along the north side of the roadway.	Peoples Gas	The gas valve is in conflict with construction of the proposed sidewalk and shall be relocated adjusted Peoples Gas.  <b>Estimated duration: 2 days</b>
Jackson Boulevard  <i>East Approach</i>  <i>Sta. 8215+04, 5' LT</i>	Electric	ComEd maintains a Manhole	ComEd	The electric manhole that is in conflict with construction of the roadway pavement and shall be adjusted by ComEd.  <b>Estimated duration: 1 day</b>

STAGE / LOCATION	TYPE	DESCRIPTION	RESPONSIBLE AGENCY	DURATION OF TIME
Adams Street  <i>West Approach Roadway</i>  <i>Sta. 8310+53, 16' RT, 8310+54, 22' RT</i>	Electric Manhole (2 Manholes)	ComEd maintains electric manholes along the south side of the roadway.	ComEd	The electric manholes are in conflict with construction of the roadway pavement and shall be adjusted by ComEd.  <b>Estimated duration: 1 day</b>

STAGE / LOCATION	TYPE	DESCRIPTION	RESPONSIBLE AGENCY	DURATION OF TIME
Jackson Boulevard  <i>East Approach Roadway</i> <i>Sta. 8215+10, 28' RT</i>  <i>West Approach Roadway</i> <i>Sta. 8211+41, 28' RT</i>	Fire Hydrant	CDWM maintains fire hydrants located on the south side of the roadway just beyond the limits of the bridge.	CDWM	The fire hydrants are in conflict with construction of the sidewalk and shall be adjusted by CDWM. The contractor shall coordinate with CDWM and perform all earthwork activities, removal and restoration work necessary to relocate the fire hydrant.  <b>Estimated duration: 5 days</b>

**Stage 0B: 48 Days Total Installation**  
**Stage 2: 2 Days Total Installation**  
**Stage 5: 9 Days Total Installation**

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

<b>Agency/Company Responsible to Resolve Conflict</b>	<b>Name of contact</b>	<b>Address</b>	<b>Phone</b>	<b>E-mail address</b>
Peoples Gas	Chuck Creager	Peoples Energy 200 E. Randolph St., 21 <sup>st</sup> FL Chicago, IL 60601	312-240-7189	crcreager@peoplesgasdelivery.com
ComEd	Carla Strunga Pete Kratzer	Facility Relocation Dept. 7601 S Lawndale Avenue Chicago, IL 60652	708-518-6209; 815-409-8622	Peter.Kratzer@ComEd.com Carla.Waldvogel@ComEd.com
CDWM (Water Section)	Brian McGahan (CTR Joint Venture)	CTR Joint Venture Jardine Water Purification Plant 1000 E Ohio St +51 Chicago, IL 60611	312-742-5919	Brian.McGahan@ctrwater.net
Crown Castle (Formerly Lighttower Fiber Networks)	John Pyka	350 N Orleans Street Suite 620 Chicago, IL 60654	312-415-8184	John.Pyka@crowncastle.com
RCN	Tom McKay	2640 W. Bradley Pl, Chicago, IL 60618	312-955-2273	Tom.mckay@rcn.net

**UTILITIES TO BE WATCHED AND PROTECTED**

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

**Stage 0B**

<b>STAGE / LOCATION</b>	<b>TYPE</b>	<b>DESCRIPTION</b>	<b>OWNER</b>
Jackson Boulevard  <i>West Abutment Sta. 8211+92, 15' LT</i>	Gas Main	Peoples Gas abandoned 24" main and vault along the north side of the roadway.	Peoples Gas
Jackson Boulevard Bridge  <i>Northeast and Southwest Wingwalls 8210+60, 17' RT to 8215+70, 17' RT</i>	Water Main	The 16" water main crossing under I-90/94 is located south of the Jackson Boulevard Bridge and is encased in a 30" steel pipe for a portion underneath I-90/94. This water main was previously installed as part of Contract 62A75.  The existing CDWM water main shall not be disturbed. The Contractor shall verify the location of the water main prior to drilling the shafts for the wingwalls.	CDWM
Jackson Boulevard Bridge over I-90/94	Electric	ComEd previously abandoned their facilities in conduits attached to the north half of the bridge structure. The conduits across the bridge will be removed as part of Contract 62J31 and reattached as part of this contract.  Existing ComEd facilities shall not be disturbed.	ComEd

STAGE / LOCATION	TYPE	DESCRIPTION	OWNER
<p>Jackson Boulevard Bridge</p> <p><i>Southeast and Southwest Wingwalls</i>            8210+60, 18' LT to 8215+70, 9' RT</p>	<p>Fiber Optic (Abandoned)</p>	<p>The 2-4" HDPE Fiber Optic Conduits w/ 3-1¼" Innerducts per conduit are located just south of the Jackson Boulevard Bridge. These conduits were previously abandoned as part of Contract 62A75.</p> <p>The abandoned conduit shall be removed by the Contractor where encountered.</p>	<p>Crown Castle (formerly Lighttower Fiber Networks)</p>
<p>Jackson Boulevard Bridge</p> <p><i>Southeast and Southwest Wingwalls</i>            8211+60, 25' RT to 8215+12, 17' RT</p>	<p>Water Main (Abandoned)</p>	<p>The 16" water main crossing under I-90/94 is located just south of the Jackson Boulevard Bridge. This water main was previously abandoned and filled with CLSM as part of Contract 62A75</p> <p>The existing abandoned water main shall be cut and capped by the Contractor where encountered.</p>	<p>CDWM</p>
<p>I-90/94 from Jackson Boulevard to Quincy Street</p> <p><i>Jackson Boulevard East and West Abutment Retaining Wall 8 Retaining Wal 37</i>            8210+60, 2' RT to 8215+70, 2' RT</p>	<p>Freight Tunnel (Bulkheaded and Filled)</p>	<p>City of Chicago freight tunnels are located below I-90/94. These tunnels were previously bulkheaded and filled in specific locations. These tunnels run within the abandoned Quincy Street existing ROW, which is located between Adams Street and Jackson Boulevard, under the Jackson Boulevard Bridge, and between Quincy Street and Jackson Boulevard.</p> <p>The Contractor shall be made aware that the drilled shafts and soldier piles have been placed such that one is located in the middle of the filled freight tunnel while the adjacent shafts are to be placed outside the limits of the tunnel. In addition, a portion of the freight tunnel will be filled as part of this contract as detailed in the plans. The remaining portions of the freight tunnel shall not be disturbed.</p>	<p>City of Chicago CDOT</p>



STAGE / LOCATION	TYPE	DESCRIPTION	OWNER
Jackson Boulevard Bridge  <i>West Abutment Retaining Wall 8            8210+60, 11' LT to            8215+70, 11' LT</i>	Gas main (Retired)	<p>Peoples Gas previously retired a 24" steel gas main crossing under NB I-90/94 just north of the Jackson Boulevard Bridge. These mains were previously filled with CLSM in contract 62J31.</p> <p>The retired gas main shall be cut and capped by the Contractor where encountered.</p>	Peoples Gas
I-90/94  <i>Retaining Wall 37            Retaining Wall 8            6213+53</i>	Electric	<p>ComEd maintains a 20 duct package crossing under I-90/94 within the abandoned Quincy Street existing ROW which is located between Adams Street and Jackson Boulevard.</p> <p>The electric duct package shall not be disturbed.</p> <p>ComEd shall verify the location of the duct package prior to the Contractor drilling the soldier piles and shafts. The Contractor shall coordinate with ComEd to install steel plates over and adjacent to the duct bank during excavation.</p>	ComEd
Jackson Boulevard Bridge	Electric (Abandoned)	<p>ComEd previously abandoned their facilities in conduits attached to the north half of the bridge structure.</p> <p>The conduits will be removed as part of Contract 62J31.</p>	ComEd
NB I-90/94	Combined Sewer Siphon Pipe	<p>The existing 60" combined sewer siphon sewer pipe is located just north of the Van Buren Street Bridge.</p> <p>Existing combined sewer siphon pipe shall not be disturbed.</p>	CDWM
NB I-90/94	Cable TV	<p>The conduit is located north of the Van Buren Street Bridge. The conduit was previously abandoned as part of Contract 60X99.</p> <p>The abandoned conduit shall be removed by the Contractor where encountered.</p>	Comcast

STAGE / LOCATION	TYPE	DESCRIPTION	OWNER
Adams Street  <i>West Approach Roadway</i>  <i>Sta. 8310+46, 12'RT to 8311+14.2, 23'RT</i>	Water Main and Valve Vault	CDWM abandoned 12" water main and valve vault located on the south side of the roadway.  Contractor to cut and cap where encountered.	CDWM
Adams Street  <i>West Approach Roadway</i>  <i>Sta. 8310+46, 8' RT to 8310+74, 7' RT</i>	Unknown	The unknown conduit is located on the south side of the roadway.	Unknown
I-90/94  <i>Existing Retaining Wall 18</i> <i>6207+16</i>	Cable TV (Abandoned)	The conduit is located just south of the Monroe Street Bridge. This conduit was previously abandoned as part of Contract 60X95.  The abandoned conduit shall be removed by the Contractor where encountered.	Comcast
Monroe Street Bridge over I-90/94	Cable TV	Comcast maintains active facilities in conduits shared with MCI that are attached to the bridge structure. These conduits were installed as part of Contract 60X95.  The existing Comcast conduits shall not be disturbed.	Comcast
Monroe Street Bridge over I-90/94	Communications	MCI maintains active facilities in conduits shared with Comcast that are attached to the bridge structure. These conduits were installed as part of Contract 60X95.  The existing MCI conduits shall not be disturbed.	MCI
Monroe Street Bridge over I-90/94	Communications	OEMC maintains active communication facilities in conduits attached to the north half of the bridge structure. These conduits were installed as part of Contract 60X95.  The existing OEMC conduits shall not be disturbed.	OEMC

STAGE / LOCATION	TYPE	DESCRIPTION	OWNER
I-90/94	Combined Sewer Siphon Pipe	<p>The existing 84", 54", and 108" combined siphon sewer pipes are located just north of the Monroe Street Bridge.</p> <p>The existing CDWM combined sewer siphon pipe shall not be disturbed.</p>	CDWM
I-90/94	Combined Sewer Siphon Pipe	<p>The existing 60" combined siphon sewer pipe is located in the embankment between the Monroe Street exit ramp and existing ROW.</p> <p>Existing CDWM combined sewer siphon pipe shall not be disturbed.</p>	CDWM
<p>Jackson Boulevard</p> <p><i>East Approach Roadway</i>  <i>Sta. 8214+97, 71'RT</i></p> <p><i>West Approach Roadway</i>  <i>Sta. 8211+78, 71'RT</i></p>	Riser Shaft	<p>The existing riser shafts are located just south of the Jackson Boulevard Bridge on the east and west sides.</p> <p>The existing riser shaft manholes will be adjusted in the contract. The remainder of the structure shall not be disturbed.</p>	CDWM
<p>I-90/94 from</p> <p><i>Jackson Boulevard Entrance Ramp, Wall 8, 24, 37</i></p>	Freight Tunnel (Bulkheaded and Filled)	<p>City of Chicago freight tunnels are located below I-90/94. These tunnels were previously bulkheaded and filled in specific locations. These tunnels run under the Jackson Boulevard Bridge, between Quincy Street and Jackson Boulevard, and within the abandoned Quincy Street existing ROW.</p> <p>The Contractor shall be made aware that the drilled shafts have been placed such that one is located in the middle of the filled freight tunnel while the adjacent shafts are to be placed outside the limits of the tunnel. The remaining portions of the freight tunnel shall not be disturbed.</p>	City of Chicago DOT

STAGE / LOCATION	TYPE	DESCRIPTION	OWNER
I-90/94  <i>Jackson Boulevard Entrance Ramp, Wall 8, 24, 37</i>	Electric	ComEd maintains a 20 duct package crossing under I-90/94 within the abandoned Quincy Street existing ROW which is located between Adams Street and Jackson Boulevard.  The electric duct package shall not be disturbed.  ComEd shall verify the location of the duct package prior to the Contractor drilling the shafts. The Contractor shall coordinate with ComEd to install steel plates over and adjacent to the duct bank construction.	ComEd
Jackson Boulevard  <i>West Approach Roadway</i>  <i>8210+46, 17' RT to 8211+75, 34' RT</i>  <i>East Approach Roadway</i>  <i>8215+01, 33' RT to 8215+70, 18' RT.</i>	Water Main	CDWM maintains a 16" water main located on the south side of the roadway.  The Water Main shall not be disturbed.	CDWM
Jackson Boulevard  <i>West Approach Roadway</i>  <i>8210+46, 17' RT to 8211+75, 34' RT</i>  <i>East Approach Roadway</i>  <i>8215+01, 33' RT to 8215+70, 18' RT.</i>	Water Main	CDWM maintains a 16" water main located on the south side of the roadway.  The Water Main shall not be disturbed.	CDWM

STAGE / LOCATION	TYPE	DESCRIPTION	OWNER
<p>Jackson Boulevard</p> <p><i>East Approach Roadway Sta. 8210+60, 18' LT to 8211+70, 34' RT</i></p> <p><i>West Approach Roadway Sta. 8215+08, 36' RT to 8215+71' RT</i></p>	Fiber Optic	<p>Crown Castle maintains 2-4" HDPE Fiber Optic Conduits w/ 3-1 1/4" Innerducts on the south side of the roadway, east of the bridge, and on the north side of the bridge, west of the bridge.</p> <p>Fiber Optic shall not be disturbed.</p>	Crown Castle (formerly Lightower Communications)
<p>Jackson Boulevard</p> <p><i>East Approach Roadway Sta. 8214+21, 6' LT to 8215+70, 5' LT</i></p> <p><i>West Approach Roadway 8210+60, 7' LT to 8212+30, 7' LT</i></p>	Electric	<p>ComEd maintains a duct package on the north side of the roadway.</p> <p>The duct package shall not be disturbed.</p>	ComEd

**Stage 1A/1B – Same as Stage 0B plus the following:**

STAGE / LOCATION	TYPE	DESCRIPTION	OWNER
No additional utilities to be noted in this Stage.			

**Stage 2 – Same as Stage 0B through Stage 1A/1B plus the following:**

<b>STAGE / LOCATION</b>	<b>TYPE</b>	<b>DESCRIPTION</b>	<b>OWNER</b>
Adams Street <i>East Approach Roadway</i> <i>Sta. 8315+69, 25' RT</i>	Fire Hydrant	CDWM maintains a fire hydrant located on the south side of the roadway just beyond the limits of the bridge.  The Fire Hydrant shall not be disturbed.	CDWM
Adams Street <i>East Approach Roadway</i> <i>Sta. 8316+30, 26' RT</i>	Electric Vault	ComEd maintains an electric vault along the south side of the roadway.  The electric vault shall not be disturbed.  The Contractor shall coordinate with ComEd to install steel plates over and adjacent to the duct bank construction.	ComEd
Adams Street <i>East Approach Roadway</i> <i>Sta. 8316+39, 11' RT to 8316+39, 25' LT</i>	Water Service	CDWM maintains water services for properties located on the north and south side of the roadway.  Water service line shall not be disturbed.	CDWM
Adams Street <i>East Approach Roadway</i> <i>Sta. 8316+02, 26' LT</i>	Gas Valve	Peoples gas maintains a gas valve.  Gas valve shall not be disturbed.	People's Gas
Adams Street <i>East Approach Roadway</i> <i>Sta. 8315+89, 15' LT to 8316+00, 15' LT</i>	Gas Main	Peoples Gas maintains an active 4" main along the north side of the roadway.  The gas main shall not be disturbed.	Peoples Gas

STAGE / LOCATION	TYPE	DESCRIPTION	OWNER
Adams Street <i>East Approach Roadway Alley between Adams Street and Monroe Street</i>	Electric	Old St Patrick's Church and ComEd maintain a duct package on the north side of the roadway and along the alley between Adams Street and Monroe Street.  The duct package shall not be disturbed.	Old St. Patrick Church/ ComEd
Adams Street  East Approach Roadway  Sta. 8315+79,37' RT to 8316+00, 27' RT	Electric	ComEd maintains a duct package on the south side of the roadway.  The duct package shall not be disturbed.	ComEd

**Stage 3 – Same as Stage 0B through Stage 2 plus the following:**

STAGE / LOCATION	TYPE	DESCRIPTION	OWNER
No additional utilities to be noted in this Stage.			

**Stage 4A – Same as Stage 0B through Stage 3 plus the following:**

STAGE / LOCATION	TYPE	DESCRIPTION	OWNER
No additional utilities to be noted in this Stage			

**Stage 4B – Same as Stage 0B through Stage 4A plus the following:**

STAGE / LOCATION	TYPE	DESCRIPTION	OWNER
No additional utilities to be noted in this Stage.			

**Stage 5 – Same as Stage 0B through Stage 4B plus the following:**

STAGE / LOCATION	TYPE	DESCRIPTION	OWNER
Jackson Boulevard  <i>West Abutment 8210+60, 12' LT to 8210+83, 12' LT</i>	Gas Main	Peoples Gas maintains an active 2" main along the north side of the roadway.  The existing gas main shall not be disturbed.	Peoples Gas
Adams Street  <i>West Approach Roadway Sta. 8310+46, 32' RT to 8310+72, 35' RT</i>	Gas Main	Peoples Gas maintains an active 4" main along the south side of the roadway.  Gas lines shall not be disturbed.	Peoples Gas
Adams Street  <i>West Approach Roadway Sta. 8310+90, 33' RT</i>	Communications Vault	AT&T maintains a communication vault along the south side of roadway.  Vault shall not be disturbed  The Contractor shall coordinate with AT&T to install steel plates over and adjacent to the duct bank construction.	AT&T
Adams Street  <i>West Approach Roadway Sta. 8310+46, 31' RT to 8310+92, 35' RT</i>	Communications	The owner of 765 W. Adams Street maintains a duct package on the south side of the roadway.  Duct package shall not be disturbed	Owner of 765 W. Adams Street



STAGE / LOCATION	TYPE	DESCRIPTION	OWNER
Adams Street  <i>West Approach Roadway</i>  <i>Sta. 8310+46, 27' RT to 8311+60, 35' RT</i>	Electric	ComEd maintains duct packages on the south side of the roadway.  Duct package shall not be disturbed.  The Contractor shall coordinate with ComEd to install steel plates over and adjacent to the duct bank construction.	ComEd
Adams Street  <i>West Approach Roadway</i>  <i>Sta. 8310+46, 12' RT to 8311+14.2, 23' RT</i>	Water Main and Valve Vault	CDWM abandoned 12" water main and valve vault located on the south side of the roadway.  Contractor to cut and cap where encountered.	CDWM
Jackson Boulevard  <i>East Approach Roadway</i>  <i>Sta. 8215+88, 14' LT</i>	Gas Main	Peoples Gas maintains an active 6" main along the north side of the roadway.  Gas Main shall not be disturbed	Peoples Gas
Jackson Boulevard  East Approach Roadway  Sta. 8215+38, 8215+45, 8215+55	Water Service	CDWM maintains multiple water services for properties located on both the north and south side of the roadway.  CDWM water service shall not be disturbed.	CDWM
Adams Street  West Approach Roadway  Sta. 8310+46, 15' RT to 8311+64, 15' RT to 8311+66, 65' LT	Electric	ComEd maintains a duct package on the south side of the roadway.  Duct package shall not be disturbed.	ComEd

**Stage 6 – Same as Stage 0B through Stage 5 plus the following:**

STAGE / LOCATION	TYPE	DESCRIPTION	OWNER
No additional utilities to be noted in this Stage.			

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

Agency/Company Responsible to Resolve Conflict	Name of contact	Address	Phone	E-mail address
AT&T	Jamie Gwin; Stan Plodzien	AT&T Civic Project Eng 1000 Commerce Drive Oak Brook, IL 60523	630-573-5423; 630-573-5453	jg8128@att.com; sp3264@att.com
CDWM (Water Section)	Brian McGahan (CTR Joint Venture)	CTR Joint Venture Jardine Water Purification Plant 1000 E Ohio St +51 Chicago, IL 60611	312-742-5919	Brian.McGahan@ctrwater.net
CDWM (Sewer Section)	Sid Osakada	1000 E Ohio St +51, Room 313 Chicago, IL 60611	312-744-0344	Sid.osakada@cityofchicago.org
Verizon (MCI) Business	Jim Todd	400 International Parkway Richardson, TX 75081	708-458-6410	jimtodd@ameritech.net
City of Chicago CDOT	Dan Grigas	30 N. LaSalle St. Room 400 Chicago, IL 60602	312-744-4815	Daniel.Grigas@cityofchicago.org
City of Chicago OEMC	Frank Kelly	1411 W. Madison St. Chicago, IL 60607	312-746-9238	Frank.Kelly@cityofchicago.org

Agency/Company Responsible to Resolve Conflict	Name of contact	Address	Phone	E-mail address
Peoples Gas	Chuck Creager	Peoples Energy 200 E. Randolph St., 21 <sup>st</sup> FL Chicago, IL 60601	312-240-7189	crcreager@peoplesgasdelivery.com
Comcast	Bob Schulter Robert Stoll	688 Industrial Drive Elmhurst, IL 60126	224-229-5861; 224-229-5849	Bob_Schulter@comcast.com or Robert_Stoll@comcast.com
Crown Castle (Formerly Lighttower Fiber Networks)	John Pyka	350 N Orleans Street Suite 620 Chicago, IL 60654	(312) 415-8184	John.Pyka@crowncastle.com
St. Patrick's Church	Tom Borah	700 W. Adams St. Chicago, IL 60661	(312) 798-2381	Tom@oldstpats.org

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

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

The estimated relocation dates must be part of the progress schedule submitted by the contractor. A utility kickoff meeting will be scheduled between the Department, the Department's contractor and the utility companies. The Department's contractor is responsible for contacting J.U.L.I.E. prior to any and all excavation work.

## **TEMPORARY PAVEMENT**

Effective: March 1, 2003

Revised: April 10, 2008

Description. This work shall consist of constructing a temporary pavement at the locations shown on the plans or as directed by the engineer.

The contractor shall use either Portland cement concrete (PCC) according to Sections 353 and 354 of the Standard Specifications or Hot-mix asphalt (HMA) according to Sections 355, 356, 406 of the Standard Specifications, and other applicable PCC and HMA special provisions as contained herein. The HMA mixtures to be used shall be specified in the plans. The thickness of the Temporary Pavement shall be as described in the plans or variable in order to meet existing conditions. The contractor shall have the option of constructing either material type if both Portland cement concrete and HMA are shown in the plans. The Contractor shall furnish and construct Subbase Granular Material, Type B, of the thickness specified on the plans and under the temporary pavement in accordance with the Standard Specifications. All materials according to section 1003, 1004, 1006, 1020, 1030 and/or 1032 needed to construct temporary pavement are included in the cost of Temporary Pavement.

Articles 355.08 and 406.11 of the Standard Specifications shall not apply.

The removal of Temporary Pavement, if required, shall conform to Section 440 of the Standard Specifications.

Method of Measurement. TEMPORARY PAVEMENT and SUBBASE GRANULAR MATERIAL, TYPE B of the thickness specified on the plans will be measured in place and the area computed in square yards. The Temporary Pavement will be measured in place at the equivalent weight in tons based upon the area and average depth placed.

Basis of Payment. This work will be paid for at the contract unit price per square yard for TEMPORARY PAVEMENT and SUBBASE GRANULAR MATERIAL, TYPE B of the thickness specified on the plans.

Removal of temporary pavement will be paid for at the contract unit price per square yard for PAVEMENT REMOVAL.

**KEEPING THE EXPRESSWAY OPEN TO TRAFFIC**

Effective: March 22, 1996

Revised: January 21, 2015

Whenever work is in progress on or adjacent to an expressway, the Contractor shall provide the necessary traffic control devices to warn the public and to delineate the work zone as required in these Special Provisions, the Standard Specifications, the State Standards and the District Freeway details. All Contractors' personnel shall be limited to these barricaded work zones and shall not cross the expressway.

The Contractor shall request and gain approval from the Illinois Department of Transportation's Expressway Traffic Operations Engineer at [www.idotlcs.com](http://www.idotlcs.com) twenty-four (24) hours in advance of all daily lane, ramp and shoulder closures and 7 days in advance of all permanent and weekend closures on all Freeways and/or Expressways in District One. This advance notification is calculated based on workweek of Monday through Friday and shall not include weekends or Holidays.

**LOCATION: I-90/94 Kennedy: Ohio to I-290**

WEEK NIGHT	TYPE OF CLOSURE	ALLOWABLE LANE CLOSURE HOURS		
Sunday - Thursday	1-Lane	10:00 PM	to	5:00 AM
	2-Lane	11:59 PM	to	5:00 AM
Friday	1-Lane	11:00 PM (Fri)	to	8:00 AM (Sat)
	2-Lane	11:59 PM (Fri)	to	6:00 AM (Sat)
Saturday	1-Lane	10:00 PM (Sat)	to	10:00 AM (Sun)
	2-Lane	11:59 PM (Sat)	to	8:00 AM (Sun)

**LOCATION: I-90/94 Kennedy REVERSIBLES**

WEEK NIGHT	ALLOWABLE LANE CLOSURE HOURS		
Sunday-Friday	9:00 PM	to	5:00 AM
Friday	11:00 PM (Fri)	to	6:00 AM (Sat)
Saturday	11:00 PM (Sat)	to	8:00 AM (Sun)

NOTE: All closures on I-90/94 shall start from left side. Lane closures on EB I-90/94 shall require that the Kennedy Reversible Lanes be closed or outbound, start at Chicago St., and requires the closure of Lake St. and Randolph St. entrance ramps.

**LOCATION: I-90/94 Dan Ryan: 31st to I-290**

WEEK NIGHT	TYPE OF CLOSURE	ALLOWABLE LANE CLOSURE HOURS		
Sunday-Thursday	1-Lane	10:00 PM	to	5:00 AM
	2-Lane*	11:59 PM	to	5:00 AM
Friday	1-Lane	11:00 PM (Fri)	to	8:00 AM (Sat)
	2-Lane*	11:59 PM (Fri)	to	6:00 AM (Sat)
Saturday	1-Lane	10:00 PM (Sat)	to	9:00 AM (Sun)
	2-Lane*	11:59 PM (Sat)	to	9:00 AM (Sun)

In addition to the hours noted above, temporary shoulder and non-system interchange partial ramp closures are allowed weekdays between 9:00 A.M. and 3:00 P.M. and between 7:00 P.M. and 5:00 A.M.

Narrow Lanes and permanent shoulder closures will not be allowed between Dec. 1<sup>st</sup> and April 1<sup>st</sup> without written authorization from the Department.

Full Expressway Closures will only be permitted for a maximum of 15 minutes at a time during the low traffic volume hours of 1:00 A.M. to 5:00 A.M. Monday thru Friday and from 1:00 A.M. to 7:00 A.M. on Sunday. During Full Expressway Closures, the Contractor will be required to close off all lanes except one, using Freeway Standard Closures. Police forces should be notified and requested to close off the remaining lane at which time the work item may be removed or set in place. The District One Expressway Traffic Control Supervisor (847-705-4151) **shall be** notified at least 3 working days (weekends and holidays DO NOT count into this 72 hours notification) in advance of the proposed road closure and will coordinate the closure operations with police forces. Liquidated Damages as specified in the Failure to Open Traffic Lanes to Traffic for One lane or ramp blocked shall be assessed to the Contract for every 15 minutes beyond the initial 15 minutes all lanes are blocked.

All stage changes requiring the stopping and/or the pacing of traffic shall take place during the allowable hours for Full Expressway Closures and shall be approved by the Department. The Contractor shall notify the District One Expressway Traffic Control Supervisor at least 3 working days (weekends and holidays DO NOT count into this 72 hours notification) in advance of any proposed stage change.

A Maintenance of Traffic Plan shall be submitted to the District One Expressway Traffic Control Supervisor 14 days in advance of any stages changes or full expressway closures. The Maintenance of Traffic Plan shall include, but not be limited to: lane and ramp closures, existing geometrics, and equipment and material location.

All daily lane closures shall be removed during adverse weather conditions such as rain, snow, and/or fog and as determined by the Engineer. Also, the contractor shall promptly remove their lane closures when Maintenance forces are out for snow and ice removal.

Additional lane closure hour restrictions may have to be imposed to facilitate the flow of traffic to and from major sporting events and/or other events.

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.

The Contractor will be required to cooperate with all other contractors when erecting lane closures on the expressway. All lane closures (includes the taper lengths) without a three (3) mile gap between each other, in one direction of the expressway, shall be on the same side of the pavement. Lane closures on the same side of the pavement with a one (1) mile or less gap between the end of one work zone and the start of taper of next work zone should be connected. The maximum length of any lane closure on the project and combined with any adjacent projects shall be three (3) miles. Gaps between successive permanent lane closures shall be no less than two (2) miles in length.

Private vehicles shall not be parked in the work zone. Contractor's equipment and/or vehicles shall not be parked on the shoulders or in the median during non-working hours. The parking of equipment and/or vehicles on State right-of-way will only be permitted at the locations approved by the Engineer.

Check barricades shall be placed every 1000' within a lane closure to prevent vehicles from driving through closed lanes.

Temporary ramp closures for service interchanges will only be permitted at night during the restricted hours listed for temporary one-lane closures within the project limits. However, no two (2) adjacent entrance and exit ramps in one direction of the expressway shall be closed at the same time.

Freeway to freeway (system interchange) full ramp closures for two lane ramps will not be permitted. Partial ramp closures of system ramps may be allowed during the 1-lane closure hours above. System ramp full closures for single lane ramps are only permitted for a maximum of four (4) hours

- between the hours of 1:00 a.m. and 5:00 a.m. on Monday thru Friday
- between the hours of 1:00 a.m. and 6:00 a.m. on Saturday, and
- between the hours of 1:00 a.m. and 7:00 a.m. on Sunday.

The Contractor shall furnish and install large (48" X 48") "DETOUR with arrow" signs as directed by the Engineer for all system ramp closures. In addition, one portable changeable message sign will be required to be placed in advance of the ramp closure. The cost of these signs and PCMS board shall be included in the cost of traffic control and protection (6 static signs maximum per closure).

Should the Contractor fail to completely open, and keep open, the ramps to traffic in accordance with the above limitations, the Contractor shall be liable to the Department for liquidated damages as noted under the Special Provision, "Failure to Open Traffic Lanes to Traffic".

**FAILURE TO OPEN TRAFFIC LANES TO TRAFFIC**

Effective: March 22, 1996

Revised: February 9, 2005

Should the Contractor fail to completely open and keep open all the traffic lanes to traffic in accordance with the limitations specified under the Special Provision for "Keeping the Expressway Open to Traffic", the Contractor shall be liable to the Department for the amount of:

I-90/94, I-290 and ramps: All Stages  
One lane or ramp blocked = \$1,700 /15 min.  
Two lanes blocked = \$3,500 /15 min.

Not as a penalty but as liquidated and ascertained damages for each and every 15 minute interval or a portion thereof that a lane is blocked outside the allowable time limitations. Such damages may be deducted by the Department from any monies due the Contractor. These damages shall apply during the contract time and during any extensions of the contract time.

**TRAFFIC CONTROL AND PROTECTION (EXPRESSWAYS)**

Effective: March 8, 1996

Revised: April 1, 2019

Description. This work shall include furnishing, installing, maintaining, replacing, relocating, and removing all traffic control devices used for the purpose of regulating, warning, or directing traffic. Traffic control and protection shall be provided as called for in the plans, applicable Highway Standards, District One Expressway details, Standards and Supplemental Specifications, these Special Provisions, or as directed by the Engineer.

General. The governing factor in the execution and staging of work for this project is to provide the motoring public with the safest possible travel conditions on the expressway through the construction zone. The Contractor shall arrange his operations to keep the closing of lanes and/or ramps to a minimum.

The Contractor shall be responsible for the proper location, installation, and arrangement of all traffic control devices. Special attention shall be given to existing warning signs and overhead guide signs during all construction operations. Warning signs and existing guide signs with down arrows shall be kept consistent with the barricade placement at all times. The Contractor shall immediately remove, completely cover, or turn from the motorist's view all signs which are inconsistent with lane assignment patterns.

The Contractor shall coordinate all traffic control work on this project with adjoining or overlapping projects, including barricade placement necessary to provide a uniform traffic detour pattern. When directed by the Engineer, the Contractor shall remove all traffic control devices that were furnished, installed, or maintained by him under this contract, and such devices shall remain the property of the Contractor. All traffic control devices shall remain in place until specific authorization for relocation or removal is received from the Engineer.



Additional requirements for traffic control devices shall be as follows.

- (a) Traffic Control Setup and Removal. The setting and removal of barricades for the taper portion of a lane closure shall be done under the protection of a vehicle with a truck/trailer mounted attenuator and arrow board per State Standard 701428 and Section 701 of the Standard Specifications. Failure to meet this requirement will be subject to a Traffic Control Deficiency. The deficiency will be calculated as outlined in Article 105.03 of the Standard Specifications. Truck/trailer mounted attenuators shall comply with Article 1106.02(g) or shall meet the requirements of NCHRP 350 Test Level 3 with vehicles used in accordance with manufacturer's recommendations and requirements.
- (b) Sign Requirements
  - (1) Sign Maintenance. Prior to the beginning of construction operations, the Contractor will be provided a sign log of all existing signs within the limits of the construction zone. The Contractor is responsible for verifying the accuracy of the sign log. Throughout the duration of this project, all existing traffic signs shall be maintained by the Contractor. All provisions of Article 107.25 of the Standard Specifications shall apply.
  - (2) Work Zone Speed Limit Signs. Work zone speed limit signs shall be installed as required in Article 701.14(b) and as shown in the plans and Highway Standards. Based upon the existing posted speed limit, work zone speed limits shall be established and signed as follows.
    - a. Existing Speed Limit of 55mph or higher. The initial work zone speed limit assembly, located approximately 4200' before the closure, and shall be 55mph as shown in 701400. Additional work zone 45mph assemblies shall be used as required according to Article 701.14(b) and as shown in the Highway Standards and plans. WORK ZONE SPEED LIMIT 55 PHOTO ENFORCED assemblies may be omitted when this assembly would normally be placed within 1500 feet of the END WORK ZONE SPEED LIMIT sign. If existing speed limit is over 65mph then additional signage should be installed per 701400.
    - b. Existing Speed Limit of 45mph. The advance 55mph work zone speed limit assembly shown in 701400 shall be replaced with a 45mph assembly. Additional work zone 45mph assemblies shall be used as required according to Article 701.14(b) and as shown in the Highway Standards and plans. WORK ZONE SPEED LIMIT 55 PHOTO ENFORCED assemblies shall be eliminated in all cases. END WORK ZONE SPEED LIMIT signs are required.

- (3) Exit Signs. The exit gore signs as shown in Standard 701411 shall be a minimum size of 48 inch by 48 inch with 12 inch capital letters and a 20 inch arrow. EXIT OPEN AHEAD signs shown in Standard 701411 shall be a minimum size of 48 inch by 48 inch with 8 inch capital letters.
- (4) Uneven Lanes Signs. The Contractor shall furnish and erect “UNEVEN LANES” signs (W8-11) on both sides of the expressway, at any time when the elevation difference between adjacent lanes open to traffic equals or exceeds one inch. Signs shall be placed 500’ in advance of the drop-off, within 500’ of every entrance, and a minimum of every mile.
- (c) Drums/Barricades. Check barricades shall be placed in work areas perpendicular to traffic every 1000’, one per lane and per shoulder, to prevent motorists from using work areas as a traveled way. Check barricades shall also be placed in advance of each open patch, or excavation, or any other hazard in the work area, the first at the edge of the open traffic lane and the second centered in the closed lane. Check barricades, either Type I or II, or drums shall be equipped with a flashing light.
- To provide sufficient lane widths (10’ minimum) for traffic and also working room, the Contractor shall furnish and install vertical barricades, in lieu of Type II or drums, along the cold milling and asphalt paving operations. The vertical barricades shall be placed at the same spacing as the drums.
- (d) Vertical Barricades. Vertical barricades shall not be used in lane closure tapers, lane shifts, exit ramp gores, or staged construction projects lasting more than 12 hours. Also, vertical barricades shall not be used as patch barricades or check barricades. Special attention shall be given, and ballast provided per manufacture’s specification, to maintain the vertical barricades in an upright position and in proper alignment.
- (e) Temporary Concrete Barrier Wall. Prismatic barrier wall reflectors shall be installed on both the face of the wall next to traffic, and the top of sections of the temporary concrete barrier wall as shown in Standard 704001. The color of these reflectors shall match the color of the edgelines (yellow on the left and crystal or white on the right). If the base of the temporary concrete barrier wall is 12 inches or less from the travel lane, then the lower slope of the wall shall also have a 6 inch wide temporary pavement marking edgeline (yellow on the left and white on the right).
- (f) Flaggers. One flagger will be required for each separate activity of an operation that requires frequent construction vehicles to enter or leave a work zone to or from a lane open to traffic. Temporary traffic control and flagger position shall be according to District One Detail TC-18 – Expressway Flagging, or as directed by the Engineer.

(g) Full Expressway Closures. Full Expressway Closures will only be permitted for a maximum of 15 minutes during the allowable hours listed in the Keeping the Expressway Open to Traffic Special Provision. During Full Expressway Closures, the Contractor will be required to close off all lanes except one, using Freeway Standard Closures. The Contractor will be required to provide one changeable message sign to be placed at the direction of the Engineer. The sign shall display a message as directed by the Engineer. A Maintenance of Traffic Plan shall be submitted to the District One Expressway Traffic Control Supervisor 14 days in advance of the planned work; including all stage changes. The Maintenance of Traffic Plan shall include, but not be limited to: lane and ramp closures, existing geometrics, and equipment and material location. The District One Expressway Traffic Control Supervisor (847-705-4151) shall be contacted at least 3 working days in advance of the proposed road closure and will coordinate the closure operation with police forces.

Method of Measurement. This item of work will be measured on a lump sum basis for furnishing, installing, maintaining, replacing, relocating, and removing traffic control devices required in the plans and these Special Provisions. Traffic control and protection required under Standards 701101, 701400, 701401, 701402, 701406, 701411, 701416, 701426, 701428, 701446, 701901 and District details TC-8, TC-9, TC-17, TC-18 and TC-25 will be included with this item.

Basis of Payment.

(a) This work will be paid for at the contract lump sum price for TRAFFIC CONTROL AND PROTECTION (EXPRESSWAYS). This price shall be payment in full for all labor, materials, transportation, handling, and incidental work necessary to furnish, install, maintain, replace, relocate, and remove all Expressway traffic control devices required in the plans and specifications.

In the event the sum total value of all the work items for which traffic control and protection is required is increased or decreased by more than ten percent (10%), the contract bid price for TRAFFIC CONTROL AND PROTECTION (EXPRESSWAYS) will be adjusted as follows:

$$\text{Adjusted contract price} = .25P + .75P [1 \pm (X - 0.1)]$$

Where: "P" is the bid unit price for Traffic Control and Protection

Where: "X" =		$\frac{\text{Difference between original and final sum total value of all work items for which traffic control and protection is required}}{\text{Original sum total value of all work items for which traffic control and protection is required.}}$
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The value of the work items used in calculating the increase and decrease will include only items that have been added to or deducted from the contract under Article 104.02 of the Standard Specifications and only items which require use of Traffic Control and Protection.

Temporary traffic control costs due to delay will be paid for according to the Compensable Delay Costs (BDE) Special Provision.

- (b) The Engineer may require additional traffic control be installed in accordance with standards and/or designs other than those included in the plans. In such cases, the standards and/or designs will be made available to the Contractor at least one week in advance of the change in traffic control. Payment for any additional traffic control required will be in accordance with Article 109.04 of the Standard Specifications.
- (c) Revisions in the phasing of construction or maintenance operations, requested by the Contractor, may require traffic control to be installed in accordance with standards and/or designs other than those included in the plans. Revisions or modifications to the traffic control shown in the contract shall be submitted by the Contractor for approval by the Engineer. No additional payment will be made for a Contractor requested modification.
- (d) Temporary concrete barrier wall will be measured and paid for according to Section 704.
- (e) Impact attenuators, temporary bridge rail, and temporary rumble strips will be paid for separately.
- (f) Temporary pavement markings shown on the Standard will be measured and paid for according to Section 703 and Section 780.
- (g) All pavement marking removal will be measured and paid for according to Section 703 or Section 783.
- (h) Temporary pavement marking on the lower slope of the temporary concrete barrier wall will be measured and paid for as TEMPORARY PAVEMENT MARKING, 6”.
- (i) All barrier wall reflectors will be measured and paid for according to Section 782.
- (j) The Changeable Message Sign required for Full Expressway Closures shall not be paid for separately.

## **TRAFFIC CONTROL SURVEILLANCE (EXPRESSWAYS)**

Effective: October 25, 1995

Revised: January 21, 2015

The contractor shall provide a person with a vehicle to survey, inspect and maintain all temporary traffic control devices when a lane is closed to traffic, when hazards are present adjacent to or within 10 foot of the edge of pavement for more than 24 hours, or as directed by the Engineer.

The surveillance person is required to drive through the project, to inspect all temporary traffic control devices, to correct all traffic control deficiencies, if possible, or immediately contact someone else to make corrections and to assist with directing traffic until such corrections are made, at intervals not to exceed 4 hours. This person shall list every inspection on an inspection form, furnished by the Engineer, and shall return a completed form on the first working day after the inspections are made.

The Contractor shall supply a telephone staffed on a 24-hour-a-day basis to receive any notification of any deficiencies regarding traffic control and protection or receive any request for improving, correcting or modifying traffic control, installations or devices, including pavement markings. The Contractor shall dispatch additional men, materials and equipment as necessary to begin to correct, improve or modify the traffic control as directed, within one hour of notification by this surveillance person or by the Department. Upon completion of such corrections and/or revisions, the Contractor shall notify the Department's Communication Center at (847) 705-4612.

### Method of Measurement.

Traffic Control Surveillance will be measured on calendar day basis. One calendar day is equal to a minimum of six (6) inspections. The inspections shall start within 4 hours after the lane is closed to traffic, a hazard exists within 10 foot from the edge of pavement, or as directed by the Engineer and shall end when the lane closure or hazard is removed or as directed by the Engineer.

### Basis of Payment.

Surveillance will be paid for at the contract unit price per calendar day or fraction thereof for TRAFFIC CONTROL SURVEILLANCE (EXPRESSWAYS). The price shall include all labor and equipment necessary to provide the required inspection and maintenance on the expressway and on all cross streets which are included in the project. The cost of the materials for the maintenance of traffic control devices shall be included in the traffic control pay items.

## TEMPORARY INFORMATION SIGNING

Effective: November 13, 1996

Revised: January 29, 2020

### Description.

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

### Materials.

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

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

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

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

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

## GENERAL CONSTRUCTION REQUIREMENTS

### Installation.

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

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

The attachment of temporary signs to existing 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.

### Method of Measurement.

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

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

Basis Of Payment.

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

**TRAFFIC CONTROL FOR WORK ZONE AREAS**

Effective: September 14, 1995

Revised: January 1, 2007

Work zone entry and exit openings shall be established daily by the Contractor with the approval of the Engineer. All vehicles including cars and pickup trucks shall exit the work zone at the exit openings. All trucks shall enter the work zone at the entry openings. These openings shall be signed in accordance with the details shown elsewhere in the plans and shall be under flagger control during working hours.

The Contractor shall plan his trucking operations into and out of the work zone as well as on to and off the expressway to maintain adequate merging distance. Merging distances to cross all lanes of traffic shall be no less than 1/2 mile. This distance is the length from where the trucks enter the expressway to where the trucks enter the work zone. It is also the length from where the trucks exit the work zone to where the trucks exit the expressway. The stopping of expressway traffic to allow trucks to change lanes and/or cross the expressway is prohibited.

Failure to comply with the above requirements will result in a Traffic Control Deficiency charge. The deficiency charge will be calculated as outlined in Article 105.03 of the Standard Specifications. The Contractor will be assessed this daily charge for each day a deficiency is documented by the Engineer.

**SPEED DISPLAY TRAILER (D1)**

Effective: April 1, 2015

Revised: January 1, 2017

Revise the third paragraph of Article 701.11 of the Standard Specifications to read:

“When not being utilized to inform and direct traffic, sign trailers, speed display trailers, arrow boards, and portable changeable message boards shall be treated as nonoperating equipment.”

Add the following to Article 701.15 of the Standard Specifications:

“(m) Speed Display Trailer. A speed display trailer is used to enhance safety of the traveling public and workers in work zones by alerting drivers of their speed, thus deterring them from driving above the posted work zone speed limit.”

Whenever the speed display trailer is not in use, it shall be considered non-operating equipment and shall be stored according to Article 701.11.”

Add the following to Article 701.20 of the Standard Specifications:

“(k) “Speed Display Trailer will NOT be paid for by separate pay item, but its costs shall be included in the contract unit price of the various traffic control pay items.



Add the following to Article 1106.02 of the Standard Specifications:

- “(o) Speed Display Trailer. The speed display trailer shall consist of a LED speed indicator display with self-contained, one-direction radar mounted on an orange see-through trailer. The height of the display and radar shall be such that it will function and be visible when located behind concrete barrier.

The speed measurement shall be by radar and provide a minimum detection distance of 1000 ft (300 m). The radar shall have an accuracy of  $\pm 1$  mile per hour.

The speed indicator display shall face approaching traffic and shall have a sign legend of “YOUR SPEED” immediately above or below the speed display. The digital speed display shall show two digits (00 to 99) in mph. The color of the changeable message legend shall be a yellow legend on a black background. The minimum height of the numerals shall be 18 in. (450 mm), and the nominal legibility distance shall be at least 750 ft (250 m).

The speed indicator display shall be equipped with a violation alert that flashes the displayed detected speed when the posted limit is exceeded. The speed indicator shall have a maximum speed cutoff. On roadway facilities with a normal posted speed limit greater than or equal to 45 mph, the detected speeds of vehicles traveling more than 25mph over the work zone speed limit shall not be displayed. On facilities with normal posted speed limit of less than 45 mph, the detected speeds of vehicles traveling more than 15 mph over the work zone speed limit shall not be displayed. On any roadway facility if detected speeds are less than 25 mph, speed shall not be displayed. The display shall include automatic dimming for nighttime operation.

The speed indicator measurement and display functions shall be equipped with the power supply capable of providing 24 hours of uninterrupted service.”

## **SIGN SHOP DRAWING SUBMITTAL**

Effective: January 22, 2013

Revised: July 1, 2015

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

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

## **STAGING AND INTERCHANGE RESTRICTIONS**

Prior to the actual beginning and completion of the various stages of construction and traffic control and protection, the Contractor will be required to provide lane closures and barricade systems, for preparation work such as pavement marking removal, temporary lane marking, placing temporary concrete barrier, relocating existing guardrail, etc. These lane closures and barricade systems, including barricades, drums, cones, lights, signs, flaggers etc. shall be provided in accordance with details in the Plans and these Special Provisions and as approved by the Engineer.

The cost of this work will not be paid for separately but shall be considered included in the contract lump sum price for TRAFFIC CONTROL AND PROTECTION (EXPRESSWAYS).

### LANE AND RAMP CLOSURES

Prior to and after stage construction, temporary lane closures on I-90/94, I-290 and associated ramps will only be permitted at night during the allowable hours as listed in the Special Provision KEEPING THE EXPRESSWAY OPEN TO TRAFFIC. These hours also apply to temporary closures of the ramps, which are shown as open on the Maintenance of Traffic plan sheets.

For all ramp closures, the Contractor shall furnish and install signage per District Detail TC-08, as directed by the Engineer.

The closing of ramps, which are used as the detour route for other roadways or ramps, is prohibited. Should the Contractor fail to completely open, and keep open, the ramps to traffic in accordance with the above limitations, the Contractor shall be liable to the Department for liquidated damages as noted under the Special Provision, FAILURE TO OPEN TRAFFIC LANES TO TRAFFIC.

The Contractor shall submit to the Department two (2) weeks ahead of time, in writing, the starting date for each of the extended ramp and/or lane closures. Approval from the Department is required prior to closing the ramp and/or lanes. Should the Contractor fail to complete the work and reopen the ramp to traffic within the allowable time limit, the Contractor shall be liable to the Department for liquidated damages as noted under FAILURE TO OPEN TRAFFIC LANES TO TRAFFIC

### EXTENDED INTERSTATE RAMP CLOSURE RESTRICTIONS

The Contractor shall request and gain approval from the Illinois Department of Transportation's Expressway Traffic Operations Engineer at [www.idotlcs.com](http://www.idotlcs.com) seven (7) days in advance of all permanent and weekend closures on all Freeways and/or Expressways in District One. This advance notification is calculated based on workweek of Monday through Friday and shall not include weekends or Holidays.

A Maintenance of Traffic Plan shall be submitted to and approved by the District One Expressway Traffic Control Supervisor 14 days in advance of any full expressway closures. The Maintenance of Traffic Plan shall include, but not be limited to: lane and ramp closures, existing geometrics, equipment and material locations, material delivery schedule, detailed work schedule, communication plan and risk assessment.

The cost of this work will not be paid for separately but shall be considered included in the contract lump sum price for TRAFFIC CONTROL AND PROTECTION (EXPRESSWAYS).

### LOCAL ROAD CLOSURES

To facilitate the demolition and construction of various substructure and superstructure items and for signing work on some of the existing bridges that may require City Street or sidewalk closures, the use of local streets for construction staging and City Street or sidewalk closures must be approved by the City of Chicago and the Department in advance of the proposed closure or partial closure.

#### **Adams Street Closure West of I-90/94**

1. Adams Street west of I-90/94 shall remain open at all times as shown on the contract plans except as noted below.
2. Adams Street west of I-90/94 may be closed for 60 consecutive calendar days to allow for construction of the project elements west of I-90/94.
3. A pedestrian access route must be maintained to all properties at all times.
4. If the Adams Street pavement west of I-90/94 has not been opened by the end time of the closure period described above, and approved by the Department, Liquidated Damages as specified in the "FAILURE TO OPEN TRAFFIC LANES TO TRAFFIC" special provision shall be assessed to the Contract except the value applied shall be \$750/day beyond the completion time listed above.

**Retaining Wall 51 (SN 016-Z048), Noise Abatement Wall and Alley between Adams Street and Monroe Street East of I-90/94**

1. The Alley between Adams Street and Monroe Street east of I-90/94 shall remain open at all times as shown on the contract plans except as noted below.
2. The Alley between Adams Street and Monroe Street east of I-90/94 may be partially closed for 150 consecutive calendar days to allow for construction of Retaining Wall 51 (SN 016-Z048), Noise Abatement Wall, and the alley.
3. Work must be staged so that access to the Old St. Patrick's Church driveway at station 42+33 is maintained at all times.
4. If the construction of Retaining Wall 51 (SN 016-Z048), Noise Abatement Wall, and the alley between Adams Street and Monroe Street east of I-90/94 have not been completed by the end of the 150 days described above, and approved by the Department, Liquidated Damages as specified in the "FAILURE TO OPEN TRAFFIC LANES TO TRAFFIC" special provision shall be assessed to the Contract except the value applied shall be \$1,025/day beyond the completion time listed above.

**Adams Street Closure East of I-90/94**

1. Adams Street east of I-90/94 shall remain open at all times as shown on the contract plans except as noted below.
2. Adams Street east of I-90/94 may be closed for 60 consecutive calendar days to allow for the construction of the proposed project elements east of I-90/94.
3. Adams Street east of I-90/94 shall only be closed concurrently with the closure of the south section of the alley between Adams Street and Monroe Street east of I-90/94.

A pedestrian access route must be maintained to all properties at all times.

4. If the Adams Street pavement east of I-90/94 has not been opened by the end time of the closure period described above, and approved by the Department, Liquidated Damages as specified in the "FAILURE TO OPEN TRAFFIC LANES TO TRAFFIC" special provision shall be assessed to the Contract except the value applied shall be \$750/day beyond the completion time listed above.

**Jackson Boulevard Closure West of I-90/94**

1. Jackson Boulevard west of I-90/94 shall remain open at all times as shown on the contract plans except as noted below.
2. Jackson Boulevard west of I-90/94 may be closed for 60 consecutive calendar days to allow for construction of the project elements west of I-90/94.
3. A pedestrian access route must be maintained to all properties at all times.
4. If the Jackson Boulevard pavement west of I-90/94 has not been opened by the end time of the closure period described above, and approved by the Department, Liquidated Damages as specified in the "FAILURE TO OPEN TRAFFIC LANES TO TRAFFIC" special provision shall be assessed to the Contract except the value applied shall be \$750/day beyond the completion time listed above.

### **Jackson Boulevard Closure East of I-90/94**

1. Jackson Boulevard east of I-90/94 shall remain open at all times as shown on the contract plans except as noted below.
2. Jackson Boulevard east of I-90/94 may be closed for 45 consecutive calendar days to allow for construction of the project elements east of I-90/94.
3. A pedestrian access route must be maintained to all properties at all times.

If the Jackson Boulevard pavement east of I-90/94 has not been opened by the end time of the closure period described above, and approved by the Department, Liquidated Damages as specified in the "FAILURE TO OPEN TRAFFIC LANES TO TRAFFIC" special provision shall be assessed to the Contract except the value applied shall be \$750/day beyond the completion time listed above.

### **AVAILABLE WORK AREAS AND SEQUENCING REQUIREMENTS**

Based upon ongoing and concurrent proposed work by others, various areas may not be available for Work under this Contract until certain timeframes.

#### Cooperation between Contract 62J31 and Contract 60X94:

- Removal of Existing Jackson Boulevard Bridge and Northbound Entrance Ramp: The existing Jackson Boulevard Bridge superstructure and piers and Jackson Boulevard NB entrance ramp bridge and approach walls will be removed by Contract 62J31 to the limits shown within those contract plans. Per the Contract 62J31 bid documents, this work is anticipated to be completed by October 1, 2020.

#### Cooperation between Contract 60X93 and Contract 60X94:

- Adams Street Bridge Demolition: Contract 60X93 will use the Adams Street NB Entrance Ramp as a detour for Ramp WN traffic. Per the Contract 60X93 bid documents, the work necessitating this detour is anticipated to be completed by August 31, 2020. Closure of the Adams Street Bridge and the NB Entrance Ramp by Contract 60X94 shall not occur until the Contract 60X93 detour utilizing the Adams Street NB Entrance Ramp is removed. Temporary overnight lane closures to permit the removal of the existing Adams Street Bridge and NB Entrance Ramp structure shall be provided by Contract 60X94.

Cooperation between Contracts 60X93, 60X94, and 62J31:

- Adams SB Exit Ramp – Contracts 60X93 and 62J31 will close various nearby exit ramps from southbound I-90/94. To partially mitigate area traffic, Contract 60X94 shall keep the Adams SB Exit Ramp open to traffic until deck and girder demolition and removal is complete for the existing Adams Street Bridge (SN 016-0589).
- Cooperation between Contract 62A76 and Contract 60X94 (dates and stage numbers follow those in Contract 62A76):Main Drain Construction along Northbound C-D Road from South of Jackson Boulevard to North of Adams Street: Contract 62A76 includes the construction of the storm sewer in front of retaining wall 24 (SN 016-Z016) and the Jackson Boulevard (SN 016-1702) and Adams Street (SN016-1701) east abutments and wingwalls. The east side main drain storm sewer and storm sewer connections, by Contract 62A76, must be completed from Station 6337+22 to 6343+74 prior to construction of retaining wall 24 (SN 016-2016) and Adams Street and Jackson Boulevard east abutments and wingwalls in Contract 60X94. Per the Contract 62A76 bid documents, the storm sewer in this location is anticipated to be completed by the end of Stage 0B which is December 15, 2020.
- Retaining Wall, Abutment, and Wingwall Construction Along Northbound C-D Road from South of Jackson Boulevard to North of Adams Street: Construction of proposed Retaining Wall 24 (SN 016-Z016), the proposed Jackson Boulevard east abutment and southeast wingwall (SN 016-1702), and the proposed Adams Street east abutment and northeast wingwall (SN 016-1701) by Contract 60X94 shall occur during Stages 0B and 1 (October 1, 2020-June 30, 2021) in work zones provided by Contract 62A76. Construction and backfilling the ground around these elements, by Contract 60X94 shall be completed by June 30, 2021 in order for the adjacent pavement, shoulder, and barrier wall construction to be completed by Contract 62A76.
- Retaining Wall, Noise Abatement Wall, and Alley between Adams Street and Monroe Street: Construction of proposed Retaining Wall 51 (SN 016-Z048), the Noise Abatement Wall, and the alley east of I-90/94 between Adams Street and Monroe Street by Contract 60X94 shall occur during Stages 2 and 3 (July 1, 2021-November 30, 2021). Contract 62A76 will be constructing the Northbound C-D Road, shoulder, barrier wall, and gutter to the west of this area in Stages 1 and 2 (December 16, 2020-September 30, 2021). Final grading of the slope to the gutter along the east side of the Northbound C-D Road shall be completed by November 30, 2021 to allow for Contract 62A76 to move to the Stage 4A traffic configuration.
- Jackson Boulevard Bridge Pier 2 and NB Entrance Ramp: Construction of the Jackson Boulevard Bridge pier 2, the Jackson Boulevard NB entrance ramp pier, north abutment, and entrance ramp retaining wall (SN 016-1702) by Contract 60X94 shall occur in Stages 2 and 3 (July 1, 2021-November 30, 2021) in work zones provided by Contract 62A76. Construction and backfilling the ground around these elements by Contract 60X94 shall be completed by November 30, 2021 in order for the adjacent pavement, shoulder, and barrier wall construction to be completed by Contract 62A76.
- Adams Street Bridge Pier 3 and NB Entrance Ramp: Construction of the Adams Street Bridge pier 3, the NB entrance ramp pier, north abutment, and entrance ramp retaining wall (SN 016-1701) by Contract 60X94 shall occur in Stages 3 and 4A (October 1, 2021-February 28, 2022), in work zones provided by Contract 62A76. Construction and backfilling the ground around these elements, by Contract 60X94, shall be completed by February 28, 2022 in order for the adjacent pavement, shoulder, and barrier wall construction to be completed by Contract 62A76.

- Jackson NB Entrance Ramp Girder Erection: During Stage 4B (March 1, 2022-May 31, 2022), for one extended overnight weekend period, from Saturday 10:00 PM to Sunday 10:00 AM, Contract 62A76 will provide a work zone with temporary barrier wall on the outside lane of northbound I-90/94. Ramp WN will be closed and Ramp WN traffic detoured by Contract 62A76 during this time period, and the Ramp EN merge with northbound I-90/94 will be modified. This work zone will allow Contract 60X94 to install a shoring tower and complete the girder erection for the Jackson NB Entrance Ramp curved girders. Additional traffic control for this period, per the Keeping the Expressway Open to Traffic special provision, shall be provided by Contract 60X94.

Cooperation between Contract 62A77 and Contract 60X94 (dates and stage numbers follow those in Contract 62A77):

- West Side of Southbound I-90/94 from South of Monroe Street to South of Jackson Boulevard: Construction of Retaining Walls 8 (SN 016-1727), 36 (SN 016-1825), 37 (SN 016-1826); modifications to Existing Retaining Wall 18 (SN 016-W989); the Adams Street Bridge west abutment (SN 016-1701); and the Jackson Boulevard west abutment and southwest wingwall (SN 016-1702) by Contract 60X94 shall occur during Stages 1A through 1D (December 16, 2020-August 15, 2021). Contract 62A77 will provide the work zone for this work. Associated retaining wall, pavement, median, and barrier wall removals shall occur in this area during the same time period, along with the construction of the pavement and barrier walls for the Adams Street and Jackson Boulevard SB exit ramps. Construction and backfilling the ground around the retaining walls and pavement, by Contract 60X94, shall be completed by July 15, 2021 in order for the adjacent pavement, shoulder, and barrier wall construction to be completed by Contract 62A77 by the end of Stage 1D.
- Adams Street Bridge Pier 1: Construction of the Adams Street Bridge pier 1 (SN 016-1701) by Contract 60X94 shall occur in Stages 1A to 1D (December 16, 2020-August 15, 2021). Contract 62A77 will provide the work zone for this work. Pier construction and backfilling the ground around the pier, by Contract 60X94, shall be completed by July 15, 2021 in order for the adjacent pavement, shoulder, and barrier wall construction to be completed by Contract 62A77 by the end of Stage 1D.

Cooperation between Contracts 62A77, 62A76 and 60X94 (dates and stage numbers follow those in Contract 62A76):

- Adams Street Bridge Demolition: Demolition of the Adams Street Bridge and Adams Street NB Entrance Ramp and construction of the temporary pavement by Contract 60X94 shall occur in Stage 0B (October 1, 2020-December 15, 2020). Contract 60X94 shall implement the established detours for Adams Street Bridge, Adams Street NB Entrance Ramp, and Adams Street SB Exit Ramp. Contracts 62A76 and 62A77 will provide a work zone and barrier walls for the demolition of the bridge, Piers 1, 2, and 3, the NB Entrance ramp, and construction of the temporary pavement in the area vacated by the Adams Street Bridge and NB Entrance ramp. The temporary pavement shall be completed by December 15, 2020 to allow for Contract 62A76 to move into Stage 1 traffic configuration.
- Jackson Boulevard Bridge Pier 1 and Adams Street Bridge Pier 2: Construction of Jackson Boulevard pier 1 (SN 016-1702) and Adams Street pier 2 (SN 016-1701) by Contract 60X94 is anticipated to occur in Stage 4A and 4B (December 1, 2021-May 31, 2022). From the start of work on these piers, the Contract 60X94 contractor shall have 90 consecutive calendar days to complete the work. Contracts 62A76 and 62A77 will provide the work zone for this construction.
- Adams Street and Jackson Boulevard Bridges Girder Erection and Deck Construction: The Adams Street Bridge girder erection and deck construction (SN 016-1701) and Jackson Boulevard Bridge girder erection and deck construction (SN 016-1702) by Contract 60X94 shall occur in Stages 4B and 5 (March 1, 2022-August 31, 2022). Access for work from I-90/94 expressway level shall be in work zones provided by Contracts 62A76 and 62A77. Temporary overnight lane closures, as required for bridge superstructure construction, shall be provided by Contract 60X94 except as noted herein for Adams and Jackson NB Entrance ramp curved girder erection.

Work in Parcel 0JZ0012TE-A:

- The temporary easement in Parcel 0JZ0012TE-A will expire on September 26, 2022. All work within this easement must be completed by September 26, 2022.

No additional compensation will be due to the Contractor due to lack of work zone availability as described herein.

These items shall be coordinated with contracts noted in the "Contractor Cooperation" Special Provision.



**LIST OF INCIDENTALS TO THE PAY ITEMS**

The Contractor's attention is called to several specific incidental work items as noted on the Contract Plans and Special Provisions and in addition to the lists in the Standard Specifications. Listed below is a listing of these items for general information only. The list is not intended to be all-inclusive and, therefore, the Contractor is responsible to perform all work according to the Plans, Special Provisions, and the Standard Specifications.

<b>PAY ITEM NUMBER</b>	<b>ITEM</b>	<b>INCIDENTAL WORK</b>
20200100	EARTH EXCAVATION	Disposing of abandoned underground utilities that conflict with construction shall be disposed of outside the limits of the Right-of-Way.
30300112	AGGREGATE SUBGRADE IMPROVEMENT, 12"	Additional depth of aggregate subgrade to permit drainage to the pipe underdrains.
42000300	PORTLAND CEMENT CONCRETE PAVEMENT, 8"	Saw Cut (full depth) shall be required at the joint between pavement, sidewalk, curb, and curb and gutter, median, driveway pavement, and hot-mix asphalt surfaces. Removal of any existing pavement fabric.
42000401	PORTLAND CEMENT CONCRETE PAVEMENT 9" (JOINTED)	Saw Cut (full depth) shall be required at the joint between pavement, sidewalk, curb, and curb and gutter, median, driveway pavement, and hot-mix asphalt surfaces. Removal of any existing pavement fabric.
42300400	PORTLAND CEMENT CONCRETE DRIVEWAY PAVEMENT, 8"	Saw Cut (full depth) shall be required at the joint between pavement, sidewalk, curb, and curb and gutter, median, driveway pavement, and hot-mix asphalt surfaces. Removal of any existing pavement fabric
44000100	PAVEMENT REMOVAL	Saw Cut (full depth) shall be required at the joint between pavement, sidewalk, curb, and curb and gutter, median, driveway pavement, and hot-mix asphalt surfaces. Removal of any existing pavement fabric.

<b>PAY ITEM NUMBER</b>	<b>ITEM</b>	<b>INCIDENTAL WORK</b>
44000200	DRIVEWAY PAVEMENT REMOVAL	Saw Cut (full depth) shall be required at the joint between pavement, sidewalk, curb, and curb and gutter, median, driveway pavement, and hot-mix asphalt surfaces. Removal of any existing pavement fabric.
44000300	CURB REMOVAL	Saw Cut (full depth) shall be required at the joint between pavement, sidewalk, curb, and curb and gutter, median, driveway pavement, and hot-mix asphalt surfaces. Removal of any existing pavement fabric.
44000400	GUTTER REMOVAL	Saw Cut (full depth) shall be required at the joint between pavement, sidewalk, curb, and curb and gutter, median, driveway pavement, and hot-mix asphalt surfaces. Removal of any existing pavement fabric.
44000500	COMBINATION CURB AND GUTTER REMOVAL	Saw Cut (full depth) shall be required at the joint between pavement, sidewalk, curb, and curb and gutter, median, driveway pavement, and hot-mix asphalt surfaces. Removal of any existing pavement fabric.
44003100	MEDIAN REMOVAL	Saw Cut (full depth) shall be required at the joint between pavement, sidewalk, curb, and curb and gutter, median, driveway pavement, and hot-mix asphalt surfaces. Removal of any existing pavement fabric.
44004250	PAVED SHOULDER REMOVAL	Saw Cut (full depth) shall be required at the joint between pavement, sidewalk, curb, and curb and gutter, median, driveway pavement, and hot-mix asphalt surfaces. Removal of any existing pavement fabric.

<b>PAY ITEM NUMBER</b>	<b>ITEM</b>	<b>INCIDENTAL WORK</b>
48300400	PORTLAND CEMENT CONCRETE SHOULDERS 9"	Saw Cut (full depth) shall be required at the joint between pavement, sidewalk, curb, and curb and gutter, median, driveway pavement, and hot-mix asphalt surfaces. Removal of any existing pavement fabric.
550A0340	STORM SEWERS, CLASS A, TYPE 2, 12"	Elbows and Tees and Collars. Connecting to drainage structures. Temporary plugs or connections during Staging to maintain drainage when only portions of Storm Sewers are to be installed. And removal of temporary plugs or connections.
550A0360	STORM SEWERS, CLASS A, TYPE 2, 15"	Elbows and Tees and Collars. Connecting to drainage structures. Temporary plugs or connections during Staging to maintain drainage when only portions of Storm Sewers are to be installed. And removal of temporary plugs or connections.
55100300	STORM SEWER REMOVAL, 8"	Patching holes in drainage structures as a result of removing storm sewers.
55100500	STORM SEWER REMOVAL, 12"	Patching holes in drainage structures as a result of removing storm sewers.
60600605	CONCRETE CURB, TYPE B	Saw Cut (full depth) shall be required at the joint between pavement, sidewalk, curb, and curb and gutter, median, driveway pavement, and hot-mix asphalt surfaces. Removal of any existing pavement fabric.

PAY ITEM NUMBER	ITEM	INCIDENTAL WORK
60602800	CONCRETE GUTTER, TYPE B	Saw Cut (full depth) shall be required at the joint between pavement, sidewalk, curb, and curb and gutter, median, driveway pavement, and hot-mix asphalt surfaces. Removal of any existing pavement fabric.
60603800	COMBINATION CONCRETE CURB AND GUTTER, TYPE B-6.12	Saw Cut (full depth) shall be required at the joint between pavement, sidewalk, curb, and curb and gutter, median, driveway pavement, and hot-mix asphalt surfaces. Removal of any existing pavement fabric.
60618300	CONCRETE MEDIAN SURFACE, 4 INCH	Saw Cut (full depth) shall be required at the joint between pavement, sidewalk, curb, and curb and gutter, median, driveway pavement, and hot-mix asphalt surfaces. Removal of any existing pavement fabric.
63700900	CONCRETE BARRIER BASE	Epoxy coated tie bars.
72800100	TELESCOPING STEEL SIGN SUPPORT	3" Reflective strips to sign posts for the "Stop", "Wrong Way" or "Do Not Enter" sign.
72900100	METAL POST – TYPE A	3" Reflective strips to sign posts for the "Stop", "Wrong Way" or "Do Not Enter" sign.
72900200	METAL POST – TYPE B	3" Reflective strips to sign posts for the "Stop", "Wrong Way" or "Do Not Enter" sign.
X0325155	REMOVE ABANDONED GAS MAIN	Gas valves, Gas vaults, Elbows and Tees and Collars and Temporary plugs
X0326382	CONCRETE BARRIER BASE (SPECIAL)	Epoxy coated tie bars.
X0370069	COMBINED SEWER (EXTRA STRENGTH VITRIFIED CLAY PIPE) 8 INCH (CDOT)	Elbows and Tees and Collars. Connecting to drainage structures. Temporary plugs during Staging when only portions of Storm Sewers are to be installed.

<b>PAY ITEM NUMBER</b>	<b>ITEM</b>	<b>INCIDENTAL WORK</b>
X0370080	COMBINATION CURB AND GUTTER TYPE B V.12 (CDOT)	Saw Cut (full depth) shall be required at the joint between pavement, sidewalk, curb, and curb and gutter, median, driveway pavement, and hot-mix asphalt surfaces. Removal of any existing pavement fabric.
X0370135	CONCRETE CURB, TYPE B (SPECIAL)(CDOT)	Saw Cut (full depth) shall be required at the joint between pavement, sidewalk, curb, and curb and gutter, median, driveway pavement, and hot-mix asphalt surfaces. Removal of any existing pavement fabric.
X0370185	COMBINED SEWER(EXTRA STRENGTH VITRIFIED CALY PIPE) 12 INCH (CDOT)	Elbows and Tees and Collars. Connecting to drainage structures. Temporary plugs during Staging when only portions of Storm Sewers are to be installed.
X7010216	TRAFFIC CONTROL AND PROTECTION (SPECIAL)	Removal or covering of existing regulatory, warning, and/or traffic signs which interfere with construction and/or conflict with construction traffic patterns.
X7011015	TRAFFIC CONTROL AND PROTECTION (EXPRESSWAYS)	Removal of existing sign panel covering.
XX008293	CURB WALL (SPECIAL)	Saw Cut (full depth) shall be required at the joint between pavement, sidewalk, curb, and curb and gutter, median, driveway pavement, and hot-mix asphalt surfaces. Removal of any existing pavement fabric.
XX009048	CURB AND GUTTER (SPECIAL)	Saw Cut (full depth) shall be required at the joint between pavement, sidewalk, curb, and curb and gutter, median, driveway pavement, and hot-mix asphalt surfaces. Removal of any existing pavement fabric.

<b>PAY ITEM NUMBER</b>	<b>ITEM</b>	<b>INCIDENTAL WORK</b>
Z0010614	CLEAINING EXISTING MANHOLE OR HANDHOLE	Furnishing and installing racks and/or cable hooks for new and existing cables.
Z0004552	APPROACH SLAB REMOVAL	Saw Cut (full depth) shall be required at the joint between pavement, curb, and curb and gutter, median, and hot- mix asphalt surfaces. Removal of any existing pavement fabric.
Z0018800	DRAINAGE SYSTEM	Connecting existing drainage systems to proposed drainage systems.
Contract	STABILIZED CONSTRUCTION ENTRANCE	All work associated with the installation and maintenance shall be incidental to the Contract.
Contract	CONCRETE WASHOUTS	All work associated with the installation and maintenance shall be incidental to the Contract.

## **NON-SPECIAL WASTE CERTIFICATION**

The Department or its authorized representative will certify and sign any required transportation documentation for non-special waste as the generator of pre-existing non-special waste for this project.

## **ROAD CONSTRUCTION REPORTING AND SIGNING FOR VEHICLE WIDTH RESTRICTIONS**

### Introduction.

The intent of this policy is to provide uniform width restriction signing and reporting in order to reduce the chances of oversized vehicles, particularly those operating under blanket permits, from becoming entrapped in construction zones.

### Construction/Maintenance Projects Requiring Over Size and Over Weight Restrictions.

- a) Closures of any roadway, Rail Road crossing, Interstate or Freeway Ramps
- b) All road construction that restricts the actual measured opening to less than 17' 6".
- c) Any construction zone with characteristics that have the potential of creating delays and/or potentially hazardous conditions such as roadways with a high traffic volume or unnecessary merging situations. Any other condition that the Engineer deems necessary to ensure safety should be listed.

### Measuring with Restrictions.

In order to ensure state-wide uniformity, the opening shall be measured as follows:

- a) Two fixed structures – Measurement shall be made between the narrowest points of the fixed structures. Fixed structures may include but are not limited to bridge railing, concrete barrier, cable rail, or guard rail.
- b) Fixed structure and non-fixed devices or equipment – Measurement shall be made between the two narrowest points of the fixed structure and non-fixed devices when such non-fixed devices cannot easily be moved to accommodate the overwidth load. Such devices or equipment may include snoopers, barricades/cones/drums placed to keep traffic away from open holes in the pavement, arrow boards, dynamic message signs, etc.
- c) Construction near a fixed structure – Construction activities near a fixed structure may result in a reportable width restriction where there is insufficient room for an overwidth load to safely move onto the structure

### Reporting.

In order to provide timely information to truckers, all road construction or maintenance activities which result in measured openings for traffic of less than 17' 6" or which involve the closure of any roadway, railroad grade crossing or freeway ramp are to be reported to the Central Bureau of Operations at least 21 days in advance of the date of the restriction start date which may be different from the start date of the project itself. The reporting is to be on form OPER 2410. Note on the form if the restrictions will only be in effect during the time period of ½ hour before sunrise to ½ after sunset Monday through Friday and ½ hour before sunrise to noon on Saturday, or if they will be in effect at all times.

When using form OPER 2410, the restriction location on interstate routes or other freeways should be identified with mileposts and/or a distance from an identifiable location, such as an intersection of two routes. If the restriction is located a structure, identify the feature crossed. The location of restrictions on conventional highways should be identified with a distance from an identifiable locations, such as an intersection of two routes and the From Mile/To Mile fields left blank. If construction is located at a structure, identify the feature crossed. If there are multiple structures with different width restriction dimensions, each structure and restriction must be listed separately. This can be accomplished on the same form.

If the construction and/or width restriction start/stop dates change after being submitted, a revised OPER 2410 must be submitted.

The width restriction dimension to be listed on form OPER 2410 and used on the width restriction signing should be the actual measured opening less 18". For example if the actual measured opening is 16' 3", the restriction dimension is to be reported and signed at 14' 9".

A greater deduction than 18" may be taken if, in the opinion of the Engineer, it is warranted due to unusual geometrics or other operational considerations. The dimension listed on form OPER 2410 and used on the signing should reflect the greater deduction.

After completion, the form is to be e-mailed to the IDOT ROAD INFO mailbox.

Emergencies or any unusual construction restrictions or closures should be reported immediately.

- a) During Normal Business Hours: Call (217) 782-8551. Submittal of OPER 2410 by e-mail to IDOT ROAD INFO is still required.
- b) After Normal Business Hours/ Weekends/ Holidays: Call the Communications Center (Station 1) at (217) 782-2937. After calling Station 1, submit OPER 2410 by e-mail to IDOT ROAD INFO and fax a copy to the Communications Center at (217) 782-1927.



Signing.

Signing shall be provided whenever the actual measured restriction is less than 17' 6". W12-I102 signs should be placed prior to the beginning of the traffic control where the width restriction occurs. Advance signing (W12-I103) shall also be placed where the roadway intersects with the previous state route and with any major local routes where overwidth vehicles are likely to enter the highway. The advance signing must be visible to approaching traffic sufficiently in advance of the intersection to enable overwidth trucks to change direction. This may require the use of more than one advance sign at the intersection. The dimensions shown on the signing shall be the actual measured opening less 18" as noted previously.

**NOISE COMPLIANCE**

Description. This work shall be according to Article 107.35 of the Standard Specifications, with the following additions:

All Work requiring lane closures and lane restrictions under KEEPING THE EXPRESSWAY OPEN TO TRAFFIC special provision shall follow the requirements described herein. Unless specifically approved in writing by the Engineer, no work that could be considered a noise nuisance, including but not limited to demolition activities, shall be performed during the period of 10 p.m. to 7 a.m.

When the Contractor requests to modify or deviate from the requirements of Article 107.35, the Contractor shall identify the intended construction activities, utilize noise mitigation techniques and identify the anticipated duration that noise levels will be elevated. Vehicle noise, including horns, back up warning signals and other abrupt noises shall be minimized

The Engineer may elect to shut down any nuisance activity that was not previously approved or does not meet the Contractor obligations identified in the approval request.

Basis of Payment. This work will not be paid for separately. All obligations described herein are included in associated pay items. No extension of the completion date, waiver of penalties or claims shall arise from any Contractor activity shut down enacted due to deficiencies described herein.

**TREE TRUNK PROTECTION**

Add the following to Article 201.05(b):

"Install a mulch ring of the size noted on the plans around each tree, per the requirements of the SHREDDED HARDWOOD BARK MULCH special provision."

Add the following to Article 201.10(c)(2):

"Mulch may remain in place at the conclusion of the contract."

Add the following to Article 201.11(b):

"Mulch will be included in this item and not measured for payment under SHREDDED HARDWOOD BARK MULCH."

## **SUPPLEMENTAL WATERING**

Description: This work will include watering turf, trees, shrubs, and perennial plants at the rates specified and as directed by the Engineer. The work shall be done in accordance with the applicable portions of Section 201 of the Standard Specifications.

Construction Requirements:

Schedule: Watering will only begin after the successful completion of all period of establishment requirements. Supplemental watering should be used at any time after initial watering to keep turf, trees, shrubs and perennials in a live healthy condition while it is establishing in the non-irrigated areas.

Watering must be completed in a timely manner. When the Engineer directs the Contractor to do supplemental watering, the Contractor must begin the watering operation within 24 hours of notice. Damage to plant material that is a result of the Contractor's failure to water in a timely way must be repaired or replaced at the Contractor's expense.

Source of Water: The Contractor shall notify the Engineer of the source of water used and provide written certification that the water does not contain chemicals harmful to plant growth.

Rate of Application: The normal rates of application for watering are as follows. The Engineer will adjust these quantities and frequency rates as needed depending upon weather conditions.

- Turf: 3 gallons per square foot
- Trees: 10 gallons per inch caliper or 5 gallons per foot in height
- Shrubs: 10 gallons per shrub
- Ornamental Grasses: 3 gallons per square foot
- Perennial Plants and Groundcovers: 3 gallons per square foot
- Vines: 3 gallons per vine

Method of Application: A spray nozzle that does not damage small plants must be used when watering all vegetation. Water shall be applied at the base of the plant to keep as much water as possible off plant leaves. An open hose may be used to water trees, shrubs, and seedlings if mulch and soil are not displaced by watering. The water shall be applied to individual plants in such a manner that the plant hole shall be saturated without allowing the water to overflow beyond the earthen saucer. Watering of plants in beds shall be applied in such a manner that all plant holes are uniformly saturated without allowing the water flow beyond the periphery of the bed. Water shall slowly infiltrate into soil and completely soak the root zone. The Contractor must supply metering equipment as needed to assure the specified application rate of water.

Method of Measurement: Supplemental watering will be measured for payment in units of 1000 gallons of water applied as directed.

Basis of Payment: This work will be paid for at the contract unit price per unit of SUPPLEMENTAL WATERING, measured as specified. Payment will include the cost of all water, equipment and labor needed to complete the work specified herein and to the satisfaction of the Engineer.

## **COMPOST FURNISH AND PLACE**

This work shall consist of furnishing, transporting and placing compost to the depth specified in areas as shown in the plans or as directed by the Engineer.

Delete Article 211.02 Materials (b) Compost and substitute the following:

Compost shall be thoroughly, and aerobically decomposed organic waste produced at an IEPA registered composting facility. The compost supplier shall furnish a certification with each shipment stating that the compost complies with the following requirements:

- (1) Particle Size: 98 percent of the compost shall pass through a 3/4 in. (20 mm) screen.
- (2) Physical Contaminant: Less than one percent combined glass, metal, and plastic.
- (3) Organic Matter/Ash Content: At least 40 percent organic matter; less than 60 percent ash content.
- (4) Carbon to Nitrogen Ratio: Ranging from 10:1 to 20:1 C:N ratio.
- (5) pH: Between 6 and 8.
- (6) Soluble Salts: Electrical conductivity below 10 dS m<sup>-1</sup> (mmhos cm<sup>-1</sup>)
- (7) Moisture Content: Between 35 percent and 50 percent by weight.
- (8) Maturity: The compost shall be resistant to further decomposition and free of compounds, such as ammonia and organic acids, in concentrations toxic to plant growth.
- (9) Residual Seeds and Pathogens: Pathogens and noxious weeds shall be minimized.

A copy of the compost test results complying with IEPA standards for General Use Compost and certification of IEPA registration shall be provided to the Engineer with each shipment of compost.

Compost shall be capable of supporting and germinating vegetation.

Delete the first sentence of the first paragraph of Article 211.04 Placing Topsoil and Compost and substitute the following:

Compost shall not be placed until the area to be covered has been shaped, trimmed and finished according to Section 212. Prior to placing compost the contractor shall remove all litter (including plastic bags, bottles, rocks, etc.) and plant debris.

Delete the second paragraph of Article 211.04 Placing Topsoil and Compost and substitute the following:

When compost is specified as a soil amendment, it shall be place at the specified depth on top of the topsoil. The Engineer will verify that the proper compost depth has been applied. After verification of proper depth, the Contractor shall completely incorporate the compost by tilling the top 6" of the fairly dry topsoil. Do not till when the topsoil is muddy.

Add the following to Article 211.07 Basis of Payment:

Compost Furnish and Place will be measured in place to the depth specified.

Add the following to Article 211.08 Basis of Payment:

The work will be paid for at the contract unit price per square yard for COMPOST FURNISH AND PLACE, 3". Payment shall include all furnishing, stockpiling, transporting, all labor and equipment necessary, disposal and incidentals required to complete the work as specified herein and to the satisfaction of the Engineer.

## **PLANTING WOODY PLANTS**

This work shall consist of planting woody plants as specified in Section 253 of the Standard Specifications with the following revisions:

### **Delete Article 253.03 Planting Time and substitute the following:**

Spring Planting. This work shall be performed between March 15th and May 31st except that evergreen planting shall be performed between March 15th and April 30th in the northern zone.

### **Add the following to Article 253.03 (a) (2) and (b):**

All plants shall be obtained from Illinois Nurserymen's Association or appropriate state chapter nurseries. All trees and shrubs shall be dug prior to leafing out (bud break) in the spring or when plants have gone dormant in the fall, except for the following species which are only to be dug prior to leafing out in the spring:

- Maple (*Acer* spp.)
- Buckeye (*Aesculus* spp.)
- Serviceberry (*Amelanchier* spp.)
- Birch (*Betulus* spp.)
- American Hornbeam (*Carpinus caroliniana*)
- Hickory (*Carya* spp.)
- Hackberry (*Celtis occidentalis*)
- Eastern Redbud (*Cercis canadensis*)
- Hawthorn (*Crataegus* spp.)
- Walnut (*Juglans* spp.)
- Tuliptree (*Liriodendron* spp.)
- Crabapple (*Malus* spp.)
- Black Tupelo (*Nyssa sylvatica*)
- American Hophornbeam (*Ostrya virginiana*)
- Oak (*Quercus* spp.)
- Sassafras (*Sassafras albidum*)
- Baldcypress (*Taxodium distichum*)
- American Linden (*Tilia americana*)

Fall Planting. This work shall be performed between October 1 and November 30 except that evergreen planting shall be performed between August 15 and October 15.

Planting dates are dependent on species of plant material and weather. Planting might begin or end prior or after above dates as approved by the Engineer. Do not plant when soil is muddy or during frost.

**Add the following to Article 253.05 Transportation:**

Cover plants during transport to prevent desiccation. Plant material transported without cover shall be automatically rejected. During loading and unloading, plants shall be handled such that stems are not stressed, scraped or broken and that root balls are kept intact.

**Delete the third sentence of Article 253.07 and substitute the following:**

Trees must be installed first to establish proper layout and to avoid damage to other plantings such as shrubs and perennials.

The Contractor shall be responsible for all plant layout. The layout must be performed by qualified personnel. The planting locations must be laid out as shown in the landscape plan. This will require the use of an engineer's scale to determine some dimensions. Tree locations within each planting area shall be marked with a different color stake/flag and labeled to denote the different tree species. Shrub beds limits must be painted.

All utilities shall have been marked prior to contacting the Roadside Development Unit. The Engineer will contact the Roadside Development Unit at (847) 705-4171 to approve the layout prior to installation. Allow a minimum of seven (7) working days prior to installation for approval.

**Delete the first paragraph to Article 253.08 Excavation of Plant Holes and substitute with the following:**

Protect structures, noise walls, utilities, sidewalks, bicycle paths, knee walls, fences, pavements, utility boxes, other facilities, lawns and existing plants from damage caused by planting operations. Excavation of the planting hole may be performed by hand, machine excavator, or auger.

The excavated material shall not be stockpiled on turf, in ditches, or used to create enormous water saucer berms around newly installed trees or shrubs. Remove all excess excavated subsoil from the site and dispose as specified in Article 202.03.

**Delete the second sentence of Article 253.08 Excavation of Plant Holes (a) and the third paragraph of Article 253.08(b) and substitute with the following:**

Excavation of planting hole width. Planting holes for trees, shrubs, and vines shall be three times the diameter of the root mass and with 45-degree sides sloping down to the base of the root mass to encourage rapid root growth. Roots can become deformed by the edge of the hole if the hole is too small and will hinder root growth.

Planting holes dug with an auger shall have the sides cut down with a shovel to eliminate the glazed, smooth sides and create sloping sides.

Excavation of planting hole depth. The root flare shall be visible at the top of the root mass. If the trunk flare is not visible, carefully remove soil from around the trunk until the root flare is visible without damaging the roots. Remove excess soil until the top of the root mass exposes the root collar.

The root flare shall always be slightly above the surface of the surrounding soil. The depth of the hole shall be equal to the depth of the root mass minus 2" allowing the tree or shrub to sit 2" higher than the surrounding soil surface for trees.

For stability, the root mass shall sit on existing undisturbed soil. If the hole was inadvertently dug too deep, backfill and recompact the soil to the correct depth.

Excavation of planting hole on slopes. Excavate away the slope above the planting hole to create a flattened area uphill of the planting hole to prevent the uphill roots from being buried too deep. Place the excess soil on the downslope of the planting hole to extend the planting shelf to ensure roots on the downhill side of the tree remain buried. The planting hole shall be three times the diameter of the root mass and saucer shaped. The hole may be a bit elongated to fit the contour of the slope as opposed to the typical round hole on flat ground.

Add backfill to create a small berm on the downhill portion of the planting shelf to trap water and encourage movement into the soil to increase water filtration around the tree. Smooth out the slope above the plant where you have cut into the soil so the old slope and the new slope transition together smoothly.

**Add the following to Article 253.08 Excavation of Plant Holes (b):**

When planting shrubs in shrub beds or vines in vine beds as shown on the plans or as directed by the Engineer, spade a planting bed edge at approximately a 45-degree angle and to a depth of approximately 3-inches around the perimeter of the shrub/vine bed prior to placement of the mulch. Remove any debris created in the spade edging process and dispose of as specified in Article 202.03.

**Delete Article 253.09 (b) Pruning and substitute with the following:**

Deciduous Shrubs. Shrubs shall be pruned to remove dead, conflicting, or broken branches and shall preserve the natural form of the shrub.

**Delete the third and fourth paragraphs of Article 253.10 Planting Procedures and Article 253.10 (a) and substitute the following:**

Approved watering equipment shall be at the site of the work and in operational condition PRIOR TO STARTING the planting operation and DURING all planting operations OR PLANTING WILL NOT BE ALLOWED.

All plants shall be placed in a plumb position and avoid the appearance of leaning. Confirm the tree is straight from two directions prior to backfilling.

Before the plant is placed in the hole, any paper or cardboard trunk wrap shall be removed. Check that the trunk is not damaged. Any soil covering the tree's root flare shall be removed to expose the root crown prior to planting.

Check the depth of the root ball in the planting hole. With the root flare exposed, the depth of the hole shall be equal to the depth of the root mass minus 2" allowing the tree or shrub to sit 2" higher than the surrounding soil surface for trees. The root flare shall always be slightly above the surface of the surrounding soil. For stability, the root ball shall sit on existing undisturbed soil. If the hole was inadvertently dug too deep, backfill and recompact the soil to the correct depth.

After the plant is placed in the hole, all cords and burlap shall be removed from the trunk. Remove the wire basket from the top three quarters (3/4) of the root ball. The remaining burlap shall be loosened and scored to provide the root system quick contact with the soil. All ropes or twine shall be removed from the root ball and tree trunk. All materials shall be disposed of properly.

The plant hole shall be backfilled with the same soil that was removed from the hole. Clay soil clumps shall be broken up as much as possible. Where rocks, gravel, heavy clay or other debris are encountered, clean top soil shall be used. Do not backfill excavation with subsoil.

The hole shall be 1/3 filled with soil and firmly packed to assure the plant remains in plumb, then saturated with water. After the water has soaked in, complete the remaining backfill in 8" lifts, tamping the topsoil to eliminate voids, and then the hole shall be saturated again. Maintain plumb during backfilling. Backfill to the edge of the root mass and do not place any soil on top of the root mass. Visible root flare shall be left exposed, uncovered by the addition of soil.

**Add the following to Article 253.10 (b):**

After removal of the container, inspect the root system for circling, matted or crowded roots at the container sides and bottom. Using a sharp knife or hand pruners, prune, cut, and loosen any parts of the root system requiring corrective action.

**Delete the first sentence of Article 253.10(e) and substitute with the following:**

Water Saucer. All plants placed individually and not specified to be bedded with other plants, shall have a water saucer constructed of soil by mounding up the soil 4-inches high x 8-inches wide outside the edge of the planting hole.



**Delete Article 253.11 and substitute the following:**

Individual trees, shrubs, shrub beds, and vines shall be mulched within 48 hours after being planted. No weed barrier fabric will be required for tree and shrub plantings. Pre-emergent herbicide will be used instead of weed barrier fabric. The pre-emergent herbicide shall be applied prior to mulching. See specification for Weed Control, Pre-Emergent Granular Herbicide.

The mulch shall consist of wood chips or shredded tree bark not to exceed two (2) inches in its largest dimension, free of foreign matter, sticks, stones, and clods. Mulch shall be aged in stockpiles for a minimum of four (4) months where interior temperatures reach a minimum of 140-degrees. The mulch shall be free from inorganic materials, contaminants, fuels, invasive weed seeds, disease, harmful insects such as emerald ash borer or any other type of material detrimental to plant growth. A sample must be supplied to the Roadside Development Unit for approval prior to performing any work. Allow a minimum of seven (7) working days prior to installation for approval.

Mulch shall be applied at a depth of 4-inches around all plants within the entire mulched bed area or around each individual tree forming a minimum 6-foot diameter mulch ring around each tree. An excess of 4-inches of mulch is unacceptable and excess shall be removed. Mulch shall be tapered so that no mulch shall be placed within 6-inches of the shrub base or trunk to allow the root flare to be exposed and shall be free of mulch contact.

Care shall be taken not to bury leaves, stems, or vines under mulch material. All finished mulch areas shall be left smooth and level to maintain uniform surface and appearance. After the mulch placement, any debris or piles of material shall be immediately removed from the right of way, including raking excess mulch out of turf areas in accordance with Article 202.03.

**Delete Article 253.12 Wrapping and substitute the following:**

Within 48 hours after planting, screen mesh shall be wrapped around the trunk of all deciduous trees with a caliper of 1-inch or greater. Multi-stem or clump form trees, with individual stems having a caliper of 1-inch or greater, shall have each stem wrapped separately. The screen mesh shall be secured to itself with staples or single wire strands tied to the mesh. Trees shall be wrapped at time of planting, before the installation of mulch. The lower edge of the screen wire shall be in continuous contact with the ground and shall extend up to a minimum of 36-inches or to the lowest major branch, whichever is less. Replacement plantings shall not be wrapped.

**Delete Article 253.13 Bracing and substitute with the following:**

Unless otherwise specified by the Engineer, within 48 hours after planting all deciduous and evergreen trees, with the exception of multi-stem or clump form specimens, over 8-feet in height shall require three 6-foot long steel posts equally spaced from each other and adjacent to the outside of the ball. The posts shall be driven vertically to a depth of 18-inches below the bottom of the hole. The anchor plate shall be aligned perpendicular to a line between the tree and the post. The tree shall be firmly attached to each post with a double guy of 14-gauge steel wire. The portion of the wire in contact with the tree shall be encased in a hose of a type and length approved by the Engineer.

During the life of the contract, within 72 hours the Contractor shall straighten any tree that deviates from a plumb position. The Contractor shall adjust backfill compaction and install or adjust bracing on the tree as necessary to maintain a plumb position. Replacement trees shall not be braced.

**Delete the second sentence of the first paragraph of Article 253.14 Period of Establishment and substitute the following:**

This period shall begin in April 1 and end November 30 of the same year.

**Delete the first paragraph of Article 253.15 Plant Care and substitute the following:**

From planting until final acceptance of planting, the Contractor shall properly care for all plants including watering, weeding, adjusting braces, repairing water saucers, spraying insect infected plants, or other work which is necessary to maintain the health, vigor and satisfactory appearance of the plantings. The Contractor shall provide plant care a minimum of every two weeks, or within three days following notification by the Engineer. Water shall be applied at a reasonable velocity and distance such as to cause no harm to the plant or displacement of mulch or soil. All requirements for plant care shall be considered as included in the cost of the contract.

**Delete the first paragraph of Article 253.15 Plant Care (a) and substitute with the following:**

During plant care, watering shall be performed at least every ten (10) days during the months of April through November. The Contractor shall apply a minimum of 40 gallons of water per tree, 25 gallons per large shrub/evergreen shrub, 15 gallons per small shrub, and 4 gallons per vine. The Engineer may direct the Contractor to adjust the watering rate and frequency depending upon weather conditions.

**Add the following to Article 253.15 Plant Care (c):**

The contractor shall correct any vine growing across the ground plane that should be growing up desired vertical element (noise wall, retaining wall, fence, knee wall, etc.). Work may include but is not limited to carefully weaving vines through fence and/or taping vines to vertical elements.

**Add the following to Article 253.15 Plant Care (d):**

The contractor shall inspect all trees, shrubs, and vines for pests and diseases at least every two weeks during the months of initial planting through final acceptance. Contractor must identify and monitor pest and diseases and determine action required to maintain the good appearance, health and, top performance of all plant material. Contractor shall notify the Engineer with their inspection findings and recommendations within twenty-four hours of findings. The recommendations for action by the Contractor must be reviewed and by the Engineer for approval/rejection. All approved corrective activities will be included in the cost of the contract and shall be performed within 48 hours following notification by the Engineer.

**Delete Article 253.16 Method of Measurement and substitute with the following:**

Trees, shrubs, evergreens, vines, and seedlings will be measured as each individual plant.

- (a) This work will be measured for initial payment, in place, for plant material found to be in live and healthy condition by June 1.
- (b) This work will be measured for final payment, in place, for plant material found to be in live and healthy condition upon final acceptance by the department.
- (c) Pre-emergent Herbicide will be measured for payment as specified in Weed Control, Pre-emergent Granular Herbicide.

**Delete Article 253.17 Basis of Payment and substitute the following:**

This work will be paid for at the contract unit price per each for TREES, SHRUBS, EVERGREENS, or VINES, of the species, root type, and plant size specified.

The unit price shall include the cost of all material, equipment, labor, plant care, mulch, watering, disposal, and incidentals required to complete the work as specified herein and to the satisfaction of the Engineer. Payment will be made according to the following schedule.

- (a) Initial Payment. This work will be paid for 75% of the contract unit price each for several kinds and sizes of trees, evergreens, shrubs, and vines found to be alive and healthy condition by May 31<sup>st</sup>, as specified in Article 253.14.
- (b) Final Payment. After the successful completion of all required replacement plantings, clean-up work and receipt of the "Final Acceptance of Landscape Work" memorandum from the Bureau of Maintenance, or upon execution of a third-party bond, the remaining 25 percent of the pay item(s) will be paid.
- (c) The placement of Pre-emergent Herbicide shall be paid for at the contract unit price for WEED CONTROL, PRE-EMERGENT GRANULAR HERBICIDE.

## **REQUIRED INSPECTION OF WOODY PLANT MATERIAL**

### **Delete Article 1081.01(a)(5) and substitute the following:**

The place of growth for all material, and subsequent inspection, must be located within 200 miles of the project.

### **Delete Article 1081.01(c)(1) and substitute the following:**

Inspection of plant material will be made at the nursery by the Engineer, or a duly authorized representative of the Department; all plant material must be in the ground of the nursery supplying the material.

The Contractor shall submit plant inspection forms and allow a minimum of 30 calendar days advance notice of the plant material to be inspected. Written certification by the Nursery will be required certifying that the plants are true to their species and/or cultivar specified in the plans.

The Department reserves the right to place identification seals on any or all plants selected. No trees shall be delivered without IDOT seal. Plant material not installed within 60 days of initial inspection will be required to be re-inspected.

## **PLANTING PERENNIAL PLANTS**

Delete Article 254.03(a) Planting Time and replace with the following:

Planting Time. With the exception of bulb type plants, the following shall apply: Plantings shall be installed during Spring. No fall planting will be allowed without written request by the Contractor and written approval by the Engineer.

All bulb type planting located within all Stages shall be installed during Fall.

Planting Times for the various types of perennial plants shall be as follows:

- (a) Bulbs shall be planted between October 15 and November 30. Bulbs shall not be installed prior to trees, shrubs, perennials, and ornamental grasses are planted.
- (b) Ornamental Type and Prairie Type plant shall be planted between May 1 and June 15.

Delete Article 254.05 Layout of Planting and substitute the following:

When plants are specified to be planted in prepared soil planting beds, the planting bed shall be approved by the Engineer prior to planting. The Contractor shall be responsible for all plant layout. The layout must be performed by qualified personnel. The planting locations must be laid out as shown in the landscape plan. This will require the use of an engineer's scale to determine some dimensions. Bed limits shall be painted or flagged. Landscape Architect shall be present at time of installations to approve layout of plant beds and vegetation prior to planting. The Engineer will contact the Roadside Development Unit at (847) 705-4171 to approve the layout prior to installation. Allow a minimum of seven (7) days prior to installation for coordination.

Add the following to Article 254.06 Planting Procedures:

When planting perennials in bed areas shown on the plans or as directed by the Engineer, the following work shall be performed prior to planting:

- Spade a planting bed edge at approximately a 45 degree angle and to a depth of approximately three (3) inches around the perimeter of the perennial bed. Remove any debris created in the spade edging process and dispose of as specified in Article 202.03.
- Coarse sand (FA2) 28 lbs/sq. ft. shall be added and applied to the planting beds at a depth of 2-inch then tilled into the soil to a depth of 6-inches to amend the existing topsoil.
- Do not plant when soil is saturated with water or muddy.

- Trees and shrubs shall be installed first to establish proper layout and to avoid damage to other plantings. See planting details.
- Perennial plants shall be planted by a hand method approved by the Engineer. Open holes sized to accommodate roots, place plants at proper elevation and backfill with planting soil, working carefully to avoid damage to roots and to leave no voids. Build up a small water basin of soil around each plant.
- Immediately after planting, thoroughly water plant beds. Do not wash soil onto crowns of plants.

Delete the first sentence of Article 254.07 Mulching and substitute the following:

A mulch sample shall be submitted to the Engineer for approval seven (7) days prior to placing.

Within 24 hours, the entire perennial plant bed shall be mulched with three (3) inches of fine grade Shredded Hardwood Bark Mulch. Hardwood bark mulch shall be clean, finely shredded mixed-hardwood bark not to exceed two (2) inches in its largest dimension, free of foreign matter, sticks, stones, and clods. All hardwood mulch shall be processed through a hammer mill. Hardwood bark not processed through a hammer mill shall not be accepted.

The mulch shall be placed to form saucers around each individual plant, mulch shall not touch the stems of the perennial plants. Care shall be taken to place the mulch so as not to smother the plants or bury leaves, stems or vines under mulch material.

Add the following to Article 254.07 Mulching:

Pre-emergent Herbicide shall be used in the perennial beds after the placement of mulch. See specification for Weed Control, Pre-emergent Granular Herbicide.

Delete Article 254.08 (b) Period of Establishment and substitute the following:

Perennial plants must undergo a 30-day period of establishment. Additional watering shall be performed not less than twice a week for four weeks following installation. Any signs of stress exhibited by plant material must be given special consideration in determining water needs. Water shall be applied at the rate of 3 gallons per square foot. Water to insure that moisture penetrates throughout the root zone, including the surrounding soil, and only as frequently as necessary to maintain healthy growth. **Do not over water.**

Should excess moisture prevail, the Engineer may delete any or all of the additional watering cycles. In severe weather, the Engineer may require additional watering.

A spray nozzle that does not damage small plants must be used when watering perennial plants. An open-end hose is unacceptable. Water must trickle slowly into soil and completely soak the root zone. Force of dispersal shall not disrupt the soil, mulch, or plant stability. Water early in the day and apply water as close to the soil as possible without washing out soil or mulch. Water at the base of the plant to keep as much water as possible off plant leaves to minimize fungus problems. Watering of plants in beds shall be applied in such a manner that all plant holes are uniformly saturated without allowing water to flow beyond the periphery of the bed. Thoroughly saturate all areas of the perennial bed, not just individual plants. The plants to be watered and the method of application will be approved by the Engineer. The Contractor will not be relieved in any way from the responsibility for unsatisfactory plants due to the amount of watering.

Add the following Article 254.09 Period of Establishment:

During the period of establishment, weeds and grass growth shall be removed from within the mulched perennial beds. This weeding shall be performed a minimum of once per week or within 48 hours following notification by the Engineer during the 30 - day period of establishment. The Contractor will not be relieved in any way from the responsibility for unsatisfactory plants due to the extent of weeding.

The weeding may be hand pulled or performed in any manner approved by the Engineer in writing provided the weed and grass growth, including their roots and stems, are removed from the area specified. Mulch disturbed by the weeding operation shall be replaced to its original condition. All debris that results from this operation must be removed from the right-of-way and disposed of at the end of each day in accordance with Article 202.03.

Add the following to Article 254.10 Method of Measurement:

- a) Disposal of weeds, sod and debris (rock, stones, concrete, bottles, plastic bags, etc.) removed from the perennial planting bed as specified in Article 202.03.
- b) Coarse sand (FA2) will be measured for payment as specified in Coarse Sand Placement.

Add the following to Article 254.11 Basis of Payment:

- a) Coarse sand (FA2) will be paid for as specified in Coarse Sand Placement.
- b) Pre-emergent Herbicide will be paid for as specified in Weed Control, Pre-emergent Herbicide.
- c) Payment for Shredded Mulch shall be included in contract unit price of the perennial plant pay item.
- d) The unit price shall include the cost of all materials, equipment, labor, plant care, removal, disposal and incidentals required to complete the work as specified herein and to the satisfaction of the Engineer.



## **PERENNIAL PLANT CARE**

Description: This work shall consist of weeding, replenishing mulch, trimming and other perennial plant care work items for each work cycle as described herein and as directed by the Engineer. The work required for each work cycle shall be scheduled to be complete and acceptable at the time of inspection.

Inspection Date: Perennial Plant Care shall be performed every 30 days and will only begin after the successful completion of all period of establishment requirements (July – October). The work required for each work cycle must be 100 percent complete on the inspection date. Inspections of partially completed areas will not be performed. Perennial plant care will be inspected on a schedule as directed by the Engineer.

### Work Cycle Requirements:

- Perennial plant beds must be 100 percent weed-free and clear of litter and debris to be acceptable. Control weeds in landscaped areas by pulling the entire plant and roots. (The Contractor may apply a pre-emergent herbicide, approved by the Engineer, during Spring perennial plant care cycles). Disturbed areas shall be raked level and mulch adjusted.
- Dead flowers, stems, and leaves must be trimmed and removed.
- Trim dead tips of ground covers.
- Plants must be free of insect infestations and sprayed if necessary.
- Monitor mulch depths to maintain a three-inch (75 mm) depth around perennial plants (no more, no less). Rake mulch any away from perennial crowns.
- Finely shredded hardwood bark mulch must be replenished to maintain a (3") three-inch depth around perennial plants, if necessary. Hardwood mulch shall not exceed (2") two inches in its largest dimension, free of foreign matter, sticks, stones and clods. (Mulch must be approved by the Engineer prior to placement).
- Beds must have a neatly spaded edge between the mulched bed and the turf.
- Mulch must be raked out of turf surrounding the mulched bed.
- In the spring (April), cut back ornamental grasses to six (6) inches in height. Cut down any perennial left up over the winter to a height of six (6) inches or less and remove any dead leaves around the crowns of the plants. Rake beds free of accumulated debris, dead leaves, and other material, leaving mulch in place and being careful not to damage emerging bulb foliage and flowers. Rake back any mulch that covers plant crowns.
- Fall clean-up (October 15 – November 15; depending upon weather conditions and condition of plant material), cut back perennials leaving 3 to 4 inches height foliage as soon as foliage has died back or at discretion of the Engineer. Do not cut into plant crowns. Do not cut back any perennial with winter interest (ornamental grasses, Echinacea/Rudbeckia seed heads).
- Remove litter and other debris. All drain inlets must be kept clean and draining freely. All walls, pavement, curb and gutters, and concrete pads are to be left clean and swept free of all debris.
- All debris that results from this operation must be removed from the right-of-way and disposed of in accordance with Article 202.03 at the end of each day.

Method of Measurement: The work will be measured for payment of surface area cared for to the satisfaction of the Engineer on the inspection date determined by the Engineer (approximately every 30 days). The area will be computed in square yards.

If the inspection discloses any work as being unsatisfactory, the Engineer will give the Contractor the necessary instructions for correction of same, and the Contractor shall immediately comply with such instructions and correct the unsatisfactory work on the inspection date. Work that is not acceptable on the inspection date will not be measured for payment. Individual perennial plant areas within a perennial plant bed will not be measured for payment if any portion of the perennial plant bed has not been cared for to the satisfaction of the Engineer. Each perennial plant care work cycle specified in the plans will be measure separately for payment.

Basis of Payment: This work will be paid for at the contract unit price per square yards for PERENNIAL PLANT CARE, which price shall include all materials, equipment, labor, removal, disposal and incidentals required to complete the work as specified herein and to the satisfaction of the Engineer.

## **WEED CONTROL, PRE-EMERGENT GRANULAR HERBICIDE**

Description: This work shall consist of spreading a pre-emergent granular herbicide in areas as shown on the plans or as directed by the Engineer. This item will be used in mulched plant beds and mulch rings.

Materials: The pre-emergent granular herbicide shall contain the chemicals Trifluralin 2% active ingredient and Isoxaben with 0.5% active ingredient. The herbicide label shall be submitted to the Engineer for approval at least seventy-two (72) hours prior to application.

Method: The pre-emergent granular herbicide shall be used in accordance with the manufacturer's directions on the package. The granules are to be applied after mulching.

Apply the granular herbicide using a drop or rotary-type designed to apply granular herbicide or insecticides. Calibrate application equipment to use according to manufacturer's directions. Check frequently to be sure equipment is working properly and distributing granules uniformly. Do not use spreaders that apply material in narrow concentrated bands. Avoid skips or overlaps as poor weed control or crop injury may occur. More uniform application may be achieved by spreading half of the required amount of product over the area and then applying the remaining half in swaths at right angles to the first. Apply the granular herbicide at the rate of 100 lbs/acre (112 kg/ha) or 2.3 lbs/1000 sq. ft. (11.2 kg/1000 sq. meters).

Within 48 hours of the application of the granular herbicide, the Contractor shall complete and return to the Engineer, Operations form "OPER 2720" (Pesticide Application Daily Spray Record).

Method of Measurement: Pre-emergent granular herbicide will be measured in place in Pounds (Kilograms) of Pre-emergent Granular Herbicide applied. Areas treated after mulch placement shall not be measured for payment.

Basis of Payment: This work will be paid for at the contract unit price per pound (kilogram) of WEED CONTROL, PRE-EMERGENT GRANULAR HERBICIDE which price shall include all materials, equipment, and labor necessary to complete the work as specified.

## **SHREDDED BARK MULCH**

This work shall be done in accordance with the applicable portion of Section 253.02 (c) and Section 1081.06 (b) of the Standard Specifications for Road and Bridge Construction.

Description: This work shall consist of furnishing, transporting, and spreading an approved shredded hardwood bark mulch to the depth specified in areas as shown in the plans or as directed by the Engineer.

Material: Hardwood bark mulch shall be clean, finely shredded mixed-hardwood bark meeting the following requirements:

- Material shall be free of sticks, leaves, stones, dirt clods, and other debris.
- Individual wood chips shall not exceed 2 inches (50 mm) in the largest dimension.

A mulch sample and request for material inspection must be supplied to the Engineer for approval prior to performing any work 72 hours prior to application.

Method: The grade, depth, and condition of the area must be approved by the Engineer prior to placement.

The Contractor shall remove all weeds, litter and plant debris before mulching. Pre-emergent herbicide, if specified, shall be applied prior to the placement of shredded mulch. The Contractor shall prepare a neatly spaded edge between the landscaped bed and/or tree ring and the turf. The Contractor shall repair the grade by raking and adding topsoil as needed, before mulching.

The shredded mulch shall be placed according at the required depth as specified in the plans for planting trees, shrubs, vines and perennial plants. Care shall be taken not to bury leaves, stems, or vines under mulch material. Mulch shall not be in contact with the base of the trunk.

All finished mulch areas shall be left smooth and level to maintain uniform surface and appearance.

After the mulch placement, any debris or piles of material shall be immediately removed from the right of way, including raking excess mulch out of turf areas.

Method of Measurement: Mulch placement will be measured in place in square yards. Areas not meeting the depth specified shall not be measured for payment.

Basis of Payment: This work will be paid for at the contract unit price per square yard for SHREDDED BARK MULCH at the thickness specified. Payment shall include all costs for materials, equipment and labor required to complete the work specified herein, including the cost of removing and disposing of any debris. Any mulch placement included as part of the work in other work items will not be measured separately for payment. Pre-emergent herbicide, if required, shall be paid for separately.

## **GRAFFITI REMOVAL**

Description: This work shall consist of removing graffiti from the surfaces of the existing retaining wall at Quincy Street behind Proposed Retaining Wall 24 (S.N. 016-Z016). or other locations as directed by the Resident Engineer, by the methods described in this specification.

Materials: All materials and equipment shall be subject to the Resident Engineer's approval before any work can begin.

Abrasive material for blast cleaning shall meet the requirements of IEPA.

Paint: All paint used shall meet the following requirements:

The paint shall be a quality primer formulated specifically for the purpose of covering graffiti. It shall be compatible with the surface it is used on as per the manufacturer's data sheet, and must adhere well to the substrate and resist fading and chalking. Compatibility shall be verified by the paint manufacturer's product data sheet or by written documentation from the paint manufacturer. Color of primer used to cover graffiti shall match existing paint color to the satisfaction of the engineer.

Power Wash: Soluble, abrasive blast media shall be a large crystal sodium bicarbonate or a magnesium sulfate based media. Solubility of the media in water shall meet the requirements of IEPA.

The equipment with the media shall be a soluble media injector type power washer. The Contractor shall submit catalog cuts or other documentation for all equipment proposed for use in this work. The Resident Engineer may require demonstration of the equipment's capabilities. No work shall begin until the equipment have been demonstrated to, and accepted by the Resident Engineer.

Solvent Wash: The cleaning compound shall be a blend of an organic solvent of emulsifiers and surfactants. It shall be a bio-degradable water-based, mixture developed from non-toxic and noncorrosive substances. This may be a soybean solution or other, satisfactory to the Resident Engineer. Mineral spirits are also acceptable for this usage.

The cleaner shall lift graffiti from the substrate surface, and emulsify and dissolve the paint constituents; pigments; oils; binders and fillers. Acceptance of the cleaning compound will be based on the manufacturer's certification that the material conforms to the requirements of this specification. No work shall begin until these materials have been delivered to, and accepted by the Resident Engineer.

Construction Details: All work must conform to the OSHA standards.

Unless otherwise directed by the Resident Engineer, the following methods shall be used to remove graffiti from various surfaces. If one of these prescribed methods is used, and the graffiti still remains visible, the Contractor shall use an alternate method approved by the Resident Engineer. Painting over graffiti is the preferred option on previously painted surfaces, and where solvents were unsuccessful at removing graffiti.

Unless otherwise noted or directed by the Resident Engineer, graffiti shall be removed within five (5) working days of written notification. If a lift device will be necessary, the removal date will be extended to ten (10) working days.

<b>Graffiti Surface</b>	<b>Suggested Graffiti Removal Method</b>
Steel (smooth, non-porous) Wood (painted or unpainted)	Solvent wash with Enviro-Solutions Paint Stripper & Graffiti Remover; SOY solv; Mineral Spirits or Painting Over Graffiti or Power Washing
Brick, Stone, Concrete, Paving. Solvent blocks (porous, unpainted)	Wash with Taginator, or Power Washing, or Painting Over Graffiti or Abrasive Blasting
Painted Masonry	Painting Over Graffiti or Power Wash
Sign Panel Faces & Aluminum (unpainted mill finish or anodized finish)	Solvent Washing with Enviro-Solutions Paint Stripper & Graffiti Remover; SOY Solv; <b>EZ</b> Solv or Mineral Spirits.

Painting Over Graffiti: The Contractor shall primer paint over all graffiti on the concrete surfaces within project limits and take appropriate precautions to prevent paint from falling onto traffic.

The substrate surfaces shall be thoroughly cleaned before painting. All dust, dirt, oil, grease, and other substances which might prevent the adhesion of the paint to the substrate shall be removed. No sandblasting will be allowed. Paint shall be applied as soon as practicable after cleaning is completed. If in the opinion of the Resident Engineer, the substrate surface has become soiled, or otherwise contaminated, prior to the application of the paint, the surface shall be recleaned at no additional cost to the State. The paint shall be applied evenly in a neat and workmanlike manner by a roller or other suitable method, as approved by the Resident Engineer. The rolling shall be done at such a pace that no spinning of the roller or throwing off of paint occurs when the roller is lifted from the surface. The paint shall be feathered out by using light pressure at the end of the stroke to promote uniformity. The first time a surface is painted, it shall be painted from column to column, post to post, and from top to bottom for panels and from joint to joint or score mark to score mark for other concrete surfaces. After the first time, which includes previous painting for graffiti removal, the substrate surface shall be painted in small rectangular patterns in order to minimize the area painted and ensure that the graffiti will no longer be "readable" when the painting is complete. If the paint to be applied requires more stringent or additional surface preparation than stated in this specification, the Contractor shall prepare the surface in accordance with the paint manufacturer's recommendations.

The graffiti must be completely hidden before the painted area will be measured for payment.

The Contractor will be required to repaint areas if the graffiti remains visible after painting at no additional cost to the State. New graffiti at the same location will be measured for payment when the painting meets the requirements of this specification. The Resident Engineer may require sand be added to the paint to provide a texture to the final surface.

Power Washing Graffiti Surfaces: All graffitied surfaces shall be cleaned with a soluble, abrasive blasting media applied with a soluble media injector or a compressed air delivery system, whichever is satisfactory to the Resident Engineer. No particulate matter of any nature shall be permitted to remain on the cleaned surface. After cleaning, the surface shall be rinsed with tap water applied with a power washer. All visible media shall be removed from the surface.

After rinsing, the Contractor shall repeat the cleaning process in areas where graffiti or paint is still visible. If the second cleaning process fails to remove the graffiti or paint to the Resident Engineer's satisfaction, the equipment and methods used by the Contractor will again be subject to review and approved by the Resident Engineer. Cleaned surfaces shall bear no evidence of graffiti paint layers.

Solvent Washing Graffiti Surfaces: Pre-Cleaning Materials: A wet, non-abrasive cleanser is recommended. This cleanser shall not contain strong solvents or alcohols.

Pre-Cleaning Procedure: Cleanse the surface of loose dirt particles with clean water. Use a soft sponge or brush to wash the graffitied surface with detergent and water. Avoid scrubbing the surface unnecessarily. After the cleaner has been utilized, apply a steady stream of water on the cleaned surface to wash the dirt particles away. Allow to dry.

**Cleaning Procedure:** The Contractor shall supply the instructions of the cleaning procedure, to the Resident Engineer, at least two weeks prior to starting this work. Graffiti Removal material shall be applied to surfaces as per the manufacturer's instructions. Graffiti Removal material shall not be applied to silk screen processed areas.

After the solvent is applied, the surfaces shall then be wiped with a non-abrasive material. The wiped surfaces shall then be rinsed with a water wash. The cleanliness of the surfaces is subject to the approval by the Resident Engineer.

After rinsing, the Contractor shall repeat the cleaning process in areas where graffiti is still visible. If the second cleaning process fails to remove the graffiti to the Resident Engineer's satisfaction, the equipment and methods used by the Contractor will again be subject to review and approval by the Resident Engineer.

Cleaned surfaces shall bear no evidence of graffiti. The cleaning of the graffiti image shall be feathered out by using light pressure at the end of the stroke to promote uniformity on the surrounding surface.

**Abrasive Blasting off Graffiti:** Due to the potential of abrasive blasting to damage the substrate, this method of graffiti removal may only be performed as a last resort, at the direction of the Resident Engineer, after all other methods to remove graffiti have failed.

Graffiti should be removed using vacuum-shrouded blasting or power-tool equipment that has the appropriate attachments for the surface being cleaned to ensure that no dust or abrasive escapes during operation. This equipment should be capable of cleaning all the graffiti off the surface at a rate acceptable to the Resident Engineer while producing no detectable dust. The equipment should operate in a manner such that all dust or abrasive/dust mix generated is simultaneously drawn away from the contact surface into attached vacuum hoses leading to a vacuum that utilizes HEPA filters. The vacuum and its hoses should be sufficiently rated for the volume of debris and/or abrasive/debris generated. The equipment, its method of use, and efficiency shall be demonstrated to the Resident Engineer prior to the start of work. Power tool cleaning should remove the graffiti without causing undue damage to the surface being cleaned.

**Graffiti Removal from Overhead Structures:** If the use of a mechanical aerial lift is required to safely access the graffitied surface, the Contractor shall obtain the necessary equipment and use it in conjunction with the other graffiti removal items.

**Method of Measurement:** This work will be measured in square yards of surface area that graffiti is either removed from, or painted over, in accordance with this specification. There will be no payment for removing graffiti that is not done within the time limitations stated in this specification.

**Basis of Payment:** This work will be paid for at the contract unit price per square yard for GRAFFITI REMOVAL.

## **GENERAL REQUIREMENTS FOR WEED CONTROL SPRAYING**

### Experience:

The Contractor shall have previous experience with the use of weed control chemicals. He/she shall have had at least one (1) season's experience in the use of their chemicals in spraying highway right-of-way or at least three (3) season's experience in their use in farm or custom spraying. The Contractor shall observe and comply with all sections of the Illinois Custom Spray Law, including licensing.

### Equipment:

The equipment used shall consist of a vehicle-mounted tank, pump, spray bar and handgun, plus any other accessories needed to complete the specified work. Spraying shall be done through multiple low-pressure flooding or broad jet nozzles mounted on spray bars operated not more than 36" above the ground. If different sizes or types of nozzles are used to make up the spray pattern, the pressure, sizes and capacities shall be adjusted to provide a uniform rate of application for each segment of the spray pattern. Hand spray guns may be used for spraying areas around traffic control devices, lighting standard and similar inaccessible areas. Maximum speed of the spray vehicle during application of chemical shall be five (5) miles per hour.

Pumps used shall have a volume and pressure capacity range sufficient to deliver the mixture at a pressure to provide the required coverage and to keep the spray pattern full and steady without pulsation or excessive pressure as to cause fogging. Maximum pressure for application shall be 15 PSI. Quick acting shut-off valves and spring-loaded ball check valves shall be provided to stop the spray pattern with a minimum of nozzle drip. In areas where the spray vehicle must traverse the right-of-way, a four-wheel drive vehicle with flotation tires will be required to minimize damage to the ground surface.

Prior to beginning work, the Contractor shall obtain approval from the Engineer of the spraying equipment proposed for completing this work. The proposed equipment shall be in an operational condition and available for inspection by the Engineer at least two (2) weeks prior to the proposed starting time. If requested by the Engineer, the Contractor shall demonstrate the calibration of the equipment.

The equipment must provide consistently uniform coverage and keep the spray mixture sufficiently agitated or the work will be suspended until the equipment is repaired or replaced.



Spraying Areas:

This work includes roadsides and other types of right-of-way of various widths and gradients. Spray areas often extend more than thirty (30) feet from the edge of the roadway, requiring both spray bar and hand gun applications.

When the description of work requires weed control of a stated species, such as teasel, the chemical shall be applied only to locations where the stated species is present. When the description of work requires general weed control within a bed or area, such as broadleaf weed control in turf, then the chemical shall be applied to the entire bed or area.

Exclusion of Spraying Areas:

Areas where weed control spraying is inappropriate or detrimental to the environment, desirable planting, or private property shall be excluded from the spray area.

Spraying will not be permitted over any drainage swales or waterways, or other areas where the chemical label prohibits application. Spraying within 150 feet of a natural area or site where endangered or threatened species occur.

Responsibility for Prevention of Damage to Private Property:

The Contractor shall, at all times, exercise extreme caution to prevent damage to residential plantings, flower or vegetable gardens, vegetable crops, farm crops, orchard or desirable plants adjacent to the roadside.

The Contractor or Department receives a complaint, the Contractor shall contact a complaint within ten (10) days after receiving a claim for damages, either in person or by letter. The Contractor, or his authorized representative, shall make a personal contact with the complainant within twenty (20) days. The Engineer shall also be notified by the Contractor of all claims for damage he received and shall keep the Engineer informed as to the progress in arriving at a settlement for such claims.

Communication with the Engineer:

The Contractor is required to communicate with the Engineer to receive all required approvals in a timely way and to assure that the Engineer can accurately document the work performed.

It shall be the Contractor's responsibility to assure that all chemical containers are opened and added to the spray mixture in the presence of the Engineer.

The Contractor shall obtain approval from the Engineer to proceed with spraying at each location 24 hours prior to the proposed spray operations.

### **FAILURE TO COMPLETE PLANT CARE AND ESTABLISHMENT WORK ON TIME**

Should the Contractor fail to complete the plant care or supplemental watering within the scheduled time frame as specified in the Special Provision for “Planting Woody Plants” and “Supplemental Watering”, or within 24 hours notification from the Engineer, or within such extended times as may have been allowed by the Department, the Contractor shall be liable to the Department in the amount of \$50.00 per tree/per day, \$40.00 per shrub/per day, \$20.00 per vine/ornamental grass/ or perennial/per day, and not as penalty but as liquidated damages, for each calendar day or a portion thereof of overrun in the contract time or such extended time as may have been allowed.

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

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

**COARSE SAND PLACEMENT**

Description. This work shall consist of furnishing, transporting, spreading, and incorporating Coarse Sand (FA 2) into the soil in areas shown on the plans and as directed by the Engineer.

Materials. Materials shall meet the requirements of the following Article of Section 1000 –  
Materials:

Item	Article / Section
(a) Fine Aggregate.....	1003.04(a)

Method. Coarse Sand shall not be placed until the area designated has been shaped, trimmed, and finished in accordance with Section 212 of the Standard Specifications and any required placement of Topsoil has been completed. Prior to Coarse Sand placement, the area shall be disked or raked to a minimum depth of 4 inches and all debris and loose stones removed. The grades and condition of the area must be approved by the Engineer prior to Coarse Sand placement.

The Coarse Sand shall be placed in the planting beds to the depth specified. After the Engineer verifies that the proper Coarse Sand depth has been applied, the Contractor shall completely incorporate the sand into the soil to a minimum depth of 6 inches by raking, disking, or tilling to amend the existing topsoil.

After the Coarse Sand has been incorporated into the soil, any debris or piles of unincorporated material shall be immediately removed from the right-of-way and the area finished to the lines and grades shown on the plans and approved by the Engineer. Disposal of material shall be done in accordance with Article 202.03.

Method of Measurement. Coarse Sand Placement will be measured in square yards at the location shown in the plans and as directed by the Engineer prior to incorporation into the soil.

Basis of Payment. This work will be paid for at the contract unit price per square yards for COARSE SAND PLACEMENT of the thickness specified.

## **DETECTABLE WARNINGS (SPECIAL)**

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

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

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

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

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

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

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

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

## **PAVEMENT REMOVAL**

Modify the second paragraph of Article 440.01 of the Standard Specifications to read:

"Pavement removal shall be defined as Portland cement concrete, pavers, or HMA pavement and shall include Portland cement concrete or HMA bases, pavers, streetcar rails and ties, overlays, and stabilized subbase."

Add the following to Article 440.06 of the Standard Specifications:

"Granite pavers shall be salvaged for pickup by the community organization identified in the plans."

## **REMOVAL OF EXISTING STRUCTURES NO. 1**

Description. This item shall consist of furnishing all labor, equipment and materials necessary for the removal and disposal of the existing Adams Street Bridge (S.N. 016-0589) over Interstate 90/94. The work shall be done in accordance with the applicable portions of Section 501 of the Standard Specifications, as described herein, as detailed in the Plans, and as directed by the Engineer.

All structure elements of the Adams Street Bridge over I-90/94 including, but not limited to, abutments, abutments' footings, piers, piers' footings, wingwalls, concrete footing bracing system, beams, bearings, diaphragms, deck, sidewalk, cladding, railing, and entrance ramp retaining wall shall be included in Removal of Existing Structures No. 1.

The Contractor shall remove existing piers and retaining wall according to the removal limits indicated on the Plans.

Included in the Removal of Existing Structures No. 1 shall be the removal of items and appurtenances located on, attached or adjacent to the bridge including, but not limited to existing drainage systems and conduits attached to the bridge, scuppers, and newspaper stands and highway sign structures attached to the fascia of the bridge.

Included in the Removal of Existing Structures No. 1, and prior to any removal of conduit material, the existing City of Chicago conduits must be tested for the presence of asbestos content by qualified personal and/or qualified testing firm. Tests shall be comprehensive, and include detailed visual inspection, sampling as determined by qualified testing firm or personnel and laboratory testing for samples in order to determine if conduits included asbestos cement. Each of the existing conduits should be independently reviewed due to unknown installation or maintenance improvement records. All testing records and results shall be provided to the Engineer prior to any removal of existing City of Chicago conduits. Conduits that are determined to contain asbestos will be removed in accordance with REMOVAL OF ASBESTOS CEMENT CONDUIT. Otherwise, the conduits shall be removed under the requirements of this section and will not be paid for separately.

Included in the Removal of Existing Structures No. 1, the Contractor shall coordinate with City of Chicago Office of Emergency Management and Communications (OEMC 911) and City of Chicago Department of Electric Operations. The Contractor is required to coordinate the removal of City of Chicago conduits. Any active wires owned by the City of Chicago will be removed by city of Chicago forces. The City of Chicago will remove cables and wire in advance of the conduit removal unless the City of Chicago determines that cables are abandoned and can be removed as part of the bridge demolition. All IDOT ITS conduit will be removed as part of the bridge demolition unless conduits are attached to the abutments.

The work shall conform in every respect to all environmental, state and local regulations regarding construction requirements, the protection of adjacent properties, as well as dust and noise control.

Prior to commencing work under this Item, the Contractor shall verify the location of all existing utilities in the area. The Contractor shall submit drawings and written documentation to the Engineer of such verification. All work under this Item shall be executed in such a manner so as not to disturb or damage the existing utilities.

All materials removed under this Item shall become the property of the Contractor and shall be disposed of by the Contractor off the site and in a lawful manner meeting all IDOT Policies and Procedures.

Traffic Operations

The traffic using Interstate I-90/94 must remain open to all lanes of traffic during demolition activities unless the Contractor has secured the necessary permits from the Illinois Department of Transportation to allow for temporary closure of lanes.

Method of Measurement. Removal of Existing Structures No. 1 and testing for asbestos content shall be measured for payment by each of the structure removed including additional elements noted above.

Basis of Payment. The work under this Item will be paid for at the Contract unit price each for REMOVAL OF EXISTING STRUCTURES NO. 1, as indicated on the Plans and as specified herein.

## **REMOVAL OF EXISTING STRUCTURES NO. 2**

Description. This item shall consist of furnishing all labor, equipment and materials necessary for the removal and disposal of the existing Retaining Wall 7 and existing Jackson Boulevard Bridge northwest wingwall along Interstate 90/94 Southbound Jackson Boulevard Exit Ramp according to the station limits shown on the Plans. The work shall be done in accordance with the applicable portions of Section 501 of the Standard Specifications, as described herein, as shown on the Plans, and as directed by the Engineer.

All structure elements of existing Retaining Wall 7 and the existing Jackson Boulevard Bridge northwest wingwall along I-90/94 SB Jackson Exit Ramp between the station limits stated on the Plans including, but not limited to, concrete parapet, concrete stem, concrete footing, and piles (to a depth as noted on the Plans or directed by the Engineer) shall be included in Removal of Existing Structures No. 2.

Included in the Removal of Existing Structures No. 2 shall be the removal of items and appurtenances located on, attached or adjacent to the wall including, but not limited to existing conduits and junction boxes attached to the wall.

Prior to commencing work under this Item, the Contractor shall verify the location of all existing utilities in the area. Utilities identified during design are shown on the drawings. The final location of utilities is the responsibility of the Contractor and is included in this Item. The Contractor shall submit drawings and written documentation to the Engineer of such verification. All work under this Item shall be executed in such a manner so as not to disturb or damage the existing utilities.

The work shall conform in every respect to all environmental, state and local regulations regarding construction requirements, the protection of adjacent properties, as well as dust and noise control.

All materials removed under this Item, unless specified otherwise in the Contract Specifications and the Plans, shall become the property of the Contractor and shall be disposed of by the Contractor off the site and in a lawful manner meeting all IDOT Policies and Procedures.

Traffic Operations. The traffic using Interstate I-90/94 must remain open to all lanes of traffic during demolition activities unless the Contractor has secured the necessary permits from the Illinois Department of Transportation to allow for temporary closure of lanes. Traffic using the SB Jackson Exit Ramp will be detoured during construction.

Method of Measurement. No separate measurement will be made for Removal of Existing Structures No. 2. Excavation of earth necessary to perform the Removal of Existing Structures No. 2 is included and will not be measured for payment.

Basis of Payment. The work under this Item will be paid for at the Contract unit price each for REMOVAL OF EXISTING STRUCTURES NO. 2, as indicated on the Plans and as specified herein.

### **REMOVAL OF EXISTING STRUCTURES NO. 3**

Description. This item shall consist of furnishing all labor, equipment and materials necessary for the removal and disposal of the existing Retaining Wall 16 and existing monument foundation along Interstate 90/94 Southbound Jackson Boulevard Exit Ramp according to the station limits shown on the Plans. The work shall be done in accordance with the applicable portions of Section 501 of the Standard Specifications, as described herein, as shown on the Plans, and as directed by the Engineer.

All structure elements of existing Retaining Wall 16 and the existing monument foundation along I-90/94 SB Jackson Exit Ramp between the station limits stated on the Plans including, but not limited to, chain link fence, steel railing, cladding, concrete stem, and concrete footing (to a depth as noted on the Plans or directed by the Engineer) shall be included in Removal of Existing Structures No. 3.

Included in the Removal of Existing Structures No. 3 shall be the removal of items and appurtenances located on, attached or adjacent to the wall including, but not limited to existing conduits and junction boxes attached to the wall.

Prior to commencing work under this Item, the Contractor shall verify the location of all existing utilities in the area. Utilities identified during design are shown on the drawings. The final location of utilities is the responsibility of the Contractor and is included in this Item. The Contractor shall submit drawings and written documentation to the Engineer of such verification. All work under this Item shall be executed in such a manner so as not to disturb or damage the existing utilities.

The work shall conform in every respect to all environmental, state and local regulations regarding construction requirements, the protection of adjacent properties, as well as dust and noise control.

All materials removed under this Item, unless specified otherwise in the Contract Specifications and the Plans, shall become the property of the Contractor and shall be disposed of by the Contractor off the site and in a lawful manner meeting all IDOT Policies and Procedures.

Traffic Operations. The traffic using Interstate I-90/94 must remain open to all lanes of traffic during demolition activities unless the Contractor has secured the necessary permits from the Illinois Department of Transportation to allow for temporary closure of lanes. Traffic using the SB Jackson Exit Ramp will be detoured during construction.

Method of Measurement. No separate measurement will be made for Removal of Existing Structures No. 3. Excavation of earth necessary to perform the Removal of Existing Structures No. 3 is included and will not be measured for payment.

Basis of Payment. The work under this Item will be paid for at the Contract unit price each for REMOVAL OF EXISTING STRUCTURES NO. 3, as indicated on the Plans and as specified herein.



#### **REMOVAL OF EXISTING STRUCTURES NO. 4**

Description. This item shall consist of furnishing all labor, equipment and materials necessary for the partial removal and disposal of the retaining wall along existing alley behind Wall 51. The work shall be done in accordance with the applicable portions of Section 501 of the Standard Specifications, as described herein, as detailed in the plans and as directed by the Engineer.

The scope of this item shall include, but not limited to, removal and disposal of retaining wall stem, foundation, piles and steel sheet piling. This work shall also include removal and disposal of miscellaneous items appurtenant to the structures, including but not limited to fence, existing conduits, conduit supports, electrical wires, junction boxes, light pole, traffic signal etc. The Contractor must submit a detailed procedure for removing the existing structures, to the Engineer for approval, prior to starting this Work.

The Contractor shall remove existing foundation as shown on the plans.

The Contractor shall exercise extreme caution not to damage existing retaining wall that remain in service and adjacent properties during construction. Any damage to the existing wall and/or adjacent properties is the responsibility of the Contractor and Contractor shall repair any such damage to the satisfaction of the Department.

Contractor shall coordinate existing utilities owners and the City of Chicago to remove and/or relocate existing utilities within the work zone prior to structure removal activities. Where utilities were identified during design they are shown on the drawings. The final location of utilities is the responsibility of the Contractor and is included in Removal of Existing Structure No. 4.

The work shall conform in every respect to all environmental, state and local regulations regarding construction requirements, the protection of adjacent properties, as well as dust and noise control.

Equipment to perform removal work shall be appropriate for the location immediately adjacent to the Archdiocese of Chicago. The approval of the equipment and procedure by the Engineer does not guarantee the performance in the field of the equipment will be acceptable. If, in the judgment of the Engineer, the noise and/or vibration effects exceed those required by the local residents, then the Contractor must halt production and find a remedy acceptable to the Engineer. Threshold values for vibration monitoring are included in the special provision "CONSTRUCTION VIBRATION MONITORING." The costs incurred finding suitable equipment and procedures shall be included in the cost of this item. No additional costs shall be paid for this effort.

Prior to commencing work under this Item, the Contractor shall verify the location of all existing utilities in the area. The Contractor shall submit drawings and written documentation to the Engineer of such verification. All work under this Item shall be executed in such a manner so as not to disturb or damage the existing utilities.

All materials removed under this Item shall become the property of the Contractor and shall be disposed of by the Contractor off the site and in a lawful manner meeting all IDOT Policies and Procedures.

Traffic Operations. The traffic using Interstate I-90/94 must remain open to all lanes of traffic during demolition activities unless the Contractor has secured the necessary permits from the Illinois Department of Transportation to allow for temporary closure of lanes.

Existing Plans. See contract drawings for original plans for the existing structures involved in this work. The original plans, however, may not show all modifications that have been made to the structures over the years. The completeness of these plans is not guaranteed and no responsibility is assumed by IDOT for their accuracy. Information is furnished for the Contractor's convenience and is to be used solely at the Contractor's risk.

Method of Measurement. No separate measurement will be made for removal of existing structures.

Excavation of earth necessary to perform the removal of existing structure will not be measured for payment.

Basis of Payment. The work under this Item will be paid for at the Contract unit price each for REMOVAL OF EXISTING STRUCTURES, NO. 4, as indicated on the Plans and as specified herein.

## **FOUNDATION DRILLING PROCEDURES**

This Special Provision modifies the requirements of the Article 516.06 of Drilled Shafts Special Provision for the installation of the permanent or temporary casing. Drilling procedures described herein shall be used for permanent or temporary casing installation for following:

- Proposed Adams Street Bridge (S.N. 016-1701) abutment drilled shafts and northeast wingwall drilled soldier pile shafts.
- Proposed Jackson Boulevard Bridge (S.N. 016-1702) abutment and wingwall drilled shafts.
- Proposed Retaining Wall 24 (S.N. 016-Z016) drilled soldier pile shafts.
- Proposed Noise Abatement Wall behind Retaining Wall 51 – S.N. 016-Z048
- Proposed Jackson Boulevard Freight Tunnel filling operations

The procedures contained herein are considered as minimum requirements for drilled shaft construction but do not relieve the Contractor of any of the Contract requirements.

Construction Methods. The drilled shafts shall be constructed using full length permanent or temporary casing. Casing shall be installed using either a fixed mast dual rotary drill rig or a crane mounted oscillator for the entire length of the drilled shaft through the overburden soils and screwed into the underlying soil for a sufficient distance to provide a groundwater seal. The Wet Method of construction will not be permitted.

The permanent or temporary casing shall be installed by twisting and/or pushing the casing in conjunction with drilled excavation inside of the casing. The bottom of the casing shall maintain a minimum 2-foot embedment into the underlying soil below the bottom of shaft excavation elevation. The drilled excavation shall not advance below the bottom of the casing elevation except to core the rock socket once the casing is sealed into the bedrock. The casing shall be installed in segments by welding the segments together as the casing is advanced. The casing shall have a minimum wall thickness of 0.5 inch. The Contractor may need to increase the casing thickness to withstand the installation process. The Contractor is responsible for determining the actual casing thickness.

Basis of Payment. No additional compensation will be awarded to the Contractor for the conformance with this Special Provision.

## **FORM LINER TEXTURED SURFACE**

The form liner textured surfaces shall conform to applicable portions of Section 503 of the Standard Specifications except as herein modified.

Description. This Work consists of designing, developing, furnishing and installing a form liner textured surface and forming concrete using reusable, high strength urethane and elastomeric form liners to achieve concrete treatment as shown on the Plans. Form liner textured surface shall be of the type specified at locations shown on the Plans or directed by the Engineer, and in accordance with the details shown in the Plans. This work shall also include furnishing and installing reveal and bevel strips.

Various master molds, form liners and miscellaneous other components utilized for the construction of bridge piers on previous Jane Byrne Interchange contracts are available for use within this Contract, if deemed sufficient by the Contractor. Prior to utilizing previously used components into this Contract, the Contractor shall verify applicability and condition of available components. The Department makes no guarantees about the current condition of the previously used components, nor their applicability for use within this Contract. Furthermore, re-use of any previously used components shall not relieve the Contractor of the responsibility to furnish a high-quality finished product nor shall it be cause for additional compensation if the final product is rejected by the Engineer or Department. The existing components will be made available for inspection prior to letting at a Department maintenance facility within the limits of the City of Chicago.

Materials. Form liners for bridge piers shall be of high quality, highly reusable and capable of withstanding anticipated concrete pour pressures without causing leakage or physical defects. Forms for smooth surfaces shall be plastic coated to provide a smooth surface free of any impression or pattern. Reveals for the retaining walls shall be made of rubber material capable of reproducing the same quality texture with extended use on flat and curved surface.

General. Liners shall be attached to each other with flush seams and seams filled necessary to eliminate visible evidence of seams in cast concrete. Liner butt joints shall be blended into the pattern so as to create no vertical joints or reveals. Concrete pours shall be continuous form liner pattern fields. Finished textures shall be continuous without visual disruption and properly aligned over adjacent and multiple liner panels. After each use, liners shall be cleaned and visually inspected. Damaged liner shall be replaced when continued use or repair would diminish the aesthetics of the Work. At the end of the work, master molds and form liners shall be turned to the Owner, delivered at location designated by the Owner, for future use on other contracts.

All surfaces on columns and pier caps exposed to view and not indicated to receive textured liner will receive rubbed finish conforming to Article 503.15 of the Standard Specifications.

All surfaces on concrete barrier at bridge and approach exposed to view from the pedestrian side, including top and sides of barrier, will receive rubbed finish conforming to Article 503.15 of Standard Specifications.

Submittals.

Shop drawings of the form liner texture surface shall be provided for each area of textured concrete.

1. Individual form liner pattern descriptions, dimensions and sequencing of form liner sections, typical cross sections, joints, corners, joint locations, edge treatment and any other conditions.
2. Elevation views and layouts showing the full height and length of the structure with each form liner outlined.
3. Two 24"x 24" samples of each texture and two 36"x36" samples with all textures specified, adjacent to each other. Samples shall be made of the concrete mix specified for the structure.
4. Mockup: Partial mock-up of the front face of a pier, with a minimum height of 4' and an approximate 6" thickness. The mockup must be available for review at the project site by the Engineer, Department staff and their designees. The mock-up shall be made of the concrete mix specified for structure including the final finish.

No final concrete surfaces shall be cast until the Engineer accepts the final samples and mock-up after approval of any submitted materials.

Acceptable Form Liner Manufacturers:

1. Custom Rock International, St Paul, MN (Jim Rogers)
2. Scott Systems, Denver, CO
3. American Formliners, Inc, Naperville, IL
4. Creative Form Liner, INC, Brentwood, MD
5. Approved Equal.

Method of Measurement. This Work will be measured for payment, complete in place, per square feet for FORM LINER TEXTURED SURFACE.

Inspection, verifying the quantity and any repairs of stored components will not be measured for payment.

Transporting stored components from IDOT storage facility to the project site will not be measured for payment.

Basis of Payment. This Work will be paid for at the Contract Unit Price per square feet for FORM LINER TEXTURED SURFACE which price includes furnishing and placing all material required, including all labor, equipment and incidentals necessary to complete the Work as herein specified.

## **TEMPORARY SOIL RETENTION SYSTEM**

Description: This item shall consist of furnishing all labor, equipment and materials necessary for the installation and subsequent removal of Temporary Soil Retention System at locations shown in the plans. This work shall be done in accordance with Article 522.07 of the Standard Specifications, as described herein, as detailed in the plans and as directed by the Engineer.

The design calculations and shop drawings for the temporary soil retention system proposed by the Contractor shall be submitted to the Engineer for review and approval according to Article 522.05. This approval will not relieve the Contractor of responsibility for the safety of the excavation and structural adequacy of adjacent properties.

Temporary Soil Retention System shall be installed without the use of impact-type pile drivers. The proposed equipment and procedures used for the installation of Temporary Soil Retention System shall be submitted to the Engineer for approval prior to their use. If vibratory equipment is utilized, the Contractor shall also submit documentation regarding the operating noise levels and operating vibration characteristics of the equipment proposed. The approval of the equipment and procedure by the Engineer does not guarantee the performance in the field of the equipment will be acceptable. All provisions and requirements required under CONSTRUCTION VIBRATION MONITORING, MONITORING ADJACENT STRUCTURES AND NOISE COMPLIANCE shall apply to work performed under this item. The costs incurred finding suitable equipment and procedures shall be included in the cost of Temporary Soil Retention System. No additional costs shall be paid for this effort.

The Contractor shall verify locations of all underground utilities (and ancillary/shoring structures) in the vicinity of the proposed excavation prior to installation of any temporary soil retention system components and prior to commencing any excavation. Any disturbance and/or damage to existing utilities, structures or other property caused by the Contractor in the performance of the work shall be repaired by the Contractor, to the satisfaction of the Engineer, at no cost to the Department. Existing utility and structural information shown on the drawings was collected from information available at the time of the design. There is no guarantee of complete accuracy with the existing utility and/or structure locations.

When an obstruction is encountered, the Contractor shall notify the Engineer and, upon concurrence, the Contractor shall begin working to break up, push aside, or remove the obstruction. An obstruction shall be defined as any object (such as, but not limited to, boulders, logs, old foundations, etc.) where its presence was not obvious or specifically noted on the Plans prior to bidding, that cannot be driven or installed through or around with normal driving or installation procedures, but requires additional excavation or other procedures to remove the obstruction.

Method of Measurement: Temporary soil retention systems furnished and installed will be measured for payment in place, in square feet (square meters). The area measured shall be the minimum of vertical exposed surface area envelope of the excavation supported by temporary soil retention system.

Portions of the temporary soil retention system left in place for reuse in later stages of construction shall only be measured for payment once.

Any temporary soil retention system installed beyond dimensions shown on the Plans or the approved Contractor's design without the written permission of the Engineer, shall not be measured for payment but shall be done at the Contractor's own expense.

Basis of Payment: This work will be paid for at the contract unit price per square foot (square meter) for TEMPORARY SOIL RETENTION SYSTEM.

Payment for any excavation, related solely to the installation and removal of the temporary soil retention system and/or its components, shall not be paid for separately but shall be included in the unit bid price for TEMPORARY SOIL RETENTION SYSTEM. Other excavation, performed in conjunction with this work, will not be included in this item but shall be paid for as specified elsewhere in this contract.

Payment for additional work required in design or construction to adequately protect any utilities and/or structures shall be included in the bid price for TEMPORARY SOIL RETENTION SYSTEM.

Obstruction mitigation will be paid for according to Article 109.04.

Any costs related to obtaining technical assistance for the construction of a wall system from a particular supplier will not be paid for separately.

## **CONCRETE MEDIAN SURFACE REMOVAL**

Description. This work shall consist of the complete removal of the existing concrete median surface and existing fill between the adjacent barrier walls at the location shown on the plans between the Madison Street southbound entrance ramp and the Adams Street northbound entrance ramp. This work shall be done in accordance with the applicable portions of Section 440 of the Standard Specifications.

The Contractor shall remove the existing concrete median surface and fill in a manner so as not to damage the existing barrier wall that is to remain.

Method of Measurement. CONCRETE MEDIAN SURFACE REMOVAL shall be measured in place in square feet.

Basis of Payment. This work will be paid for at the contract unit price per square foot for CONCRETE MEDIAN SURFACE REMOVAL, which price shall include all labor and equipment necessary to remove and dispose of the concrete median surface and fill.

## **CONCRETE BARRIER REMOVAL**

Description. This work shall be according to Section 440 of the Standard Specifications with the following additions:

This work includes the removal of the concrete barrier of single or double face, single or double vertical face, variable cross-section heights, special types, and transition types as noted in the plans or directed by the Engineer. The work also includes the removal of the concrete barrier base, separate or monolithically with the concrete barrier.

The Contractor shall remove the existing concrete barrier and concrete barrier base in a manner so as not to damage the adjacent pavements that are to remain.

Method of Measurement. Concrete barrier walls shall be measured for payment in feet in place, along the centerline of the concrete barrier. This work shall include the removal of the concrete barrier base.

Basis of Payment. This work will be paid for at the contract unit price per foot for CONCRETE BARRIER REMOVAL; or as shown in the plans. The removal of the concrete barrier base is included in the cost for CONCRETE BARRIER REMOVAL and will not be paid for separately. This contract unit price shall include all equipment, labor and materials necessary to remove the concrete barrier wall and concrete barrier base, including all reinforcement bars in the concrete barrier wall and base.



## **STORM SEWERS**

Replace the 7<sup>th</sup> paragraph of Article 550.04 of the Standard Specifications:

“Where a firm foundation is not encountered at the grade established due to soft, spongy, or otherwise unsuitable soil, or as directed by the engineer, the Contractor shall excavate the unsuitable soil under the pipe for the full width of the trench. The material shall be replaced with AGGREGATE SUBGRADE IMPROVEMENT per the special provision. The actual depth of removal shall be determined in the field based on the Contractor’s means and methods to be used. However, the depth of removal shall not exceed 24 inches below the 4 inches of well compacted aggregate placed below the pipe. Before placing the AGGREGATE SUBGRADE IMPROVEMENT, the Contractor shall install a Fabric for ground stabilization per Section 210 of the Standard Specifications. The cost for the removal and replacement of the unsuitable material and installation of geotextile fabric will not be paid for separately but shall be considered as included in the cost of the item being installed.”

Revise the last sentence of the first paragraph of Article 550.07 of the Standard Specifications:

“The backfill material shall consist of suitable excavated material placed in uniform lifts not exceeding 12 inches in depth, loose measurement, and compacted to 85 percent of standard lab density. If 85 percent compaction cannot be obtained, trench backfill may be used. Trench backfill material shall be placed in 8 in. lifts, loose measurement and compacted by mechanical means to the satisfaction of the Engineer. No additional compensation will be allowed if the Contractor elects to utilize trench backfill in areas not specified in the Plans unless it is determined in the field that 85 percent compaction cannot be obtained.”

Add the following to the sixth paragraph of Article 550.07 of the Standard Specifications:

“Backfilling Methods 2 and 3 will not be allowed.”

Revise the seventh paragraph of Article 550.07 of the Standard Specifications:

“Where trench backfill is used with Method 1 or specified in the Plans, it shall be deposited in uniform lifts not exceeding 8 inches in depth, loose measurement, and compacted to 95 percent of standard lab density.

Where soft, spongy, or unsuitable material is encountered at the bottom of trenches below existing, temporary, or proposed pavement, the trench backfill material shall be capped with 2 feet of coarse aggregate meeting gradation CA 6 with FABRIC FOR GROUND STABILIZATION placed below the pavement subgrade. The cost for the placement of the coarse aggregate will be paid for as TRENCH BACKFILL. The installation of geotextile fabric will not be paid for separately but shall be considered as included in the cost of the item being installed.”

Delete the 9<sup>th</sup> paragraph of Article 550.07 of the Standard Specifications.

Revise the 4<sup>th</sup> paragraph of Article 550.10 of the Standard Specifications:

“Removal and replacement of soft, spongy, or unsuitable material below plan bedding grade and installation of geotextile fabric will not be paid for separately but shall be considered as included in the cost of the item being installed. The installation of geotextile fabric above the 2 feet of coarse aggregate will also not be paid for separately but shall be considered as included in the cost of the item being installed.”

### **PIPE UNDERDRAIN INSTALLATION**

Add the following paragraph to Article 601.04 of the Standard Specifications:

“Top of pipe underdrains shall be placed a minimum 6” below the aggregate subgrade improvement layer or 6” below undercut layer in areas of undercut.”

### **CATCH BASIN, MANHOLE, INLET, DRAINAGE STRUCTURE, AND VALVE VAULT CONSTRUCTION, ADJUSTMENT AND RECONSTRUCTION**

Replace the 7<sup>th</sup> paragraph of Article 550.04 of the Standard Specifications:

“Where a firm foundation is not encountered at the grade established due to soft, spongy, or otherwise unsuitable soil, or as directed by the engineer, the Contractor shall excavate the unsuitable soil under the structure for the diameter of the excavation. The material shall be replaced with AGGREGATE SUBGRADE IMPROVEMENT per the special provision. The actual depth of removal shall be determined in the field based on the Contractor’s means and methods to be used. However, the depth of removal shall not exceed 24 inches below the bottom slab or sand cushion. Before placing the AGGREGATE SUBGRADE IMPROVEMENT, the Contractor shall install a FABRIC FOR GROUND STABILIZATION per Section 210 of the Standard Specifications. The cost for the removal and replacement of the unsuitable material and installation of geotextile fabric will not be paid for separately but shall be considered as included in the cost of the item being installed.”

Revise the third paragraph of Article 602.12 of the Standards Specifications:

“Backfill shall be according to Article 550.07 and as modified in the special provision for STORM SEWERS.”

Revise the 4<sup>th</sup> paragraph of Article 550.10 of the Standard Specifications:

“Removal and replacement of unsuitable material below the bottom slab or sand cushion and installation of geotextile fabric will not be paid for separately but shall be considered as included in the cost of the item being installed. The installation of geotextile fabric above the 2 feet of coarse aggregate will also not be paid for separately but shall be considered as included in the cost of the item being installed.”

### **REMOVE TEMPORARY CONCRETE BARRIER, STATE OWNED**

Description. This work shall consist of removing existing precast temporary concrete barriers, including all fixtures attached to the temporary concrete barrier, installed in previous contracts by others at locations as specified in the Plans. This work shall be completed in accordance with the applicable portions of Section 704 of the Standard Specifications and as noted herein. The temporary concrete barrier previously installed by others shall be property of the contractor.

Construction Requirement. When the Engineer determines the existing precast temporary concrete barriers are no longer required, the installation shall be dismantled with all hardware becoming the property of the Contractor.

When the existing precast temporary concrete barriers have been anchored to the pavement, the anchor holes shall be repaired with rapid set mortar with only enough water to permit placement. Consolidation by rodding shall be used and the material shall be struck-off flush.

Method of Measurement. REMOVE TEMPORARY CONCRETE BARRIER, STATE OWNED shall be measured for payment in feet (meter) in place along the centerline of the barrier.

Basis of Payment. This work will be paid for at the contract unit price per foot (meter) for REMOVE TEMPORARY CONCRETE BARRIER, STATE OWNED for the removal of temporary concrete barrier previously installed by others

No payment will be made for the removal of temporary concrete barrier supplied and installed under this Contract.

## **TELEVISION INSPECTION OF SEWER**

Description. This work will consist of televising the storm sewer and combined sewer systems before and after construction as specified in the contract drawings.

Requirements. The Contractor must furnish a videotape of a televised inspection of the interior of all existing storm and combined sewers which may be impacted during construction under this contract. Record the videotape under the supervision of the Engineer. Perform two sessions of videotaping of the sewer: 1) before construction and 2) prior to the placement of final wearing surface.

The name, phone number, and contact person of the firm which will be performing the videotaping of the sewer must be provided by the Contractor at the pre-construction meeting.

Clean all sewers prior to videotaping before construction. The final acceptance of the sewer shall be based on the sewer videotape. All deficiencies exposed on the videotape must be corrected by the Contractor within 30 calendar days of notification. All costs incurred by the Contractor to make the required repairs are to be borne solely by the Contractor. The Contractor is required to re-videotape the sewer to verify that the deficiencies noted on any previous videotape have been corrected to the satisfaction of the Department or Chicago Department of Sewers. All costs to re-videotape the sewer, regardless of the number of times required, will be borne solely by the Contractor.

Every effort is to be made by the Contractor to correct all deficiencies prior to the placement of the final wearing surface. If, in the opinion of the Engineer, the Contractor has delayed in submitting the videotape, the placement of the final wearing surface may be suspended. No time extension will be granted due to this suspension and the Engineer will be sole judge as to any delays.

Include location maps, legends and descriptions on all videotape submittals. 2 copies of each submittal are required.

Method of Measurement. This work will be measured for payment in sewer televising per foot for the videotaping of the sewer before construction and prior to placement of the final wearing surface.

Basis of Payment. This work will be paid for at the contract unit price per foot for the TELEVISION INSPECTION OF SEWER.

The cleaning of sewers prior to videotaping before construction shall be paid for as STORM SEWERS TO BE CLEANED, of the diameter specified or COMBINED SEWERS TO BE CLEANED.

### **CONCRETE BARRIER BASE (SPECIAL)**

Description. This work shall consist of constructing a concrete barrier base with reinforcement bars below a concrete barrier wall as detailed in the plans.

Construction Requirements. This work shall be done in accordance with the applicable portions of Section 637 of the Standard Specifications. The concrete barrier base shall be constructed as detailed in the plans. The concrete barrier wall shall be constructed separately and not poured monolithically with the concrete barrier base.

Method of Measurement. CONCRETE BARRIER BASE (SPECIAL) per the number indicated on plans will be measured for payment in feet in place along the centerline of the barrier base. The concrete barrier wall of the type specified will be paid for separately in accordance to the special provision for CONCRETE BARRIER.

Basis of Payment. This work will be paid for at the contract unit price per foot for CONCRETE BARRIER BASE (SPECIAL) per the number indicated on plans, which price shall include all equipment, labor, and materials necessary to construct the concrete barrier base including all reinforcement bars in the concrete barrier base and those extending into the concrete barrier wall or concrete barrier transition, and epoxy coated tie bars.

### **CONCRETE BARRIER**

Description. This work shall consist of constructing a concrete barrier wall with reinforcement bars as detailed in the plans.

Construction Requirements. This work shall be done in accordance with the applicable portions of Section 637 of the Standard Specifications. The concrete barrier wall shall be constructed on a concrete barrier base as detailed in the plans. The concrete barrier wall shall be constructed separately and not poured monolithically with the concrete barrier base.

Method of Measurement. Concrete barrier walls shall be measured for payment in feet in place, along the centerline of the concrete barrier. Concrete barrier base will be paid for separately according to CONCRETE BARRIER BASE, (SPECIAL, per the number indicated on the plans.)

Basis of Payment. This work will be paid for at the contract unit price per foot for CONCRETE BARRIER, SINGLE FACE, 42 INCH HEIGHT (SPECIAL); CONCRETE BARRIER, SINGLE FACE, 42 INCH HEIGHT; CONCRTE BARRIER WALL (SPECIAL), CONCETE BARRIER, VARIABLE CROSS-SECTION 42" HEIGHT or as shown in the plans. This contract unit price shall include all equipment, labor and materials necessary to construct the concrete barrier wall including all reinforcement bars in the concrete barrier wall.

### **TEMPORARY CONCRETE BARRIER (SPECIAL)**

Description. This work shall consist of furnishing, placing, maintaining, relocating, and removing precast concrete barrier with 5' high chain-link fencing with top tension wire and screening on top of the precast concrete barrier at locations as shown on the Plans. This work shall be performed in accordance with Sections 664 and 704 of the Standard Specifications.

The Contractor shall submit a catalog cut or details of the fence, mounting stands, hardware, and other appurtenances for approval by the Engineer.

The individual fence panels shall be securely fastened together and the stands or other mounting devices shall be permanently installed onto the temporary concrete barrier.

After the Contract is closed and as noted in the plans, the Contractor shall remove, relocate and leave in place, or leave in place the Temporary Concrete Barrier (Special). If left in place, ownership and maintenance of barrier shall be transferred over to the Department.

Method of Measurement. Temporary Concrete Barrier (Special) will be measured for payment in feet, along the total length of the temporary concrete barrier.

Basis of Payment. This work will be paid for at the contract unit price per foot for TEMPORARY CONCRETE BARRIER (SPECIAL), which price shall include furnishing, placing, relocating, maintaining and removing the temporary concrete barrier, screening, and chain-link fencing during construction.

### **CLEANING EXISTING SEWERS AND DRAINAGE STRUCTURES**

Description. All existing storm sewers and combined sewers shall be considered as sewers insofar as the interpretation of this Special Provision is concerned. When specified for payment, the location of sewer to be cleaned will be shown on the plans.

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

All existing sewers which are specified to be cleaned on the plans will be cleaned according to Article 602.15 of the Standard Specifications.

Method of Measurement. This work will be measured for payment in feet for the length of sewer that is to be cleaned.

Basis of Payment. This work will be paid for at the contract unit price per foot for STORM SEWERS TO BE CLEANED, of the diameter specified, or at the contract unit price per foot for COMBINED SEWERS TO BE CLEANED.

### **CONCRETE MEDIAN SURFACE, 4 INCH (SPECIAL)**

Description: This item of work shall consist of constructing concrete median surface in areas between concrete barrier walls and between concrete barrier walls and existing or proposed retaining walls, bridge piers and abutments as shown in the Plans. Work shall be in accordance with Section 606 of the Standard Specifications, details in the Plans and as directed by the Engineer.

All locations denoted as CONCRETE MEDIAN SURFACE, 4 INCH (SPECIAL) shall be included in this item and shall have a thickness of 4 inches.

The pay item's use shall determine the class of concrete in accordance with Section 1020 of the Standard Specifications, with the exception that the minimum cement factor shall be 6.05 cwt. The coarse aggregate to be used shall contain no more than two percent by weight (mass) of deleterious materials. Deleterious materials shall include substances whose disintegration is accompanied by an increase in volume which may cause spalling of the concrete.

Materials: Materials shall meet the applicable requirements of Division 1000 of the Standard Specifications.

Construction Requirements: Meet applicable requirements of Section 606 of the Standard Specifications. Concrete median shall be constructed after all concrete barrier walls and proposed retaining walls are complete.

Welded wire fabric reinforcement shall be used. Welded wire fabric may be smooth or deformed and shall be equal to or better than 6" x 6" D8.0/D8.0 and meet the requirements of Article 1006.10 of the Standard Specifications.

Method of Measurement: CONCRETE MEDIAN SURFACE, 4 INCH (SPECIAL) will be measured for payment in place per square foot.

Basis of Payment: This work will be paid for at the contract unit price per square foot for CONCRETE MEDIAN SURFACE, 4 INCH (SPECIAL) which price will be payment in full for all labor, equipment, reinforcement and other materials necessary to complete the work as described.

### **CHAIN LINK FENCE REMOVAL (SPECIAL)**

Description. This work shall consist of removing and disposing the existing chain link fence of variable height along the Existing Retaining Wall at Quincy Street parapet as shown in the Plans or otherwise directed by the Engineer. The removal of gates installed along sections of existing fence is considered under this item. Existing fence and gates include all chain link fence installations.

Construction Requirements. No removal work shall be completed without the approval of the Engineer. All associated hardware and appurtenances of the existing fence including but not limited to post foundations, fittings, gates, post, and accessories, shall be removed off-site and disposed of by the Contractor in a legal disposal site. Any part of the fence that is damaged that is not called out for to be removed shall be replaced at the Contractor's expense.

Contractor shall not damage the existing structures adjacent to the fence. Any damage to the structures shall be repaired by the Contractor at no additional cost to the Department.

Any posts identified to remain must be protected from damage during the removal of adjacent fence or gates.

Method of Measurement. Fence removal shall be measured for payment in feet of CHAIN LINK FENCE REMOVAL (SPECIAL) and measured along the top of the fence from center to center of end post, including the length occupied by gates.

Basis of Payment. This work will be paid for at the contract unit price per foot for CHAIN LINK FENCE REMOVAL (SPECIAL), at the specified locations. Additionally, this price shall include all equipment, labor, and materials necessary to remove and dispose of the existing fence, including all chain link installations and their associated fence hardware, and appurtenances.

### **CHAIN LINK FENCE, 4' ATTACHED TO STRUCTURE**

Description. This work shall consist of all labor, materials and equipment necessary for the mounting of a chain link fence on retaining walls, in accordance with the details and locations shown on the plans and the requirements of Section 664 of the Standard Specifications.

Construction Requirements. All posts shall be vertical when erected; the base plate must be welded to the post at the proper angle to account for any slope along the top of the wall. The fence fabric shall be Type I, Class D and shall be in accordance with Article 1006.27 of the Standard Specifications.

The steel base plate shall meet the requirements of AASHTO M183.

Method of Measurement. Measurement shall be made along the top of the fence center to center of the end post, in feet, completed in place.

Basis of Payment. The work under this item will be paid at the contract unit price per foot for CHAIN LINK FENCE, 4' ATTACHED TO STRUCTURE.



## **TEMPORARY CHAIN LINK FENCE WITH SCREENING**

Description. Work under this item shall consist of furnishing, installing, maintaining, relocating and removing chain link fence with screening, of the height specified on the Plans, or as directed by the Engineer. Work under this item shall be performed according to Section 664 of the IDOT Standard Specifications for Road and Bridge Construction, except as herein modified.

General Requirements. The individual fence panels shall be securely fastened together and mounted with a self-standing base or ground mounted. The chain link fence shall be anchored sufficiently to resist wind loads of 30 pounds per square foot without deflection of more than three inches between top and bottom fence. The base shall not interfere with pedestrian and/or vehicular traffic, and shall be approved by the Engineer.

Opaque fabric meshing shall be affixed to the chain link fence face. The fabric meshing shall allow passage of air but shall contain dust and dirt. The mesh fabric shall be the full height of the fence and cover the entire length of the fence. The fabric meshing and fence shall not contain any advertisement. The color of the fabric shall be approved by the Engineer.

The Contractor shall submit a catalog cut or details of the fence, mounting stands, hardware, opaque fabric meshing or other appurtenances for approval by the Engineer.

Method of Measurement. Chain link fence will be measured for payment in feet along the top of fence from center to center of end posts.

Basis of Payment. This work will be paid at the contract unit price per foot for TEMPORARY CHAIN LINK FENCE WITH SCREENING, of the height specified, which price shall include furnishing, installing, maintaining, relocating and removing the chain link fence with screening during construction.

## **FENCE REMOVAL**

Description. This work shall consist of removing and disposing the existing fence of all kinds as shown in the Plans, unless included within other items or otherwise directed by the Engineer. The fence may be existing fence left from previous contracts. The removal of gates installed along sections of existing fence is considered under this item. Existing fence and gates include wrought iron, wood, steel aluminum or chain link fence installations.

Construction Requirements. No removal work shall be completed without the approval of the Engineer. All associated hardware and appurtenances of the existing fence including but not limited to post foundations, fittings, gates, post, and accessories, shall be removed off-site and disposed of by the Contractor in a legal disposal site. Any part of the fence that is damaged that is not called out for to be removed shall be replaced at the Contractor's expense.

Contractor shall not damage the existing buildings adjacent to the fence. Any damage to the building shall be repaired by the Contractor at no additional cost to the Department.

Any posts identified to remain must be protected from damage during the removal of adjacent fence or gates.

Method of Measurement. Fence removal shall be measured for payment in feet of FENCE REMOVAL and measured along the top of the fence from center to center of end post, including the length occupied by gates.

Basis of Payment. This work will be paid for at the contract unit price per foot for FENCE REMOVAL, at the specified locations. Additionally, this price shall include all equipment, labor, and materials necessary to remove and dispose of the existing fence of all kinds, including but not limited to wrought iron, wood, steel aluminum, or chain link installations and their associated fence hardware, and appurtenances.

## **APPROACH SLAB REMOVAL**

Description. This work shall consist of the complete removal of the existing approach slabs including bituminous overlays, reinforcing bars, and sleeper slabs, at locations designated in the Plans and in accordance with the applicable portions of Sections 440 and 501 of the Standard Specifications.

This work shall also include the removal of existing timber piles and pile caps to at least 300mm (1 ft) below the proposed elevation of subgrade or ground surface within the area of construction and within the limits of the right of way when encountered. This work shall also include the removal of any mud jack cylinders encountered within the existing approach slabs.

The Contractor shall remove the existing approach slabs in a manner so as not to damage the adjacent structures that are to remain.

Method of Measurement. APPROACH SLAB REMOVAL shall be measured in place in square yards.

Basis of Payment. This work will be paid for at the contract unit price per square yard for APPROACH SLAB REMOVAL, which price shall include all labor and equipment necessary to remove and dispose of the entire approach slab pavement.

**CONSTRUCTION AIR QUALITY – DUST CONTROL**

Description. This work shall consist of developing and implementing a detailed Dust Control Plan (DCP) in accordance with Article 107.36 of the Standard Specifications. Development of a DCP is required. All construction activities shall be governed by the DCP. The nature and extent of dust generating activities, and specific control techniques appropriate to specific situations shall be discussed at the pre-construction meeting, with subsequent development of the DCP to include but not be limited to the requirements below.

General Requirements. The Contractor is responsible for the control of dust at all times during the duration of the contract, 24 hours per day, 7 days per week, including non-working hours, weekends, and holidays. This work shall be considered complete after the completion of all permanent erosion control measures required for the contract, and after all temporary and permanent seeding is established.

Work on this contract shall be conducted in a manner that will not result in generating excessive total nuisance dust conditions or air borne particulate matter (PM<sub>2.5</sub>). The IEPA will provide the Baseline Air Sampling in areas where there is no construction on the Circle Interchange. Two air quality monitoring locations have been identified; the UIC Student Recreational Building and IDOT Pump Station No. 5.

Following the baseline establishment, air quality will be monitored for total nuisance dust and air borne particulate matter (PM<sub>2.5</sub>) as shown in the table below. Real-time monitoring will be conducted at the two locations adjacent to Circle Interchange. If during real-time monitoring there are exceedances of the screening standards, the Engineer will contact the Contractor and activities will cease and corrective actions will be developed.

<b>Air Sample/Screening Standards</b>			
<b>Parameter</b>	<b>Concentration</b>	<b>Basis</b>	
Total Nuisance Dust	335 µg/m <sup>3</sup>	IEPA/IDPH	
PM <sub>2.5</sub>	35 µg/m <sup>3</sup>	24 hours	NAAQS

Notes: NAAQS = National Ambient Air Quality Standards  
 IEPA = Illinois Environmental Protection Agency  
 IDPH = Illinois Department of Public Health

The DCP shall describe the plan for the implementation of control measures before, during and after conducting any dust generating operation. These controls must be in place on non-working days and after working hours, not just while work is being done on the site. The DCP must contain information specific to the project site, proposed work, and dust control measures to be implemented. A copy of the DCP must be available on the project site at all times.

The DCP must contain, at a minimum, all of the following information:

1. Name, address and phone number of the person(s) responsible for the dust generating operation and for the submittal and implementation of the DCP.
2. A drawing specifying the site boundaries of the project with the areas to be disturbed, the locations of the nearest public roads, and all planned exit and entrance locations to the site from any paved public roadways.
3. Control measures to be applied to all actual and potential fugitive dust sources before, during and after conducting any dust generating operation, including non-work hours and non-work days.
4. A contingency plan consisting of at least one contingency measure for each activity occurring on the site in case the primary control measure proves inadequate.

The Contractor shall submit two copies of the DCP that outlines in detail the measures to be implemented by the Contractor complying with this section, including prevention, cleanup, and other measures at least 14 days before beginning any dust generating activity. The Contractor shall not begin any dust generating activities until the Engineer approves the DCP in writing.

#### Materials.

1. Dust Suppression Agents: Water shall meet the requirements of Section 1002 of the Standard Specifications.
2. Soil stabilizers shall consist of seed and mulch meeting the requirements of Article 1081.06 (a) (2) and (3).
3. Covers for stockpiles shall be commercially available plastic tarps, or other materials approved by the Engineer.

Construction Methods. Water shall be used to provide temporary control of dust on entrances/exits to the job site, haul roads and other active work areas. Several applications per day may be necessary to control dust depending upon meteorological conditions and work activity. The Contractor shall apply water on a routine basis as necessary or as directed by the Engineer to control dust. Wet suppression consists of the application of water. Wet suppression equipment shall consist of sprinkler pipelines, tanks, tank trucks or other devices approved by the Engineer, capable of providing a regulated flow, uniform spray and positive shut off.

Haul truck cargo areas shall be securely covered during the transport of materials on public roadways that are prone to cause dust.

Public Roadway Dust Control. Trackout, including carryout and spillage of material that adheres to the exterior surfaces of or are spilled from motor vehicles and/or equipment and subsequently fall onto a paved public roadway must be controlled at all times. Clean up of carryout and spillage is required immediately if it extends a cumulative distance of 50 feet or more on a paved public roadway. If the extent of carryout is less than 50 feet, clean up at the end of the day is permissible. Clean up of paved surfaces shall be by wet spray power vacuum street sweeper. Dry power sweeping is prohibited.

Control of Earthwork Dust. During batch drop operations (i.e. earthwork with a front-end loader, clamshell bucket, or backhoe), the free drop height of excavated or aggregate material shall be reduced to minimum heights as necessary to perform the specified task, and to minimize the generation of dust. To prevent spills during transport, a minimum of 2 inches of freeboard space shall be maintained between the material load and the top of the truck cargo bed rail. A maximum drop height of two feet (or minimum height allowed by equipment) will be allowed, or to heights as directed by the Engineer.

Control of Dust on Stockpiles and Inactive Work Areas. The Contractor shall use the following methods to control dust and wind erosion of stockpiles and inactive areas of disturbed soil:

1. Water shall be used during active stockpile load-in, load-out, and maintenance activities.
2. Soil stabilizers (hydraulic or chemical mulch) may be applied to the surface of inactive stockpiles and other inactive areas of disturbed soil. Final grading and seeding of inactive areas shall occur immediately after construction activity is completed in an area and as directed by the Engineer.
3. Plastic tarps may be used on small stockpiles, secured with sandbags or an equivalent method approved by the Engineer, to prevent the cover from being dislodged by the wind. The Contractor shall repair or replace the covers whenever damaged or dislodged at no additional cost.

Method of Measurement. Water used as a dust suppression measure shall be measured for payment in units of 1000 Gallons of water applied. All measuring devices shall be furnished by the Contractor and approved by the Engineer. All other dust control measures will not be measured for payment.

Basis of Payment. The application of water as a dust suppression agent will be paid for at the contract unit price per unit for DUST CONTROL WATERING.

All other dust control measures, along with preparation of the DCP, will not be paid for directly but shall be considered as included in the various items involved and no additional compensation will be allowed.

**DRILLED SHAFTS**

Revise Section 516 of the Standard Specifications to read:

**“SECTION 516. DRILLED SHAFTS**

**516.01 Description.** This work shall consist of constructing drilled shaft foundations.

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

Item	Article/Section
(a) Portland Cement Concrete (Note 1) .....	1020
(b) Reinforcement Bars.....	1006.10
(c) Grout (Note 2) .....	1024.01
(d) Permanent Steel Casing .....	1006.05(d)
(e) Slurry (Note 3)	

Note 1. When the soil contains sulfate contaminates, ASTM C 1580 testing will be performed to assess the severity of sulfate exposure to the concrete. If the sulfate contaminate is >0.10 to < 0.20 percent by mass, a Type II (MH) cement shall be used. If the sulfate contaminate is >0.20 to < 2.0 percent by mass, a Type V cement shall be used. If the sulfate contaminate is ≥ 2.0 percent by mass, refer to ACI 201.2R for guidance.

Note 2. The sand-cement grout mix shall be according to Section 1020 and shall be two to five parts sand and one part Type I or II cement. The maximum water cement ratio shall be sufficient to provide a flowable mixture with a typical slump of 10 in. (250 mm).

Note 3. Slurry shall be bentonite, emulsified polymer, or dry polymer, and shall be approved by the Engineer.

**516.03 Equipment.** Equipment shall be according to the following.

Item	Article/Section
(a) Concrete Equipment	1020.03
(b) Drilling Equipment (Note 1)	
(c) Hand Vibrator	1103.17(a)
(d) Underwater Concrete Placement Equipment	1103.18

Note 1. The drilling equipment shall have adequate capacity, including power, torque and down thrust, to create a shaft excavation of the maximum diameter specified to a depth of 20 percent beyond the depths shown on the plans.

**516.04 Submittals.** The following information shall be submitted on form BBS 133.

- (a) Qualifications. At the time of the preconstruction conference, the Contractor shall provide the following documentation.
- (1) References. A list containing at least three projects completed within the three years prior to this project's bid date which the Contractor performing this work has installed drilled shafts of similar diameter, length, and site conditions to those shown in the plans. The list of projects shall contain names and phone numbers of owner's representatives who can verify the Contractor's participation on those projects.
  - (2) Experience. Name and experience record of the drilled shaft supervisor, responsible for all facets of the shaft installation, and the drill operator(s) who will be assigned to this project. The supervisor and operator(s) shall each have a minimum of three years experience in the construction of drilled shafts.
- (b) Installation Procedure. A detailed installation procedure shall be submitted to the Engineer for acceptance at least 28 days prior to drilled shaft construction and shall address each of the following items unless otherwise directed by the Engineer in writing.
- (1) Equipment List. List of proposed equipment to be used including cranes, drill rigs, augers, boring tools, casing, vibratory hammers, core barrels, bailing buckets, final cleaning equipment, slurry equipment, tremies, or concrete pumps, etc.
  - (2) General Sequence. Details of the overall construction operation sequence, equipment access, and the sequence of individual shaft construction within each substructure bent or footing group. The submittal shall address the Contractor's proposed time delay and/or the minimum concrete strength necessary before initiating a shaft excavation adjacent to a recently installed drilled shaft.
  - (3) Shaft Excavation. A site specific step by step description of how the Contractor anticipates the shaft excavation to be advanced based on their evaluation of the subsurface data and conditions expected to be encountered. This sequence shall note the method of casing advancement, anticipated casing lengths, tip elevations and diameters, the excavation tools used and drilled diameters created. The Contractor shall indicate whether wet or dry drilling conditions are expected and if groundwater will be sealed from the excavation.
  - (4) Slurry. When the use of slurry is proposed, details on the types of additives to be used and their manufacturers shall be provided. In addition, details covering the measurement and control of the hardness of the mixing water, agitation, circulation, de-sanding, sampling, testing, and chemical properties of the slurry shall be submitted.



- (5) Shaft Cleaning. Method(s) and sequence proposed for the shaft cleaning operation.
- (6) Reinforcement Cage and Permanent Casing. Details of reinforcement placement including rolling spacers to be used and method to maintain proper elevation and location of the reinforcement cage within the shaft excavation during concrete placement. The method(s) of adjusting the reinforcement cage length and permanent casing if rock is encountered at an elevation other than as shown on the plans. As an option, the Contractor may perform soil borings and rock cores at the drilled shaft locations to determine the required reinforcement cage and permanent casing lengths.
- (7) Concrete Placement. Details of concrete placement including proposed operational procedures for free fall, tremie or pumping methods. The sequence and method of casing removal shall also be stated along with the top of pour elevation, and method of forming through water above streambed.
- (8) Mix Design. The proposed concrete mix design(s).
- (9) Disposal Plan. Containment and disposal plan for slurry and displaced water. Containment and disposal plan for contaminated concrete pushed out of the top of the shaft by uncontaminated concrete during concrete placement.
- (10) Access and Site Protection Plan. Details of access to the drilled shafts and safety measures proposed. This shall include a list of casing, scaffolding, work platforms, temporary walkways, railings, and other items needed to provide safe access to the drilled shafts. Provisions to protect open excavations during non-working hours shall be included.

The Engineer will evaluate the drilled shaft installation procedure and notify the Contractor of acceptance, need for additional information, or concerns with the installation's effect on the existing or proposed structure(s).

## CONSTRUCTION REQUIREMENTS

**516.05 General.** Excavation for drilled shaft(s) shall not proceed until written authorization is received from the Engineer. The Contractor shall be responsible for verification of the dimensions and alignment of each shaft excavation as directed by the Engineer.

Unless otherwise approved in the Contractor's installation procedure, no shaft excavation, casing installation, or casing removal with a vibratory hammer shall be made within four shaft diameters center to center of a shaft with concrete that has a compressive strength less than 1500 psi (10,300 kPa). The site-specific soil strengths and installation methods selected will determine the actual required minimum spacing, if any, to address vibration and blow out concerns.

Lost tools shall not remain in the shaft excavation without the approval of the Engineer.

Blasting shall not be used as a method of shaft excavation.

**516.06 Shaft Excavation Protection Methods.** The construction of drilled shafts may involve the use of one or more of the following methods to support the excavation during the various phases of shaft excavation, cleaning, and concrete placement dependent on the site conditions encountered. Surface water shall not flow uncontrolled into the shaft excavation, however water may be placed into the shaft excavation in order to meet head pressure requirements according to Articles 516.06(c) and 516.13.

The following are general descriptions indicating the conditions when these methods may be used.

- (a) **Dry Method.** The dry construction method shall only be used at sites where the groundwater and soil conditions are suitable to permit the drilling and dewatering of the excavation without causing subsidence of adjacent ground, boiling of the base soils, squeezing, or caving of the shaft side walls. The dry method shall consist of drilling the shaft excavation, removing accumulated water, cleaning the shaft base, and placing the reinforcement cage and concrete in a predominately dry excavation.
- (b) **Slurry Method.** The slurry construction method may be used at sites where dewatering the excavation would cause collapse of the shaft sidewalls or when the volume and head of water flowing into the shaft is likely to contaminate the concrete during placement resulting in a shaft defect. This method uses slurry, or in rare cases water, to maintain stability of the shaft sidewall while advancing the shaft excavation. After the shaft excavation is completed, the slurry level in the shaft shall be kept at an elevation to maintain stability of the shaft sidewall, maintain stability of the shaft base, and prevent additional groundwater from entering the shaft. The shaft base shall be cleaned, the reinforcement cage shall be set, and the concrete shall be discharged at the bottom of the shaft excavation, displacing the slurry upwards.

- (c) Temporary Casing Method. Temporary casing shall be used when either the dry or slurry methods provide inadequate support to prevent sidewall caving or excessive deformation of the shaft excavation. Temporary casing may be used with slurry or be used to reduce the flow of water into the excavation to allow dewatering and concrete placement in a dry shaft excavation. Temporary casing shall not be allowed to remain permanently without the approval of the Engineer.

During removal of the temporary casing, the level of concrete in the casing shall be maintained at a level such that the head pressure inside the casing is a minimum of 1.25 times the head pressure outside the casing, but in no case is less than 5 ft (1.5 m) above the bottom of the casing. Casing removal shall be at a slow, uniform rate with the pull in line with the shaft axis. Excessive rotation of the casing shall be avoided to limit deformation of the reinforcement cage. In addition, the slump requirements during casing removal shall be according to Article 516.12.

When called for on the plans, the Contractor shall install a permanent casing as specified. Permanent casing may be used as a shaft excavation support method or may be installed after shaft excavation is completed using one of the above methods. For the structures listed in the Special Provision for Foundation Drilling Procedures, permanent casing shall be installed using the method described in the Special Provision for Foundation Drilling Procedures. After construction, if voids are present between the permanent casing and the drilled excavation, the voids shall be filled with grout. Permanent casing shall not remain in place beyond the limits shown on the plans without the specific approval of the Engineer.

When the shaft extends above the streambed through a body of water and permanent casing is not shown, the portion above the streambed shall be formed with removable casings, column forms, or other forming systems as approved by the Engineer. The forming system shall not scar or spall the finished concrete or leave in place any forms or casing within the removable form limits as shown on the plans unless approved as part of the installation procedure. The forming system shall not be removed until the concrete has attained a minimum compressive strength of 2500 psi (17,200 kPa) and cured for a minimum of 72 hours. For shafts extending through water, the concrete shall be protected from water action after placement for a minimum of seven days.

**516.07 Slurry.** When slurry is used, the Contractor shall provide a technical representative of the slurry additive manufacturer at the site prior to introduction of the slurry into the first shaft where slurry will be used, and during drilling and completion of a minimum of one shaft to adjust the slurry mix to the specific site conditions. During construction, the level of the slurry shall be maintained a minimum of 5 feet (1.5 m) above the height required to prevent caving of the shaft excavation. In the event of a sudden or significant loss of slurry in the shaft excavation, the construction of that foundation shall be stopped and the shaft excavation backfilled or supported by temporary casing, until a method to stop slurry loss, or an alternate construction procedure, has been approved by the Engineer.

- (a) General Properties. The material used to make the slurry shall not be detrimental to the concrete or surrounding ground. Mineral slurries shall have both a mineral grain size that remains in suspension and sufficient viscosity and gel characteristics to transport excavated material to a suitable screening system. Polymer slurries shall have sufficient viscosity and gel characteristics to transport excavated material to suitable screening systems or settling tanks. The percentage and specific gravity of the material used to make the slurry shall be sufficient to maintain the stability of the excavation and to allow proper concrete placement.

If approved by the Engineer, the Contractor may use water and excavated soils as drilling slurry. In this case, the range of acceptable values for density, viscosity and pH, as shown in the following table for bentonite slurry shall be met.

When water is used as the slurry to construct rock sockets in limestone, dolomite, sandstone or other formations that are not erodible, the requirements for slurry testing shall not apply if the entire fluid column is replaced with fresh water after drilling. To do so, fresh water shall be introduced at the top of the shaft excavation and existing water used during drilling shall be pumped out of the shaft excavation from the bottom of the shaft excavation until the entire volume of fluid has been replaced.

- (b) Preparation. Prior to introduction into the shaft excavation, the manufactured slurry admixture shall be pre-mixed thoroughly with clean, fresh water and for adequate time in accordance with the slurry admixture manufacturer's recommendations. Slurry tanks of adequate capacity shall be used for slurry mixing, circulation, storage and treatment. No excavated slurry pits will be allowed in lieu of slurry tanks without approval from the Engineer. Adequate desanding equipment shall be provided to control slurry properties during the drilled shaft excavation in accordance with the values provided in Table 1.

(c) Quality Control. Quality control tests shall be performed on the slurry to determine density, viscosity, sand content and pH of freshly mixed slurry, recycled slurry and slurry in the shaft excavation. Tests of slurry samples from within two feet of the bottom and at mid-height of the shaft excavation shall be conducted in each shaft excavation during the excavation process to measure the consistency of the slurry. A minimum of four sets of tests shall be conducted during the first eight hours of slurry use on the project. When a series of four test results do not change more than 1% from the initial test, the testing frequency may be decreased to one set every four hours of slurry use. Reports of all tests, signed by an authorized representative of the Contractor, shall be furnished to the Engineer upon completion of each drilled shaft. The physical properties of the slurry shall be as shown in Table 1.

The slurry shall be sampled and tested less than 1 hour before concrete placement. Any heavily contaminated slurry that has accumulated at the bottom of the shaft shall be removed. The contractor shall perform final shaft bottom cleaning after suspended solids have settled from the slurry. Concrete shall not be placed if the slurry does not have the required physical properties.

Table 1 – SLURRY PROPERTIES				
	Bentonite	Emulsified Polymer	Dry Polymer	Test Method
Density, lb/cu ft (kg/cu m) (at introduction)	65.2 ± 1.6 <sup>1</sup> (1043.5 ± 25.6)	63 (1009.0) max.	63 (1009.0) max.	ASTM D 4380
Density, lb/cu ft (kg/cu m) (prior to concrete placement)	67.0 ± 3.5 <sup>1</sup> (1073.0 ± 56.0)	63 (1009.0) max.	63 (1009.0) max.	ASTM D 4380
Viscosity <sup>2</sup> , sec/qt (sec/L)	46 ± 14 (48 ± 14)	38 ± 5 (40 ± 5)	65 ± 15 (69 ± 16)	ASTM D 6910
pH	9.0 ± 1.0	9.5 ± 1.5	9.0 ± 2.0	ASTM D 4972
Sand Content, percent by volume (at introduction)	4 max.	1 max.	1 max.	ASTM D 4381
Sand Content, percent by volume (prior to concrete placement)	10 max.	1 max.	1 max.	ASTM D 4381
Contact Time <sup>3</sup> , hours	4 max.	72 max.	72 max	

Note 1. When the slurry consists of only water and excavated soils, the density shall not exceed 70 lb/cu ft (1121 kg/cu m).

Note 2. Higher viscosities may be required in loose or gravelly sand deposits.

Note 3. Contact time is the time without agitation and sidewall cleaning.

**516.08 Obstructions.** An obstruction is an unknown isolated object that causes the shaft excavation method to experience a significant decrease in the actual production rate and requires the Contractor to core, break up, push aside, or use other means to mitigate the obstruction. Subsurface conditions such as boulders, cobbles, or logs and buried infrastructure such as footings, piling, or abandoned utilities, when shown on the plans, shall not constitute an obstruction. When an obstruction is encountered, the Contractor shall notify the Engineer immediately and upon concurrence of the Engineer, the Contractor shall mitigate the obstruction with an approved method.

**516.09 Top of Rock.** The top of rock will be considered as the point where rock, defined as bedded deposits and conglomerate deposits exhibiting the physical characteristics and difficulty of rock removal as determined by the Engineer, is encountered which cannot be drilled with augers and/or underreaming tools configured to be effective in the soils indicated in the contract documents.

**516.10 Design Modifications.** If the top of rock elevation differs from that shown on the plans by more than 10 percent of the length of the drilled shaft above the rock, the Engineer shall be contacted to determine if any drilled shaft design changes may be required. In addition, if the type of soil or rock encountered is not similar to that shown in the subsurface exploration data, the Contractor may be required to extend the drilled shaft length(s) beyond those specified in the plans. In either case, the Engineer will determine if revisions are necessary and the extent of the modifications required.

**516.11 Excavation Cleaning and Inspection.** Materials removed or generated from the shaft excavations shall be disposed of according to Article 202.03.

After excavation, each shaft shall be cleaned. For a drilled shaft terminating in soil, the depth of sediment or debris shall be a maximum of 1 1/2 in. (38 mm). For a drilled shaft terminating in rock, the depth of sediment or debris shall be a maximum of 1/2 in. (13 mm).

A shaft excavation shall be overreamed when, in the opinion of the Engineer, the sidewall has softened, swelled, or has a buildup of slurry cake. Overreaming may also be required to correct a shaft excavation which has been drilled out of tolerance. Overreaming may be accomplished with a grooving tool, overreaming bucket, or other approved equipment. Overreaming thickness shall be a minimum of 1/2 in. (13 mm) and a maximum of 3 in. (75 mm).

**516.12 Reinforcement.** This work shall be according to Section 508 and the following.

The shaft excavation shall be cleaned and inspected prior to placing the reinforcement cage. The reinforcement cage shall be completely assembled prior to drilling and be ready for adjustment in length as required by the conditions encountered. The reinforcement cage shall be lifted using multiple point sling straps or other approved methods to avoid reinforcement cage distortion or stress. Cross frame stiffeners may be required for lifting or to keep the reinforcement cage in proper position during lifting and concrete placement.

The Contractor shall attach rolling spacers to keep the reinforcement cage centered within the shaft excavation during concrete placement and to ensure that at no point will the finished shaft have less than the minimum concrete cover(s) shown on the plans. The rolling spacers or other approved non-corrosive spacing devices shall be installed within 2 ft (0.6 m) of both the top and bottom of the drilled shaft and at intervals not exceeding 10 ft (3 m) throughout the length of the shaft to ensure proper reinforcement cage alignment and clearance for the entire shaft. The number of rolling spacers at each level shall be one for each 1.0 ft (300 mm) of shaft diameter, with a minimum of four rolling spacers at each level. For shafts with different shaft diameters throughout the length of the excavation, different sized rolling spacers shall be provided to ensure the reinforcement cage is properly positioned throughout the entire length of the shaft.

When a specific concrete cover between the base of the drilled shaft and the reinforcement cage is shown on the plans, the bottom of the reinforcement cage shall be supported so that the proper concrete cover is maintained.

If the conditions differ such that the length of the shaft is increased, additional longitudinal bars shall be either mechanically spliced or lap spliced to the lower end of the reinforcement cage and confined with either hoop ties or spirals. The Contractor shall have additional reinforcement available or fabricate the reinforcement cages with additional length as necessary to make the required adjustments in a timely manner as dictated by the encountered conditions. The additional reinforcement may be non-epoxy coated.

**516.13 Concrete Placement.** Concrete work shall be performed according to the following.

Throughout concrete placement the head pressure inside the drilled shaft shall be at least 1.1 times the head pressure outside the drilled shaft.

Concrete placement shall begin within 1 hour of shaft cleaning and inspection. The pour shall be made in a continuous manner from the bottom to the top elevation of the shaft as shown on the contract plan or as approved in the Contractor's installation procedure. Concrete placement shall continue after the shaft excavation is full and until 18 in. (450 mm) of good quality, uncontaminated concrete is expelled at the top of shaft. Vibration of the concrete will not be allowed when the concrete is displacing slurry or water. In dry excavations, the concrete in the top 10 ft (3 m) of the shaft shall be vibrated.

When using temporary casing or placing concrete under water or slurry, a minimum of seven days prior to concrete placement, a 4 cu yd (3 cu m) trial batch of the concrete mixture shall be performed to evaluate slump retention. Temporary casing shall be withdrawn before the slump of the concrete drops below 6 in. (150 mm). For concrete placed using the slurry method of construction, the slump of all concrete placed shall be a minimum of 6 in. (150 mm) at the end of concrete placement.

Devices used to place concrete shall have no aluminum parts in contact with concrete.

When the top of the shaft is at the finished elevation and no further concrete placement above the finished elevation is specified, the top of the shaft shall be level and finished according to Article 503.15(a).



Concrete shall be placed by free fall, tremie, or concrete pump subject to the following conditions.

- (a) Free Fall Placement. Concrete shall only be placed by free fall when the rate of water infiltration into the shaft excavation is less than 12 in. (300 mm) per hour and the depth of water in the shaft excavation is less than 3 in. (75 mm) at the time of concrete placement.

Concrete placed by free fall shall fall directly to the base without contacting the reinforcement cage, cross frame stiffeners, or shaft sidewall. Drop chutes may be used to direct concrete to the base during free fall placement.

Drop chutes used to direct placement of free fall concrete shall consist of a smooth tube. Concrete may be placed through either a hopper at the top of the tube or side openings as the drop chute is retrieved during concrete placement. The drop chute shall be supported so that free fall does not exceed 60 ft (18.3 m) for conventional concrete or 30 ft (9.1 m) for self-consolidating concrete. If placement cannot be satisfactorily accomplished by free fall in the opinion of the Engineer, either a tremie or pump shall be used to accomplish the pour.

- (b) Tremie and Concrete Pump Placement. Concrete placement shall be according to Article 503.08, except the discharge end of the steel pipe shall remain embedded in the concrete a minimum of 10 ft (3.0 m) throughout concrete placement when displacing slurry or water.

**516.14 Construction Tolerances.** The following construction tolerances shall apply to all drilled shafts.

- (a) Center of Shaft. The center of the drilled shaft shall be within 3 in. (75 mm) of the plan station and offset at the top of the shaft.
- (b) Center of Reinforcement Cage. The center of the reinforcement cage shall be within 1 1/2 in. (40 mm) of plan station and offset at the top of the shaft.
- (c) Vertical Plumbness of Shaft. The out of vertical plumbness of the shaft shall not exceed 1.5 percent.
- (d) Vertical Plumbness of Reinforcement Cage. The out of vertical plumbness of the shaft reinforcement cage shall not exceed 0.83 percent.
- (e) Top of Shaft. The top of the shaft shall be no more than 1 in. (25 mm) above and no more than 3 in. (75 mm) below the plan elevation.
- (f) Top of Reinforcement Cage. The top of the reinforcement cage shall be no more than 1 in. (25 mm) above and no more than 3 in. (75 mm) below the plan elevation.
- (g) Bottom of shaft. Excavation equipment and methods used to complete the shaft excavation shall have a nearly planar bottom. The cutting edges of excavation equipment used to create the bottom of shafts in rock shall be normal to the vertical axis of the shaft within a tolerance of 6.25 percent.

**516.15 Method of Measurement.** This work will be measured for payment in place and the volume computed in cubic yards (cubic meters). The volume will be computed using the plan diameter of the shaft multiplied by the measured length of the shaft. The length of shaft in soil will be computed as the difference in elevation between the top of the drilled shaft shown on the plans, or as installed as part of the Contractor's installation procedure, and the bottom of the shaft or the top of rock (when present) whichever is higher. The length of shaft in rock will be computed as the difference in elevation between the measured top of rock and the bottom of the shaft.

When permanent casing is specified, it will be measured for payment in place, in feet (meters). Permanent casing installed at the Contractor's option will not be measured for payment.

Reinforcement furnished and installed will be measured for payment according to Article 508.07.

**516.16 Basis of Payment.** This work will be paid for at the contract unit price per cubic yard (cubic meter) for DRILLED SHAFT IN SOIL, and/or DRILLED SHAFT IN ROCK.

Permanent casing will be paid for at the contract unit price per foot (meter) for PERMANENT CASING.

Reinforcement furnished and installed will be paid for according to Article 508.08.

Obstruction mitigation will be paid for according to Article 109.04."

## **ORNAMENTAL FENCE, WROUGHT IRON**

Description. This work shall consist of furnishing and installing a new fence to match the existing fence at the locations shown in the Plans including all posts, accessories, appurtenances, fittings, fasteners, braces, footings, backfill, labor and equipment required to install the fence.

Construction Requirements. This work shall be done in accordance with the applicable portions of Section 664 of the Standard Specifications. Fence post installation in soil shall be done using concrete footings having a minimum depth of 36 inches or as directed by the Engineer.

Materials. All new fence materials and style shall match the existing fence to be removed in kind to the satisfaction of the Engineer. In general, this fence shall be a wrought iron fence, painted black, and 6'-0" in height. Any modifications or substitutions will not be allowed unless previously agreed to by the Engineer. The contractor shall submit all proposed fence materials to the Engineer for approval prior to installation.

Method of Measurement. ORANMENTAL FENCE, WROUGHT IRON shall be measured for payment in feet along the top of the fence from center to center of end post.

Basis of Payment. This work will be paid for at the contract unit price per foot for ORNAMENTAL FENCE, WROUGHT IRON, which price shall include all equipment, labor, and materials necessary to furnish and install the fence, including posts, accessories, appurtenances, fittings, fasteners, braces, footings, and backfill.

## **DRAINAGE SYSTEM (SPECIAL)**

Description. This work shall consist of furnishing and installing a drainage system as shown on the plans, including all piping, fittings, cleanout, drainage structure, and concrete slab as shown in the plans.

Material. The piping shall be ductile iron pipe according to ANSI/AWWA C150/A21.50 and ANSI/AWWA C151/A21.51. All fittings, including elbows, wyes, and cleanouts shall be ductile iron pipe according to ANSI/AWWA C110/A21.10. The fittings shall be supplied with glands, gaskets and tee head bolts and nuts for a complete assembly. All piping joints shall be mechanical joints according to ANSI/AWWA C111/A21.11. All ductile iron pipe and fittings shall be supplied with standard thickness cement lining according to ANSI/AWWA C104/A21.4 and with an asphaltic coating according to AWWA C151 and AWWA C110. Portland Cement Concrete shall conform to the requirements of Section 1020 of the Standard Specifications.

The drainage structure shall be portland cement concrete class PC. The dimensions of the interior of the structure shall be 12" x 12". The grate cover shall also be 12" x 12" and be ultraviolet protected HDPE and color gray with a minimum load rating of 61 psi. The grate must be compliant with all ADA guidelines. The Contractor shall submit shop drawings of the drainage structure and grate to the Engineer for approval.

The supplier shall certify the material supplied meets or exceeds these requirements.

Design. The drainage system shall be designed as an open system with allowances for the differential expansion and contraction expected between the drainage structures and landscaping elements.

Installation. All connections of pipes and fittings shown on the plans to facilitate future removal for maintenance cleanout or flushing shall be made with a threaded, gasketed coupler or a bolted gasketed flange system. All ductile iron pipe and fittings shall be handled and installed according to guidelines and procedures recommended by the manufacturer or supplier of the material. The drainage system shall be installed in coordination with the construction of retaining walls to eliminate the need to excavate near the wall after the wall has been constructed.

Basis of Payment. This work will be paid for at the contract lump sum price for DRAINAGE SYSTEM (SPECIAL) which shall include all labor, excavation, backfilling, materials, and equipment necessary to execute the work as detailed herein.

**GROUND MOUNTED CONCRETE NOISE ABATEMENT WALLS (ABSORPTIVE AND REFLECTIVE)**

Effective: September 5, 2008

Revised: February 28, 2020

This work shall consist of furnishing the design, shop drawings, materials, post anchorage, and construction of ground mounted concrete noise abatement walls (noise walls) according to this Special Provision, the Contract Plans and/or as directed by the Engineer.

**General.** The noise abatement wall shall consist of precast concrete panels spanning between vertical posts supported by concrete drilled shaft foundations (ground mounted) as shown on the plans. Driven piles will not be allowed. The posts shall be steel or concrete, unless otherwise specified on the Contract Plans. The design, material, fabrication and construction shall comply with this Special Provision and the requirements specified by the noise wall supplier selected by the Contractor for use on this project. The walls shall have no omissions or gap except as detailed in the Contract Plans.

The Contractor shall verify the locations for the proposed ground mounted wall for conflicts and inform the Engineer in writing of any conflicts before realigning or redesigning the wall. The Contractor shall realign or redesign the wall to avoid any conflicts.

Post spacing shall avoid existing and proposed underground utilities and storm sewers.

Wall components shall be fabricated and erected to produce a precast concrete reflective noise wall system and/or an absorptive noise reduction system at the locations shown in the Contract Plans. The noise reduction system shall satisfy the acoustical requirements as specified on the Contract Plans. An absorptive noise reduction system may be used as an alternate to a reflective noise wall system. Substitution of alternate materials in lieu of precast concrete panels will not be allowed.

All appurtenances behind, in front of, under, over, mounted upon, or passing through the noise wall, such as drainage structures, fire hydrant access, highway signage, emergency access, utilities, and storm sewers shall be accounted for in design of the wall.

The noise walls shall be designed and constructed to extend to the minimum lines, grades and dimensions of the wall envelope, with no omissions or gaps, as shown on the Contract Plans and as directed by the Engineer.

**Submittals.** A complete wall and foundation design submittal, including design calculations for wall panels, posts, foundations, and all connections and shop drawings shall be submitted to the Department for review and approval no later than 90 days prior to beginning construction of the wall. The time required for the preparation and review of these submittals shall be charged to the allowable contract time. Delays caused by untimely submittals or insufficient data will not be considered justifications for any time extensions. No additional compensation will be made for any additional material, equipment or other items found necessary to comply with the project specifications as a result of the Engineer's review. The Contractor will be required to submit the necessary shop drawings. All submittals shall be prepared and sealed by an Illinois Licensed Structural Engineer.

Submittals shall include all structural calculations, details, dimensions, quantities and cross sections necessary for the construction of the noise abatement walls including but not be limited to:

- (1) Structural design calculations for all structural members, foundations, and connections prepared and sealed by an Illinois Licensed Structural Engineer, and prints of shop drawings on reduced size 11 x 17 in. (275 x 425 mm) sheets in accordance with Article 503.05 and 1042.03(b) of the Standard Specifications.
- (2) A plan view of the wall indicating the stations and offsets required to locate the drilled shaft foundations. The proposed foundation diameter(s) and spacing(s) shall be indicated with all changes to the horizontal alignment shown. Each panel and post shall be numbered and any changes in type or size shall be noted. The centerline of any utilities passing under the wall and locations of expansion joints, access doors, lighting, signing, curb cuts, and drainage structures shall also be shown.
- (3) An elevation view of the wall, indicating the elevations of the top of the posts and panels as well as the elevations of the bottom of the panels, tops of the shaft foundations, all steps in wall system, the finished grade line, and vertical clearances to existing utilities and storm sewers. Each post size and length, panel type and size, and foundation depth shall be designated.
- (4) A typical cross section(s) that shows the panel, post, foundation, and the elevation relationship between existing ground conditions and the finished grade as well as slopes adjacent to the wall.
- (5) All general notes required for constructing the wall.
- (6) All details for the steps in the bottom of panels shall be shown. The bottom of the panels shall be located at or below the theoretical bottom of panel line shown on the Contract Plans. The theoretical bottom of panel line is assumed to be 8 in (200 mm) below the finished grade line at front face of the wall for ground mounted noise walls, unless otherwise shown on the Contract Plans.

- (7) Tops of the panels and posts shall extend to or above the theoretical top of wall line shown on the Contract Plans. All panel tops shall be cast and placed horizontally with any changes in elevation accomplished by stepping adjacent panel sections at posts. Steps shall not exceed 1 ft (300 mm) in height, except within the last 50 ft (15 m) where 2 ft (600 mm) steps will be permitted.
- (8) All panel types shall be detailed. The details shall show panel weight, orientation, all dimensions necessary to cast and/or fabricate each type of panel, the reinforcing steel, and location of post or foundation connection hardware as well as lifting devices embedded in the panels. The Noise Reduction Coefficient (NRC) of each panel of the absorptive face shall be noted.
- (9) All post types shall be detailed. The details shall show post weight, orientation, all dimensions necessary to cast and/or fabricate each type of post, the reinforcing steel, connecting plates, and anchorage details as well as lifting devices embedded in or attached to the posts. Post spacing for walls shall be limited to a distance that does not over stress the supporting structure.
- (10) Details of wall panels with appurtenances attached to or passing through the wall, as shown on the contract plans, such as utilities, emergency access doors, framed openings, drainage structures, signs, etc. shall be shown. Any modifications to the design or location of these appurtenances to accommodate a particular system shall also be submitted.
- (11) All architectural panel treatment, including color, texture and form liner patterns shall be shown. All joints shall be placed horizontal or vertical and shall be aligned with adjacent panels.
- (12) The details for the connection between panels and posts as well as their connection to the foundation, shall be shown. Foundation details, including details showing the dimensions, reinforcement, and post anchorage system for the drilled shaft foundations, shall be shown. The method of securing the reinforcement in the foundation prior to concrete placement shall be shown.
- (13) Testing, certifications and reports from independent laboratories documenting that the panel's sound Transmission Loss (TL) and NRC for the panel satisfy the criteria shown in the design criteria section of this specification. The testing results for the flame spread, smoke density and freeze-thaw/salt scaling requirements described in the materials section of this specification shall also be submitted. If unable to document panel and post deflections by calculations, reports of full scale testing shall be submitted to demonstrate the deflection criteria have been met.
- (14) Manufacturer recommended installation requirements, a sequence of construction and a detailed bill of materials shall be included.
- (15) The color of the wall panels and support posts identified by Federal Standard 595-B color number.

The Contractor shall submit concrete stain manufacturer's standard color chart for review and initial color selection. The Department will select not more than three colors for the Contractor to produce 12" x 12" color concrete samples including the sealer. The samples will utilize the formliner type A1, as shown on drawings. The Department will make final color selection.

The Contractor shall deliver to the Department, 2 ft x 2 ft color samples in a range of colors to match Department specified color. Sample to include surface finish (stain and sealant) and the proposed formliner, texture 1. The Department will make final color selection.

After the acceptance of color and finish the Contract shall provide two 4 ft x 4 ft samples. Samples to represent panel type "A" "B" & "C". Show each formliner pattern and texture next to each other, including stain and sealer, as to be used on the final panel type "A", "B" and "C".

The Contractor shall submit sample of post, approximately 4 ft long. Paint to match final approved color for the concrete panel including the sealer.

The Contractor shall submit mockup of one full size noise abatement wall panel "B", and two posts, showing the final appearance of texture and finish, including stain and sealer. If the test panels and posts are not approved, additional test panels and posts shall be furnished until a satisfactory color and finish is obtained, at no additional cost to the Department. The mockup as approved by the Department shall then be the standard of comparison for the remaining finishes. The Contractor shall consider in his schedule a 14-calendar day period from the date the submittal is received by the Engineer to the expected date of return with comment. This 14-day review period shall be considered with any resubmittal, and such resubmittals shall not be considered cause for an extension of time to the Contract. Mockup to be reviewed on site and the approved mockup can be incorporated into Work as directed by the Department.

The samples shall be made at the same plant manufacturing the product for the noise walls under this contract and shall be representative of those which will be tested per this specification. Once the color sample is approved, a batch shall be designated by batch number and date and will remain the standard for the entire project. At the conclusion of the project the samples are to be removed and disposed of by the Contractor.

The Contractor shall submit site access plans showing access and limits of the work areas for the installation of the wall. Any required traffic controls shall be according to the requirements in the plans or the special provision for TRAFFIC CONTROL PLAN.

The initial wall and foundation design submittal shall include three (3) sets of shop drawings and calculations. One set of drawings will be returned to the Contractor with any corrections indicated. The Contractor shall do no work or ordering of materials for the structure until the Engineer has approved the submittal.

**Design Criteria.** The wall system shall be designed to withstand wind pressure, applied perpendicular to the panels in either direction, according to the AASHTO LRFD Bridge Design Specifications, Chapter 15, for the Design of Sound Barriers. The noise wall design life shall be 75 years unless otherwise noted. The wall system shall be designed to withstand active earth pressure and live load surcharge at locations indicated on the plans. The contractor shall be responsible for the structural adequacy of the panels, posts, foundations and connections as well as overall wall overturning stability. Prestressed and/or post tensioned panel concepts will not be permitted.



The Strength III design wind loading shall be as specified on the plans but not less than 35 psf. The Service I design wind loading shall be as specified on the plans but not less than 15 psf. When a sound wall is also required to support earth pressures, the unfactored design active earth pressure shall be based on an equivalent fluid pressure of 55 pounds per cubic foot and a minimum live load surcharge pressure of 2 feet of earth pressure. The earth pressure fill height shall be defined by the proposed grade line elevation and the theoretical bottom of panel line.

The post shall be connected to the foundation by either embedding the post inside the concrete foundation shaft or by attaching the post to the foundation shaft with base plates and anchor bolts as required by design. Embedded posts shall extend into the shaft for the full length of the shaft. For base plate and anchor bolt connections, the minimum number of anchor bolts per post shall be four 1 in. (M24) diameter bolts, with a minimum embedment depth of 18 in. (450 mm). The concrete shaft for base plate and anchor bolt type connections shall be reinforced. For embedded post type connections, the shaft need not be reinforced unless the minimum clear cover over the post exceeds 10 inches (250 mm). When reinforcement of the concrete shaft is required as specified above, the reinforcement shall consist of a minimum of eight #5 (#15) vertical bars symmetrically placed and tied with #3 (#10) ties at 6 in. (150 mm) centers. An additional tie shall be provided at the top and bottom of the foundation. As an alternative to the ties, a #3 (#10) spiral at a 6 in. (150 mm) pitch with an additional 1 1/2 turns at the top and bottom of the foundation or an equivalent 4 x 4 – W12.3 x W7.4 welded wire fabric may be substituted. Reinforcement bars inside the concrete foundations do not require epoxy coating.

Posts shall be oversized by 0.0625 in. in each direction to account for corrosion.

The material and construction of the foundations (drilled shafts) shall be according to Drilled Shafts special provisions and the requirements of special provision Foundation Drilling Procedures.

The shaft foundation dimensions shall be determined according to AASHTO LRFD Bridge Design Specifications. Soil borings from prior soil investigations when available are shown in the plans, and may be used to generate foundation design parameters. The design shall utilize load and resistance factors as specified in the AASHTO LRFD Bridge Design Specifications and shall account for the effects of a sloping ground surface and water table indicated on the plans. In the event that insufficient data is shown on the plans, the following parameters should be assumed for the foundation design:

Effective unit weight	70 pcf
Internal friction angle	30 degrees
Cohesion intercept	0 ksf

Except where otherwise indicated on the plans, the maximum post spacing shall be as specified in the Contractor's approved design.

The maximum allowable panel deflection shall be no more than the panel length (L) divided by 240 ( $L/240$ ). The maximum post deflection due to post curvature shall be  $H/180$ , where H is the height of the post above the foundation. The maximum total post deflection due to post curvature, foundation curvature, and top-of-foundation rotation shall be  $H/90$ . A method utilizing P-y springs for different soil layers shall be used to calculate the total post deflection. When meeting the deflection limits cannot be demonstrated by calculations, a lateral load test and report shall be submitted to the Engineer indicating that the above noted design lateral loads can be applied to the panels and/or posts without exceeding noted deflection tolerance. The test shall apply lateral loads to the panel simulating uniform wind pressure, and earth pressure when present.

The design shall account for the presence of all appurtenances mounted on or passing through the wall such as drainage structures, existing or proposed utilities, emergency access doors and other items.

Corrugations, ribs or battens on the panel shall be oriented vertically when erected. The panels shall be designed to prevent entrapment and ponding of water. The walls shall not have openings allowing the perching or nesting of birds or the collection of dirt, debris or water.

The walls shall not have handholds or grips promoting climbing of the walls. Any bolts or fasteners used to connect material to the supporting panel, posts, or foundations shall be recessed or embedded in concrete, hidden from view and weather exposure. No external mechanical fastening devices such as frames or clips shall be used for these connections.

The noise abatement material shall be designed to achieve a sound TL equal to or greater than 20 dB in all one-third octave bands from 100 hertz to 5000 hertz, inclusive, when tested according to ASTM E-90. The sound absorptive material shall have a minimum NRC as indicated on the plans. For the side of the walls specified as reflective, no minimum NRC is required.

The NRC shall be determined per ASTM E795, tested according to ASTM C423 (mounting type A). The ratio of noise absorptive material on the panel surface to total wall area (including posts) shall be greater than 90 percent. NRC testing shall be performed on coated samples, utilizing the stain that will be applied for color.

**Access Doors.** All access doors shall be designed to fit within the design of the noise wall as shown on the plans. Doors shall be complete with hardware and locking devices. Each door shall provide a 3 ft (0.9 m) wide by 7 ft (2.1 m) high minimum clear access opening. Both door jambs shall be securely fastened to anchored posts. Front and back face of the installed door shall be flush with the faces of the noise wall.

Perimeter and internal door frames shall consist of welded hot dip galvanized steel channels and miscellaneous angle stiffeners and plates designed to provide support for noise wall panels to match the noise wall material as specified in this special provision. Infill noise panel geometry and color shall match the adjacent noise wall panels. Noise wall panels shall be fastened to steel frames as per panel manufacturer's recommendations.

The door, jambs, head, hinges, door appurtenances, and adjacent ground mounted posts shall be designed to withstand the wind pressure of 30 psf (1.4 kPa) with the door in fully open and fully closed positions and support the weight of the door and a 300 lb (136 kg) vertical load on the non-hinged side of the door. Provide steel bracing as required. Door bottom shall be equipped with drainage holes to avoid accumulation of trapped moisture.

Door jambs and head section shall be hot dip galvanized steel. Door hinges shall be barrel type, edge mount, extra heavy-duty, hot dip galvanized steel or stainless steel. The hinges shall be designed to support the weight of door assembly, wind loads on the open door, and a 300 lb (136 kg) vertical load on the non-hinged side of the door.

Door pulls shall be provided on both sides of access door(s). Door locking hardware shall be hasp-type to be used with a padlock and shall be located according to local fire department or other requirements as applicable. A solid steel emergency access lock box system shall be provided and mounted near the hasp location at the steel post on the locking hardware side of door. The lock box for emergency access doors shall be according to local fire department requirements.

Doors shall be equipped with lifting bolts or beams as required for safe lifting of door units.

**Materials.** Noise wall materials shall conform to the supplier's standards, AASHTO Specifications for noise walls and the following:

- (a) Reinforcement bars shall satisfy ASTM A706 Grade 60 (400). Welded wire fabric shall be according to AASHTO M 55. All reinforcement in the wall panels shall be epoxy coated.
- (b) Anchor bolts shall conform to ASTM F1554 Grade 55 or 105 and shall be galvanized per AASHTO M232.
- (c) The precast elements shall be according to applicable portions of Section 1042 of the Standard Specifications. The precast elements are considered to be Precast Concrete Structural Members. Coarse Aggregate shall meet the requirements of Article 1004.02(f) of the Standard Specifications. Concrete shall be Class PC with a minimum compressive strength of 4500 psi (31,000 kPa) at 28 days. Dry cast concrete element will not be permitted.
- (d) For sound absorptive panels, the manufacturer shall provide test information from an independent lab that the panels meet specified durability requirements. This information shall be either a freeze/thaw test according to AASHTO T 161 (ASTM C 666) Procedure A or B, or it shall be a salt scaling test according to ASTM C 672.

For the freeze/thaw test, a minimum of three specimens shall have been tested. The maximum weight (mass) loss after 300 cycles shall be 7.0 percent. The panel shall have no cracks, delamination (applies to composite material panel), or other excessive physical distress upon completion of the test.

For the salt scaling test, the test method shall be modified as outlined in Appendix D of the Guidelines for Evaluating the Performance of Highway Sound Barriers by the Highway Innovative Technology Evaluation Center (HITEC), A Service Center of the Civil Engineering Research Foundation, CERF REPORT: HITEC 96-04, Product 24 (October 1996). The maximum weight (mass) loss after 50 cycles using a 3 percent sodium chloride solution shall be 0.2 psf (0.1 kg/m<sup>2</sup>).

The panel shall have no cracks, delamination (applies to composite material panel), or other excessive physical distress upon completion of the test.

For sound reflective panels, evidence of durability by one of the two previously mentioned tests is required for all materials except Class PC concrete.

- (e) The manufacturer for the noise abatement wall shall provide their quality control plan for testing the product, and test results shall be provided upon request by the Engineer. Manufacturers on the Department's Qualified Product List of Certified Precast Concrete Producers who are approved for noise abatement walls will be considered in compliance with this requirement.
- (f) Steel plates and posts shall conform to AASHTO M 270 (M 270 M) Grade 36 (250) or 50 (345). All portions of the post shall be galvanized according to AASHTO M111 and ASTM A385 or primed according to Section 506 of the Standard Specifications. The exposed portions of the steel posts shall be painted according to Section 506 of the Standard Specifications. The adjacent concrete panels shall be protected from over spray. The color shall match final approved color for the concrete panel including the sealer. Steel bolts, nuts, and washers shall be galvanized according to AASHTO M232.
- (g) Lifting inserts cast into the panels shall be hot dipped galvanized.
- (h) Non shrink grout shall be according to Section 1024 of the Standard Specifications.
- (i) The default color of both sides of the panels, posts and other visible elements shall be a light brown earth tone unless specified otherwise on the Contract Plans Colors shall be achieved through the use of integral pigments or stains, which are in compliance with the environmental regulation of the State of Illinois. Components manufactured with integral pigment shall be tested and certified in conformance to ASTM C979. Stains shall be non film forming, penetrating stains. Stains shall be applied to concrete at the cured age of the manufacturer's recommendation. Surface preparation and application shall be match final approved color for the concrete panel including the sealer. according to manufacturer written recommendations. Coloring of concrete elements shall be accomplished using a single component water based, sound absorptive, penetrating, architectural stain that is weather resistant. Stains and/or pigments must be applied at the manufacturing plant; application in the field on site will not be allowed. The final color shall be consistent with the quality and appearance of the approved sample.
- (j) Use of opaque concrete coatings or concrete tint is not permitted.
- (k) The finish pattern of the precast panels shall be as specified on the Contract Plans.

- (l) With the exception of the steel and Portland cement concrete elements of the wall, all materials shall be tested for flame spread and smoke density developed according to ASTM E84. The material must exhibit a flame-spread index less than 10 and a smoke density developed value of 10 or less.
- (a) The form liner used to create the pattern shall be of high quality and capable of withstanding anticipated concrete pour pressures without causing leakage or causing physical defects. The textured liner shall be made from high-strength elastomeric urethane material which shall not compress more than 0.02 feet when poured at a rate of 10 vertical feet per hour. The form release agents shall be non-staining, non-residual, and non-reactive. The forms for smooth surfaces shall be plastic coated to provide a smooth surface free of any impression.

**Fabrication.** All precast units shall be manufactured according to Section 504 of the Standard Specifications, and the following requirements and tolerances with respect to the dimensions shown on the approved shop drawings.

- (a) The minimum reinforcement bar cover shall be 1 1/2 in (40 mm).
- (b) Panel dimensions shall be within 1/4 in (6 mm).
- (c) All hardware embedded in panels or posts shall be within 1/4 in (6 mm).
- (d) Angular distortion with regard to panel squareness, defined as the difference between the two diagonals, shall not exceed 1/2 in (13 mm).
- (e) Surface defects on formed surfaces measured on a length of 5 ft (1.5 m) shall not be more than 0.10 in (2.5 mm).
- (f) Posts shall be installed plumb to within 1/2 in (13 mm) of vertical for every 15 ft (5 m) of height and to within 1/2 in (13 mm) of the station and offset indicated on the approved shop drawings.
- (g) Drilled shaft foundations shall be placed within 2 in (50 mm) of the station and offset indicated on the approved shop drawings.
- (h) Panel reinforcement and lifting devices shall be set in place to the dimension and tolerances shown on the plans and these special provisions prior to casting.

The date of manufacture, the production lot number, and the piece-mark shall be clearly noted on each panel.

Absorptive material shall be permanently attached to their supporting elements and no external mechanical fastening systems such as frames or clips shall be used. Any bolts or fasteners used shall be recessed or embedded below the surface.

Any chipping, cracks, honeycomb, or other defects, to be allowed, shall be within acceptable standards for precast concrete products according to Section 1042 of the Standard Specifications and as determined by the Engineer.

**Construction.** The Contractor shall obtain technical assistance from the supplier during wall erection to demonstrate proper construction procedures and shall include any costs related to this technical assistance in the contract unit price for Noise Abatement Wall. The instructions provided by the wall supplier are guidelines and do not relieve the contractor of the responsibility to adhere to contract requirements.

It is recommended that all bottom panels be installed for a length of wall prior to placing middle or top panels. After bottom panels are in-place, finish grading can be accomplished with heavy equipment by reaching over the in-place panels.

Site excavations and/or fill construction shall be completed to plan elevations and profiles prior to the start of wall foundation construction. All underground utility or drainage structure installation shall be completed prior to foundation installation. The ground elevations as shown on the plans and the approved noise wall shop drawings shall be verified by the contractor and discrepancies corrected prior to material fabrication. Buried utilities shall be marked to verify proper clearance from the drilled foundations. The Contractor should consider overhead obstruction such as electric and telephone wires prior to wall erection.

If the soils encountered during drilling of the foundations do not satisfy the design strengths shown on the Contract Plans, the Engineer shall be notified to evaluate the required foundation modifications. The shaft foundation will normally require additional length, which may be paid separately under Article 104.03 of the Standard Specifications. All drilled shaft excavations shall be filled with concrete within 6 hours of their initiation. The concrete for the drilled shaft foundations shall be placed against undisturbed, in-place soils. The concrete at the top of the shaft shall be shaped to provide the panels on each side of the post adequate bearing area and correct elevation per the approved shop drawings.

The panels shall be delivered to the project site in full truckload quantities. They may be off-loaded individually or by forklift with a solid steel plate spanning between the forks providing uniform, fully distributed bearing support to the underside of the panels. Units shall be shipped, handled and stored in such a manner as to minimize the danger of staining, chipping, spalling, development of cracks, fractures, and excessive bending stresses. Panels shall be stored and shipped in bundles, on edge. Any touch up and repair is at the Contractor's expense and shall be carried out according to the manufacturer's recommendations.

**Method of Measurement.** Noise abatement walls will be measured in square feet (square meters) from the wall envelope, defined by the theoretical top of wall line to the theoretical bottom of panel line for the length of the wall as shown on the Contract Plans.

Drilled shafts, concrete, reinforcement bars and other elements for supporting the ground mounted noise abatement walls will not be measured for payment.

Access doors shown on the Contract Plans will not be measured for payment.

**Basis of Payment.** This work will be paid for at the contract unit price per square foot for NOISE ABATEMENT WALL, GROUND MOUNTED.

The costs for drilled shafts, concrete, reinforcement bars and other elements supporting the noise abatement walls will not be paid for separately but will be included in the item for NOISE ABATEMENT WALL, GROUND MOUNTED.

## CONSTRUCTION VIBRATION MONITORING

Description. This work consists of monitoring buildings, structures, tunnels and other locations susceptible to vibration from construction activities.

The Contractor shall furnish monitoring equipment and all equipment and labor necessary to install and monitor adjacent buildings and structures for vibration. The Contractor shall designate a minimum of two monitoring point locations for each of the structures located at the following addresses, at a minimum.

- 713 W. Van Buren St. (IDOT Pump Station No. 5)
- 400 S. Jefferson St.
- 701 W. Jackson (Lofts)
- 333. S. Des Plaines St. (Lofts)
- 324 S. Des Plaines (Chicago Fire Department Engine 5)
- 711 W. Jackson Blvd.(H-Mart)
- 728 W. Jackson Blvd. (Haberdasher Square Lofts)
- 210 S. Des Plaines St. (Edge Lofts & Tower)
- 703 W. Monroe St. (Career Transitions Center)
- 650-660 W. Madison (ComEd SubStation)
- 659 W. Washington Blvd.
- Existing CDWM siphon junction chambers adjacent to the north side of the existing Monroe Street bridge
- 703 W. Monroe St.
- 1 N. Halsted St. (Whole Foods)
- 25 S. Halsted St. (Crowne Plaza)
- 111 S. Halsted St. (Walgreens)
- 766 W. Jackson Blvd.
- 768 W. Jackson Blvd.
- 769 W. Jackson Blvd.
- 770 W. Gladys (770 Lofts)
- 333 S. Halsted St. (National Hellenic Museum)
- 400 S. Green Street (Green Street Lofts)
- 765 W. Adams (Arkadia West Loop Apts)
- 301 S. Halsted St.

The Contractor shall designate a minimum of four monitoring point locations for each of the structures located at the following addresses, at a minimum:

- 700 W. Adams (Old St. Patrick's Church)
- 120 S. Des Plaines Street (The Francis Xavier Warde School)
- 711 W. Monroe Street (Fr. Jack Wall Mission Center)
- 718 W. Adams Street (Old St. Patrick's Church Rectory)

- (a) Background Vibrations Reports were previously developed for the buildings noted above during the Project planning phase, and are available for review, for informational purposes only, at the District One offices. These reports provide information regarding the vibration levels caused by ambient vibrations due to normal traffic, building mechanical equipment and any unrelated construction activities being performed nearby at the time of the monitoring and report development.

The Contractor is solely responsible for determining the means, methods and sequences of construction, and may identify additional locations beyond those listed above for monitoring vibration. The cost for monitoring the additional locations identified by the Contractor is included in the lump sum contract unit price for CONSTRUCTION VIBRATION MONITORING.

The Contractor shall coordinate with the Engineer and building/structure owners to ensure the proposed monitoring locations are acceptable to the building owners and accessible to both the Contractor and the Engineer at all times. The proposed locations of building vibration points are to be submitted to the Engineer for approval prior to the start of construction. Selection of the building vibration monitoring points shall be coordinated during the pre-construction condition surveys included within the MONITORING ADJACENT STRUCTURES special provision.

Vibration Monitoring: The Contractor shall employ the services of a qualified vibration monitoring consultant. Monitoring point locations and frequency of data collection shall be as determined by the Contractor's Consultant and are subject to the approval of the Engineer. All vibration monitors shall be attached to the floor of the buildings or structures being monitored. Vibration monitoring shall be a continuous and uninterrupted process and must be in place prior to the start of any construction activity. All vibration monitors for the project shall be programmed to actuate an alarm when the Threshold Value or Limiting Value is reached. The alarm notification protocol shall consist of the immediate dialing of mobile telephone numbers of the Engineer (or his/her authorized representative) and the Prime Contractor.

Response Values: The Contractor shall establish the response values, including both the Threshold Value and the Limiting Value, for each building and structure.

- **Threshold Value:** A Threshold Value is a warning value. If Threshold Values are achieved, the Contractor must stop the work, determine the best course of action to reduce the vibrations and implement corrective actions to the design and/or construction methods to avoid reaching Limiting Values.
- **Limiting Value:** A Limiting Value is an alarm value. If Limiting Values are achieved, construction work shall stop immediately, the Adjacent Structures shall be surveyed for signs of additional distress from pre-construction surveys, and corrective action shall be taken to revise the design and/or construction methods to protect the adjacent structures from damage.

If the Threshold Value or Limiting Value is reached, all vibration inducing work shall be stopped. The Contractor shall establish the horizontal/vertical distance limit requirements between the vibration monitoring point location and the source of the vibration-inducing work to determine which construction operations must be stopped. Work may resume upon implementation of the action plan and with the approval of the Engineer.



If the work is stopped because the Threshold Value or Limiting Value is reached there will be no additional compensation nor any additional time extensions granted. Any change in construction methods to avoid reaching the Limiting Value will not be grounds for additional compensation.

The Contractor must devise means and methods of construction that will not reach the established vibration response values. The Contractor is advised that particularly careful demolition/construction requirements may be required at locations where the property line is immediately adjacent to the area of construction.

Action Plans: Upon reaching or exceeding Response Values, the Contractor shall immediately notify the Engineer, and perform the following:

- **Threshold Values:** If Threshold Values are achieved, the Contractor must stop the work and evaluate the means, methods, and sequences of construction and data collection/reporting frequency. The Contractor shall provide a submittal within 24 hours of the Threshold Values being reached that summarizes the means, methods and sequences of construction to be used to preclude reaching Limiting Values, and that identifies modifications to the data collection and data reporting frequencies. Provide a summary report to the Engineer for review and approval.
- **Limiting Values:** Immediately stop construction work in the zone of influence of the instrument, and coordinate a meeting with the Engineer to evaluate distress, discuss corrective actions, develop alternate means, methods, and sequences of construction, and identify modifications to data collection and reporting frequencies. The Contractor shall provide an action plan submittal within 24 hours of the Limiting Values being reached providing a summary report to the Engineer for review and approval.

Corrective Measures. If, at any time, resulting vibrations meet or exceed the established response values, the Contractor shall stop work immediately and initiate the necessary corrective measures as approved by the Engineer. Damage to the Adjacent Structures as a result of construction activity shall be corrected by the Contractor. No additional compensation shall be due to the Contractor for repairing Adjacent Structures. The Contractor shall not be entitled to any claim of damages or delay for stopping the project construction activities to make corrective measures.

Submittals. Submit the following items to allow for review and approval by the Engineer without delaying the work. Do not order materials or start work before receiving written approval from the Engineer.

- Vibration Control Plan shall include:
  - Locations of all vibration monitoring points, including property address and property contact information.
  - Procedure and outline for how the data will be provided to the Engineer.
  - Product Data: Type of vibration monitor to be used. Include construction details, material descriptions, performance properties, dimensions of individual components and profiles.
  - List of the Contractor's equipment to be used during demolition and construction operations.
  - Contact information for the Vibration Monitoring consultant and their staff.
  - Instrumentation plans, schedules, and details, including:
    - An instrumentation plan showing the type, location, and installation details of all instruments to be installed.
    - Monitoring and reporting frequency.
    - Timetable that outlines the duration that each monitoring point will be maintained and checked.
    - Reports of all monitoring (at the required frequencies listed above) including a description of the associated construction activity. The reports shall include a tabular and graphical summary of all readings to date.
  - Submit at least fourteen (14) calendar days before construction begins.
- Qualification Data for the following:
  - Firm(s) installing instrumentation and collecting readings. Firms shall have experience installing and reading similar instrumentation on at least five projects over the last five years.
- Response Value Report establishing the response values for the Threshold Value and the Limiting Value for each building and structure. Submit at least fourteen (14) calendar days before construction begins.
- Action Plans describing potential changes to construction activities / means and methods within 24 hours if Response Values are reached during construction.

Additional Submittals include:

- Weekly reports of all vibration monitoring locations.

Method of Measurement. The work under this item as described herein will not be measured separately. It will be paid for as lump sum.

Basis of Payment. This work will be paid at the lump sum contract unit price for CONSTRUCTION VIBRATION MONITORING which payment shall be full compensation for all work described herein and as directed and approved by the Engineer.

## MONITORING ADJACENT STRUCTURES

Description. The work associated with this Special Provision requires the Contractor to monitor construction activities and monitor structures adjacent to the Project that may be susceptible to damage resulting from construction activities. “Adjacent Structures” are defined as: (1) structures adjacent to the Project that may be affected by construction of the Project including, but not limited to, structures that may be affected by vibrations, displacements, settlement, excavations, demolition, or other construction activities; (2) structures including, but not limited to, buildings, utilities, tunnels, retaining walls, bridges, and roadways; and (3) existing structures, or structures that are expected to be in place prior to completing the work on the Project.

The work associated with this Special Provision shall include, but not be limited to, the following:

- Preparation of Pre-Construction, Interim and Post-Construction Condition Survey Reports.
- Reviewing available Background Vibration Reports previously prepared by others – see CONSTRUCTION VIBRATION MONITORING special provision for list of available reports **(For informational purposes only).**
- Furnishing and installing instrumentation to monitor Adjacent Structures due to construction activities.
- Furnishing and installing instrumentation to monitor performance of temporary structures that are necessary to construct the Project.
- Furnishing and installing instrumentation to monitor performance of proposed retaining wall and bridge abutment structures during construction.
- Furnishing and installing instrumentation to monitor existing utilities due to construction activities and operations.
- Monitoring, collecting, and reporting instrumentation data at regular intervals as described herein.
- Establishing Response Values and developing Response Value Reports.
- Developing and implementing action plans in response to reaching Response Values.
- Providing submittals related to the work of this Special Provision.

At a minimum, the Contractor shall perform work described herein at the following structures:

- 713 W. Van Buren St. (IDOT Pump Station No. 5)
- 400 S. Jefferson St.
- 701 W. Jackson (Lofts)
- 333. S. Des Plaines St. (Lofts)
- 324 S. Des Plaines (Chicago Fire Department Engine 5)
- 711 W. Jackson Blvd.(H-Mart)
- 728 W. Jackson Blvd. (Haberdasher Square Lofts)
- 210 S. Des Plaines St. (Edge Lofts & Tower)
- 700 W. Adams (Old St. Patrick's Church)
- 703 W. Monroe St. (Career Transitions Center)
- 650-660 W. Madison (ComEd Substation)
- 659 W. Washington Blvd.
- 120 S. Des Plaines Street (The Francis Xavier Warde School)
- Existing CDWM siphon junction chambers adjacent to the north side of the existing Monroe Street bridge
- 703 W. Monroe St.
- 711 W. Monroe Street (Fr. Jack Wall Mission Center)
- 718 W. Adams Street (Old St. Patrick's Church Rectory)
- 1 N. Halsted St. (Whole Foods)
- 25 S. Halsted St. (Crowne Plaza)
- 111 S. Halsted St. (Walgreens)
- 766 W. Jackson Blvd.
- 768 W. Jackson Blvd.
- 769 W. Jackson Blvd.
- 770 W. Gladys (770 Lofts)
- 333 S. Halsted St. (National Hellenic Museum)
- 400 S. Green Street (Green Street Lofts)
- 765 W. Adams (Arkadia West Loop Apts)
- 301 S. Halsted St.

The Contractor shall perform additional pre-construction condition surveys at additional Adjacent Structures and utilities that the Contractor determines may be affected by the means, methods, and sequences of construction. The Contractor is solely responsible for determining the means, methods and sequences of construction, and may identify additional monitoring locations beyond those listed above. The cost for monitoring the additional locations identified by the Contractor shall be considered included in the lump sum contract unit price for MONITORING ADJACENT STRUCTURES.

Pre-Construction Condition Survey. The Contractor shall survey and provide Pre-Construction Condition Survey Reports for each of the structures listed above and at additional Adjacent Structures and utilities that the Contractor determines may be affected by the means, methods, and sequences of construction. The surveys will be used as a basis for comparison of damage that may occur after the pre-construction condition survey. The Contractor must submit the Pre-Construction Condition Survey Reports at least fourteen (14) calendar days before construction begins.

The Contractor shall request in writing, from the owner of each Adjacent Structure, permission to conduct the pre-construction condition surveys at the Adjacent Structures. The Contractor shall document if the owner of the Adjacent Structure denies access. Documentation shall include dates of requested surveys, and dates and methods of correspondence (letter, certified mail, fax, e-mail, etc.) with the property owners.

Prior to performing the pre-construction condition survey, the Contractor shall review available building information and perform independent research to determine the availability of existing documentation regarding the Adjacent Structures, including but not limited to, contacting the City's Building Department, contacting the Adjacent Structure owners, or contacting other relevant entities to obtain existing drawings, specifications, or evaluation reports. The Contractor shall document its research, including dates of requests, parties contacted, and documents available, if any.

Where access to Adjacent Structures is granted, the Contractor shall survey Adjacent Structure exteriors using telescopic aids (e.g., binoculars), high-resolution photographs, lifts or movable staging/scaffolds, remote observation equipment (e.g., drones, borescopes, or similar), or equivalent methods. Video may be used as a supplement to the survey; however, video will not be accepted by the Department as a replacement for high-resolution photography. Document defects and distress including, but not be limited to, cracks, relative displacements, discoloration, leaks, staining, ponding, or related items. Document out-of-level horizontal construction, out-of-plumb vertical construction, out-of-square or inoperable doors, windows, or other apertures, and disconnected or broken utilities. At non-building structures, survey accessible areas and similarly document defects and distress. Measure, locate, and record existing defects and distress. Where necessary, and if consent is provided from the Adjacent Structure owner, excavate test pits, perform test borings, and make exploratory openings to collect relevant information about existing conditions, including types of below-grade construction, depth of below-grade construction, and defects and distress evident in the exposed below-grade construction. The Contractor shall restore the site to its original condition.

The intent of the surveys is to establish and document, in sufficient detail, the existing conditions for comparative references during and after construction.

Submit a draft report to the Engineer for review including, at a minimum, the following:

1. Date(s) of survey
2. Adjacent Structure or property address
3. Owner of the Adjacent Structure and/or property, including contact information and phone number
4. Adjacent Structure use, occupancy, or purpose
5. Adjacent Structure approximate age
6. Persons present during the survey
7. Existing documentation discovered through research or made available
8. Access methods and equipment used
9. High-resolution digital photographs, clearly identified in a detailed log and keyed to structure plans and/or elevations
10. Annotated sketches and/or figures
11. Record defects and distress on photographs, drawings, or similarly descriptive graphics
12. Description of structural system(s)
13. Description of exterior wall or construction materials
14. Description of interior finishes or construction materials
15. Foundation type and depth
16. Subsurface conditions
17. Obstructions limiting the survey

Respond to the Engineer's comments on the draft report and provide a final report within seven (7) calendar days for the record.

Response Values. The Contractor shall establish Response Values, including both the Threshold Value and the Limiting Value, at each location based upon the pre-construction condition surveys performed.

- **Threshold Value:** A Threshold Value is a warning value that precedes damage to Adjacent Structures. If Threshold Values are achieved, corrective actions to the design and/or construction methods shall be considered to avoid reaching Limiting Values.

**Limiting Value:** A Limiting Value is an alarm value to indicate damage to Adjacent Structures is highly probable if construction activities continue without modification. If Limiting Values are achieved, construction work shall stop immediately, the Adjacent Structures shall be surveyed for signs of additional distress from pre-construction surveys, and corrective action shall be taken to revise the construction methods to protect Adjacent Structures from damage.

Instrumentation Installation, Monitoring, and Data Collection. Based on the pre-construction condition surveys and inspections performed, the Contractor shall determine physical monitoring locations, following the minimum number of locations below, and submit for approval at least seven (7) calendar days before construction begins. The Contractor shall install and monitor instruments identified herein, at the minimum frequencies identified in the following table. The Contractor, at its option and at no cost to the Department, may provide additional instrumentation, monitoring, and data collection based upon the Contractor's intended means and methods and findings during the pre-construction condition surveys. The Contractor shall maintain the equipment, provide calibration certificates and confirm that it is in working condition on a regular basis.

Table 1 provides the minimum requirements for monitoring Adjacent Structures including monitoring instruments, data collection accuracy and frequency and reporting frequencies. Data readings shall be taken at regular intervals in order to compare results to initial measurements and established Response Values. Submit reports at the designated frequencies. The Contractor shall provide monitoring of the Adjacent Structures based on the minimum monitoring requirements listed in Table 2. The Contractor shall review the information in Tables 1 and 2 to determine if more stringent requirements are necessary.

**Table 1: Monitoring Instruments and Data Collection/Reporting Requirements**

<b>Instrument Type</b>	<b>Data Collection Accuracy/Tolerance</b>	<b>Minimum Data Collection Frequency</b>	<b>Reporting Frequency</b>	<b>Response Values</b>
Vertical Movement Monitoring Points	One hundredth of a foot (0.01') in Chicago City Datum (CCD)	Twice Daily During Excavation and Drilling Operations, Daily At Other Times	Bi-weekly	To Be Established by Contractor
Horizontal Movement Monitoring Points	One hundredth of a foot (0.01')	Twice Daily During Excavation and Drilling Operations, Daily At Other Times	Bi-weekly	To Be Established by Contractor
Crack Gauges	1.0 mm	Weekly	Bi-weekly	To Be Established by Contractor
Seismographs	See CONSTRUCTION VIBRATION MONITORING Special Provision for requirements			
Groundwater Monitoring Wells	One tenth of a foot (0.1')	Daily	Bi-weekly	To Be Established by Contractor
Tiltmeters	Accuracy +/- 0.05 mm/m (+/- 10 arc-seconds)  Resolution +/- 0.025 mm/m (+/- 5 arc-seconds)	Weekly	Bi-weekly	To Be Established by Contractor
Inclinometers	See SLOPE INCLINOMETER Special Provision for requirements			



**Table 2: Monitoring Locations and Minimum Monitoring Requirements**

Adjacent Building	Vertical Movement Monitoring Points / Horizontal Movement Monitoring Points	Crack Gauges	Groundwater Monitoring Wells	Tiltmeters
713 W. Van Buren St. (IDOT Pump Station No. 5)	2 horizontal and 2 vertical locations in each tunnel	Determine need and number of gauges based upon pre-construction condition survey for each building. Exterior and interior cracks equal to or larger than one millimeter (1.0 mm) shall have crack gauges installed and monitored.	See Note 1	2 locations
400 S. Jefferson St.	2 horizontal and 2 vertical locations			2 locations
701 W. Jackson (Lofts)	2 horizontal and 2 vertical locations			2 locations
333. S. Des Plaines St. (Lofts)	2 horizontal and 2 vertical locations –			2 locations
324 S. Des Plaines (Chicago Fire Department Engine 5)	2 horizontal and 2 vertical locations–			2 locations
711 W. Jackson Blvd. (H-Mart)	2 horizontal and 2 vertical locations			2 locations
728 W. Jackson Blvd. (Haberdasher Square Lofts)	2 horizontal and 2 vertical locations			2 locations
210 S. Des Plaines St. (Edge Lofts & Tower)	2 horizontal and 2 vertical locations			2 locations
700 W. Adams (Old St. Patrick's Church)	4 horizontal and 4 vertical locations			4 locations
703 W. Monroe St. (Career Transitions Center)	2 horizontal and 2 vertical locations			2 locations
650-660 W. Madison (ComEd Substation)	2 horizontal and 2 vertical locations			2 locations
659 W. Washington St.	2 horizontal and 2 vertical locations			2 locations
120 S. Des Plaines Street (The Francis Xavier Warde School)	4 horizontal and 4 vertical locations			4 locations
Existing CDWM siphon junction chambers adjacent to the north side of the existing Monroe St. bridge.	2 horizontal and 2 vertical locations			Determine need and number of gauges based upon pre-construction condition survey for each building. Exterior and interior cracks equal to or
703 W. Monroe St.	2 horizontal and 2 vertical locations	2 locations		
711 W. Monroe Street (Fr. Jack Wall Mission Center) – four locations minimum	4 horizontal and 4 vertical locations	4 locations		

Adjacent Building	Vertical Movement Monitoring Points / Horizontal Movement Monitoring Points	Crack Gauges	Groundwater Monitoring Wells	Tiltmeters
718 W. Adams Street (Old St. Patrick's Church Rectory)	4 horizontal and 4 vertical locations	larger than one millimeter (1.0 mm) shall have crack gauges installed and monitored		4 locations
1 N. Halsted St. (Whole Foods)	2 horizontal and 2 vertical locations			2 locations
25 S. Halsted St. (Crowne Plaza)	2 horizontal and 2 vertical locations			2 locations
111 S. Halsted St. (Walgreens)	2 horizontal and 2 vertical locations			2 locations
766 W. Jackson Blvd.	2 horizontal and 2 vertical locations			2 locations
768 W. Jackson Blvd.	2 horizontal and 2 vertical locations			2 locations
769 W. Jackson Blvd.	2 horizontal and 2 vertical locations			2 locations
770 W. Gladys (770 Lofts)	2 horizontal and 2 vertical locations			2 locations
333 S. Halsted St. (National Hellenic Museum)	2 horizontal and 2 vertical locations			2 locations
400 S. Green Street (Green Street Lofts)	2 horizontal and 2 vertical locations			2 locations
765 W. Adams (Arkadia West Loop Apts)	2 horizontal and 2 vertical locations			2 locations
301 S. Halsted St.	2 horizontal and 2 vertical locations			2 locations

Note 1: Groundwater monitoring wells as located in the structural plans or as directed by the Engineer

Establish benchmarks prior to construction activities to be used for movement monitoring. Benchmarks shall be located in areas that will not be influenced by construction activities.

Maintain an accurate log of instrumentation data for comparison with baseline data. Notify the Engineer of any changes from the last report within 24 hours. Promptly notify the Engineer when Response Values are reached in order to review and enact action plan(s).

Action Plans. Upon reaching or exceeding Response Values, the Contractor shall immediately notify the Engineer and perform the following:

Threshold Values: Evaluate means, methods, and sequences of construction, and data collection/reporting frequency upon reaching Threshold Values. The Contractor shall provide a submittal within 24 hours of the Threshold Values being reached that summarizes the means, methods and sequences of construction to be used to preclude reaching Limiting Values, and that identifies modifications to data collection and data reporting frequencies. Provide a summary report to the Engineer for review and approval.

- Limiting Values: Immediately stop construction work in the zone of influence of the instrument, and coordinate a meeting with the Engineer to evaluate distress, discuss corrective actions, develop alternate means, methods, and sequences of construction, and identify modifications to data collection and reporting frequencies. The Contractor shall provide an action plan submittal within 24 hours of the Limiting Values being reached providing a summary report to the Engineer for review and approval. No additional compensation will be due the Contractor for changes to means, methods, and sequences of construction. The Contractor will not be entitled to any claim of delay for stopping of working due to the reaching of Limiting Values.

Groundwater Monitoring Wells. Groundwater monitoring wells shall be minimum 2-inch diameter. For drilled shafts that extend to bedrock, the well shall extend to the top of bedrock. The bottom 45 feet of the well shall be perforated with sand packs and sealed above this level. For all other locations, the well shall extend to ten feet below the lowest pile tip elevation. The bottom portion of the well up to five feet below the top of pile elevations shall be perforated with sand packs and sealed above this level. Groundwater shall either be monitored manually using an electronic water level meter with a sound and gauge readout or transducers linked to a data logger.

Perform Interim Construction Surveys. The Contractor shall establish construction milestones for performing interim condition surveys of Adjacent Structures to corroborate the survey data required of the Project and submit to the Engineer for review and approval. The Contractor is also required to perform condition surveys within 24 hours if Response Values are reached during construction. At a minimum, demolition, completed excavations utilizing temporary structures and the completion of foundation elements, retaining walls and the vertical faces of abutments shall be considered construction milestones. With the Engineer's approval, the Contractor shall establish the particular structures receiving interim condition surveys based upon the various construction milestones.

Perform interim condition surveys at Adjacent Structures at construction milestones established by the Project. Conduct interim survey(s) in a manner that duplicates the pre-construction condition survey to evaluate whether additional distress from pre-construction surveys has occurred. The pre-construction and interim surveys will be used to evaluate if the Project construction activities are causing damage to Adjacent Structures, and whether alternate construction means, methods, and sequences are necessary to protect the Adjacent Structures from damage. No additional compensation will be due the Contractor for changes to means, methods, and sequences of construction.

Prepare and submit an Interim Condition Survey Report identifying changes to the information identified in the Pre-Construction Survey Report. Interim Condition Survey Reports shall be submitted within seven (7) calendar days of an established construction milestone and within three (3) calendar days after a response value is reached.

Perform Post-Construction Condition Survey. The Contractor shall perform a final condition survey to establish any variations in the Adjacent Structures from the pre-construction and interim condition surveys.

Within ten (10) calendar days after Substantial Completion of the Project, as confirmed by the Engineer, conduct a post-construction survey of structures in a manner that duplicates the pre-construction and interim condition surveys to evaluate whether additional distress from pre-construction and interim condition surveys has occurred. The pre-construction, interim, and post-construction surveys will be used to evaluate if the Project construction activities caused damages to the Adjacent Structures.

Prepare and submit a Post-Construction Survey Report identifying changes to the information identified in the Pre-Construction or Interim Condition Survey Reports.

Restoration. At the completion of construction and after the submittal and approval of the post-construction condition survey report, all temporary elements utilized for the monitoring of adjacent structures as described herein shall be removed. Groundwater monitoring wells shall be grouted to final ground surface with caps and sleeves removed. Crack gauges, monitoring points and tiltmeters utilized on exterior or interior walls shall be removed with all anchorages removed, and walls and monitoring locations restored to pre-construction condition.

Submittals. Submit the following items in a timely manner to allow for review and approval by the Engineer without delaying the work. Do not order materials or start work before receiving written approval from the Engineer.

Submit the following for review and approval by the Engineer:

Pre-Construction Condition Survey Report: Submit at least fourteen (14) calendar days before construction begins.

Interim Construction Condition Survey Reports: Submit within seven (7) calendar days after the interim construction survey at an established construction milestone.

Interim Construction Condition Survey Reports: Submit within three (3) calendar days after the interim construction survey when a response value is reached.

Post-Construction Condition Survey Report: Submit within ten (10) calendar days after Substantial Completion of the Project.

Qualification Data for the following:

- Firm(s) installing instrumentation and collecting readings. Firms shall have experience installing and reading similar instrumentation on at least five projects over the last five years.

Product Data: For each type of product. Include construction details, material descriptions, performance properties, dimensions of individual components and profiles.

Instrumentation plans, schedules, and details, including:

- An instrumentation plan showing the type, location, and installation details of instruments to be installed.
- Monitoring and reporting frequency.
- Reports of all monitoring (at the required frequencies listed above) including a description of the associated construction activity. The reports shall include a tabular and graphical summary of all readings to date.

Response Value Report establishing the response values for the Threshold Value and the Limiting Value for each building and structure. Submit at least fourteen (14) calendar days before construction begins.

Action Plans describing potential changes to construction means and methods within 24 hours if Response Values are reached during construction.

Corrective Measures. Damage to Adjacent Structures as a result of construction activity shall be corrected by the Contractor. No additional compensation shall be due the Contractor for repairing Adjacent Structures. The Contractor shall not be entitled to any claim of damages or delay for stopping to make corrective measures.

Method of Measurement. The work under this item as described herein will not be measured separately but will be paid for as lump sum.

Basis of Payment. This work will be paid at the lump sum contract unit price for MONITORING ADJACENT STRUCTURES, which payment shall be full compensation for all work described herein, and as directed and approved by the Engineer.

Progress payments shall be made as follows: 30% of the lump sum bid price at completion of the Pre-Construction Condition Survey and the initial installation of monitoring equipment; 50% of the lump sum bid price shall be prorated throughout the monitoring and data collection duration and upon completion of the Interim Construction Condition Surveys at the established construction milestones; and 20% of the lump sum bid price upon removal of the monitoring equipment, restoration of the existing monitoring sites and completion of the Post-Construction Condition Survey.

Vibration monitoring and the installation and monitoring of slope inclinometers is not included in MONITORING ADJACENT STRUCTURES, but shall be paid at the lump sum contract unit price for CONSTRUCTION VIBRATION MONITORING and at the contract unit price per each for SLOPE INCLINOMETER.

#### **MONITORING ADJACENT STRUCTURES OWNER INFORMATION**

The contractor shall contact and invite the Haberdasher building condominium association representatives prior to the pre-construction and post-construction building inspections.

Roger Ady  
728 W. Jackson Blvd, Chicago IL, 60661  
847-414-8238

This work shall not be paid for separately but shall be included in the cost of MONITORING ADJACENT STRUCTURES.

## **CITY OF CHICAGO DEPARTMENT OF WATER MANAGEMENT ENGINEERING SERVICES**

Description. This item shall consist of payment for work performed by the City of Chicago Department of Water Management (CDWM) related to engineering services in support of this contract. These services include operations related to the relocation of the existing two fire hydrants on W. Jackson Boulevard East of N. Halsted Street and West of N. Des Plaines Street as shown in plans, shutting down and startup of the existing 16" water main, testing and inspection during the installation of infrastructure adjacent to, below or above existing water main, leakage survey, field supervision, technical assistance, reviews and other required services.

General. It shall be the Contractor's responsibility to arrange and coordinate all required services by CDWM. All necessary field work, including valve operations, shall be scheduled with CDWM in advance of the time period required. All work to be performed by CDWM is subject to CDWM work schedules and availability. Acceptance of complete water main by CDWM is based upon CDWM review of installation, presence during testing and disinfection operations and other roles as desired by CDWM and required in these special provisions.

Construction Requirements. The Contractor shall make the following submittals and notifications for work included in this contract adjacent, below or above existing water facilities:

- Submit five (5) copies of the shop drawings for all designs and materials associated with the temporary water main supports to be used to complete work adjacent, below or above existing water mains. Shop drawings shall be sent to the Department of Water Management, Bureau of Engineering Services, Jardine Water Purification Plant, 1000 E. Ohio Street, Office 307, Chicago, Illinois 60611, attention to Bill Doyle.
- Notify Bill Doyle, at (312) 217-1636, two (2) weeks prior to the start of the work adjacent, below or above existing water main, so a resident engineer can be assigned to the project.
- Obtain a "B-Permit" prior to construction from the City of Chicago, Department of Buildings, Plumbing Permit and Plan Section, City Hall, 121 North LaSalle Street, Room 906, Chicago, Illinois, 60602.
- Submit as-built drawings within two (2) weeks of completion of the work. The as-built drawings shall reflect all final conditions of water mains exposed, modified or otherwise impacted by work under this contract. The as-built drawings should be submitted to the Department of Water Management, Bureau of Engineering Services, Jardine Water Purification Plant, 1000 E. Ohio Street, Room 306, Chicago, Illinois 60611, attention to Rolando Villalon.

Failure to comply with these requirements may result in additional expenses to the project to verify that all work conforms to the CDWM's standards.

In order to accommodate the proposed improvements, the CDWM will conduct a leakage survey on each of the following water mains located within the proximity of the proposed improvements before and after the proposed construction to ensure they are not damaged during the fire hydrant relocation work and pier installation:

- 16 inch water main located along Jackson Boulevard from Halsted Street to Des Plaines Street.

If any damage occurs to these water facilities during the proposed improvements, the Contractor will be held responsible for the cost of repairing or replacing the water mains as necessary.

The Department's separation standards are as follows: The minimum vertical clearance (edge-to-edge) from all water mains is 18-inches. For feeder mains (water mains 16-inches and larger), the minimum horizontal clearance (edge-to-edge) is five (5) feet, and for grid mains (water mains less than 16-inches), the minimum horizontal clearance (edge-to-edge) is three (3) feet. No proposed above ground facility (tree, planter box, light pole, etc.) can be closer than five (5) feet (edge-to-edge) from a water main or closer than three (3) feet (edge-to-edge) from a water service. Should the DWM require access to its facilities, it will not be responsible for the costs to remove or support any above ground structures adjacent to its facilities. In no case shall the installation of any proposed facility be closer than five (5) feet from a fire hydrant or fire hydrant lead. All curb installation adjacent to fire hydrants must be painted 'safety yellow' for 15 feet on each side of the fire hydrant except where the 15 foot dimension intersects a crosswalk, driveway or similar feature.

Method of Payment. The Contractor will make payments to CDWM based upon the following schedule agreed to with CDWM:

- 80% of initial estimate of costs required by CDWM. CDWM has identified to the Department that the total cost for this item is \$51,440.
- This payment shall be made to CDWM within ten (10) days of contract award using certified check, certified mail and receipt notification. The receipt is to be provided to the Engineer for records.
- The initial certified check in the amount of \$41,152, payable to the City of Chicago, must be sent or hand delivered to the Department of Buildings, Plumbing Permit and Plan Section, Room 906, City Hall, 121 North LaSalle Street, Chicago, Illinois 60602
- Remaining balance at the completion of services by CDWM as invoiced including back up information.
- The estimated cost of services is an assumption subject to the receipt of the actual final estimate from CDWM. The initial estimate of costs subject to the first payment to CDWM will be based upon the actual estimate from CDWM. The initial assumption identified above is for bidding purposes only. The amount necessary for the first payment may exceed the amount calculated above.



CDWM will invoice the final amount based upon current rates for labor (straight time), material, equipment, overhead charges and other costs incurred.

The Contractor will be reimbursed based upon the requirements identified in Section 109.05, including administrative costs. The Contractor shall secure invoices from CDWM for work performed by CDWM. These invoices shall be submitted as documentation to the Department prior to or with any Contractor payment request for the remaining balance at the completion of work related to CDWM facilities.

For bidding purposes, this item shall be estimated as \$51,440 which includes the estimated costs and fixed fee from CDWM with additional administrative costs per Section 109.05.

A certified check in the amount mentioned above, payable to the City of Chicago, must be hand delivered to the Department of Buildings, Plumbing Permit and Plan Section, Room 906, City Hall, 121 North LaSalle Street, Chicago, Illinois 60602.

Basis of Payment. This work will be paid for at the contract lump sum price for CITY OF CHICAGO DEPARTMENT OF WATER MANAGEMENT ENGINEERING SERVICES which shall be reimbursement in full, and with administrative costs as described in Section 109.05, for services provided by CDWM.

### **COMBINED SEWER (EXTRA STRENGTH VITRIFIED CLAY PIPE) (CDOT)**

Description. Work under these items shall be performed according to Section 550 of the IDOT Standard Specifications and the current City of Chicago Department of Water Management (DWM) Regulations for Sewer Construction and Stormwater Management and DWM Standard Specifications for Water and Sewer Main Construction, except as herein modified.

This work shall consist of constructing combined sewers at locations designated by the Engineer, including any dewatering, sheeting and/or shoring required to perform the work as specified.

Materials. Materials shall be per the most current DWM Standard Specifications for Water and Sewer Main Construction:

Construction Requirements. Where a sewer or drain connection is to be made to a proposed E.S.V.C.P. storm sewer a manufactured Y or T branch pipe shall be installed in the sewer at this junction.

Where a sewer or drain connection is to be made to a proposed R.C.P. sewer a pipe section with a predrilled hole of the proper diameter shall be installed at this junction.

Where a sewer or drain connection is made to an existing sewer, a "T" or "Y" saddle shall be installed. The circular opening in the existing sewer must be core drilled to the same size as the external diameter of the proposed or drain connection. The protrusion of the proposed sewer into the existing sewer must not exceed a maximum of 1 inch. Edge of core holes must be a minimum of 1.5 feet from the edge of pipe and a minimum distance of 5 feet horizontally between holes. Do not drill holes higher than 10 and 2 o'clock.

QC/QA Requirements.

The Contractor must provide a Manufacturer's written certification that the materials comply with these specifications. All sewers and sewer structures must be inspected prior to the final payment to the Contractor.

Method of Measurement. This work will be measured for payment in place per foot.

Basis of Payment. This work will be paid for at the contract unit price per foot for the COMBINED SEWER (EXTRA STRENGTH VITRIFIED CLAY PIPE) of the diameter specified of the type, diameter, and material specified (CDOT).

Trench backfill will be paid for according to Article 208.04.

**COMBINED SEWER ADJACENT TO OR CROSSING WATER MAIN**

Description. This work consists of constructing combined sewer adjacent to or crossing a water main at the locations shown on the plans. The material and installation requirements shall be according to the latest edition of the "Standard Specifications for Water and Sewer Main Construction in Illinois", "City of Chicago Department of Water Management (DWM) Regulations for Sewer Construction and Stormwater Management", "City of Chicago DWM Standard Specifications for Water and Sewer Main Construction", and the applicable portions of Section 550 of the Standard Specifications; which may include concrete collars and encasing pipe with seals if required.

Pipe materials shall meet the requirements of Sections 40 and 41-2.01 of the "Standard Specifications for Water and Sewer Main Construction in Illinois" and the current "City of Chicago DWM Standard Specifications for Water and Sewer Main Construction", except PVC pipe will not be allowed. Ductile-Iron pipe shall be required and shall meet the minimum requirements for Thickness Class 50.

Method of Measurement. Sewers installed adjacent to or crossing water main shall be paid for per foot for COMBINED SEWER (WATER MAIN REQUIREMENTS), of the diameter specified CDOT.

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

## **COMBINED SEWER REMOVAL**

Description. This work will consist of the removal of combined sewers, including laterals.

Combined sewers shall be removed according to Article 551.03 of the "Standard Specifications"

Method of Measurement. This work shall be measured for payment according to Article 550.09 of the "Standard Specifications".

Excavation in rock will be measured for payment according to Article 502.12

Trench backfill for combined sewer removal will be measured for payment according to Article 208.03, except an addition will be made for one-half of the volume of the pipe removed.

Basis of Payment. This work will be paid for at the contract unit price per foot for COMBINED SEWER REMOVAL, of the diameter specified. TRENCH BACKFILL will be paid for separately.

Excavation in rock will be paid for according to Article 502.13.

Trench backfill will be paid for according to Article 208.04.

Removal and replacement of unsuitable material below plan bedding grade will be paid for according to Article 109.04.

## **COMBINATION CURB AND GUTTER TYPE B V.12 (CDOT)**

Description: Work under this item shall be performed according to Section 606 of the IDOT Standard Specifications for Road and Bridge Construction, and to the City of Chicago Department of Transportation Regulations for Openings, Construction and Repair in the Public Way. The work consists of constructing variable height Portland Cement Concrete (PCC) combination curb and gutter greater than 3" in height and less than 9" in height.

Materials: Materials shall meet the applicable requirements of Division 1000 of the Standard Specifications.

Construction Requirements: Meet applicable requirements of Section 606 of the Standard Specifications. Construct combination concrete curb and gutter type B V.12 (CDOT) at the locations, widths and thickness shown on the Plans.

Method of Measurement: COMBINATION CURB AND GUTTER TYPE B V.12 (CDOT) will be measured for payment in feet along the flow line of the gutter and along the face of the concrete curb, which measurement will include drainage castings incorporated in various curbs and gutters.

Basis of Payment: This work will be paid for at the contract unit price per foot for COMBINATION CURB AND GUTTER TYPE B V.12 (CDOT).

### **CONCRETE CURB, TYPE B (SPECIAL) (CDOT)**

Description: Work under this item shall be performed according to Section 606 of the IDOT Standard Specifications for Road and Bridge Construction and to the City of Chicago Department of Transportation Regulations for Openings, Construction and Repair in the Public Way. The work consists of constructing variable height Portland Cement Concrete (PCC) curb greater than 3” in height and less than 9” in height.

Materials: Materials shall meet the applicable requirements of Division 1000 of the Standard Specifications.

Construction Requirements: Meet applicable requirements of Section 606 of the Standard Specifications. Construct CONCRETE CURB, TYPE B (SPECIAL) (CDOT) at the locations, widths and thickness shown on the Plans.

Method of Measurement: CONCRETE CURB, TYPE B (SPECIAL) (CDOT) will be measured for payment in feet along the face of the concrete curb, which measurement will include drainage castings incorporated in various curbs and curbs and gutters.

Basis of Payment: This work will be paid for at the contract unit price per foot for CONCRETE CURB, TYPE B (SPECIAL) (CDOT).

### **REMOVE EXISTING WATER MAIN**

Description. This work shall consist of the excavation, removal, satisfactory disposal, plugging and backfilling of the existing abandoned water main at locations as shown on the Plans or as directed by the Engineer. Water main shall be removed according to Article 561 of the “Standard Specifications” and in conformance with the methods identified in Article 551.03 of the “Standard Specifications”.

Any water main dewatering required during the removal of water main pipe shall be considered included as part of the successful removal of the water main.

Method of Measurement. This Work shall be measured for payment according to Article 561.04 of the “Standard Specifications”.

Any reducer pipe sections will be measured as the pipe size of the larger opening.

Trench backfill for water main removal will be measured for payment according to Article 208.03, except an addition will be made for one-half of the volume of the pipe removed.

Basis of Payment. This Work will be paid for at the contract unit price per foot for WATER MAIN REMOVAL of the diameter specified, which price will be payment in full for all labor, equipment and materials necessary to complete the work as described and includes all excavation, including abandoned/retired utility pipe or conduit removal, backfill and proper disposal of pipe and fittings to be removed.

## **GATEWAY MONUMENT SIGN COMPLETE**

### Description

This work shall consist of furnishing, placing and installing Gateway Monument Sign and cast-in-place concrete foundation along the Adams Street southbound exit ramp at the location shown and according to the details in the plans. Items included in the Gateway Monument Sign shall include painted aluminum letters, ledge and logo, precast concrete, cast-in-place foundation and all labor required.

### Construction Requirements

Furnish and install cast-in-place foundation and precast concrete as detailed in the plans. Furnish Aluminum letters and hardware necessary to install cut metal letters shown on drawings and herein specified. Letters shall be painted in the colors specified on the plans and with an anti-graffiti coating. The work shall be in accordance with the details in the plans and the applicable portions of Sections 503, 1042 and 1090 of the Standard Specifications.

Installer Qualifications: A precast concrete erector qualified and designated by PCI's Certificate of Compliance to erect Category A (Architectural Systems) for non-load-bearing members.

Fabricator Qualifications: The firm that assumes responsibility for engineering architectural precast concrete units shall comply with performance requirements. This responsibility includes preparation of Shop Drawings and comprehensive engineering analysis by a qualified professional engineer. In addition to being prequalified by the Department, the fabricator shall also be designated as a PCI-certified plant for Group A, Category A1 - Architectural Cladding and Load Bearing Units or designated as an APA-certified plant for production of architectural precast concrete products.

### Metal Materials

General: Provide materials with smooth, flat surfaces unless otherwise indicated. For metal fabrications exposed to view in the completed Work, provide materials without seam marks, roller marks, rolled trade names, or blemishes.

1. Aluminum Plate and Sheet: ASTM B 209 (ASTM B 209M), Alloy 6061-T6.
2. Aluminum Extrusions: ASTM B 221 (ASTM B 221M), Alloy 6063-T6.
3. Finish: Painted baked enamel finish with an anti-graffiti coating
4. Color: Metallic Brushed Aluminum with semi-gloss finish.
5. Thickness: Aluminum - 1/4"
6. Font Styles : Obtain vector art file for font. 8" minimum letter height
7. Mounting Hardware: Tapped for threaded stud insertion with painted aluminum studs.
8. Paper Installation template with marked stud locations should be provided.

#### HIGH-PERFORMANCE COATINGS, GENERAL

MPI Standards: Products shall comply with MPI standards indicated and shall be listed in its "MPI Approved Products Lists."

##### Material Compatibility:

1. Materials for use within each paint system shall be compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
2. For each coat in a paint system, products shall be recommended in writing by topcoat manufacturers for use in paint system and on substrate indicated.
3. Products shall be of same manufacturer for each coat in a coating system.
4. Colors: As selected by Architect from manufacturer's full range and as indicated on Drawings.
5. Epoxy System MPI EXT 5.4E:
6. Note that vinyl wash primer has a high VOC content and may not be available in some localities.
7. Prime Coat: Primer, vinyl wash, MPI #80.
8. For a Premium Grade system, "MPI Manual" requires intermediate coat; delete first "Intermediate Coat" Subparagraph below for a Budget Grade system.
9. Intermediate Coat: Epoxy, matching topcoat.
10. Topcoat: Epoxy, gloss[, MPI #77]

#### MOLD MATERIALS

Molds: Provide molds and, where required, form-facing materials of metal, plastic, wood, or another material that is rigid, warp and buckle free, nonreactive with concrete and dimensionally stable to produce continuous and true precast concrete surfaces within fabrication tolerances and suitable for required finishes.

Mold-Release Agent: Commercially produced form-release agent that does not bond with, stain or adversely affect precast concrete surfaces and does not impair subsequent surface or joint treatments of precast concrete.

## REINFORCING MATERIALS

Reinforcing Bars: ASTM A 615/A 615M, Grade 60, deformed. – epoxy coated  
Epoxy-Coated-Steel Wire: ASTM A 884/A 884M, Class A coated, plain or deformed, flat sheet, Type 1 bendable coating.

Supports: Suspend reinforcement from back of mold or use bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded wire reinforcement in place according to PCI MNL 117

## CONCRETE MATERIALS

1. Portland Cement: ASTM C 150, Type I or Type III, of same type, brand, and source.
  - i) For surfaces exposed to view in finished structure, use gray or white cement, of same type, brand, and mill source.
2. Normal-Weight Aggregates: Except as modified by PCI MNL 116, ASTM C 33, with coarse aggregates complying with Class 4S.
  - ii) Face-Mixture-Fine Aggregates: Selected, natural or manufactured sand compatible with coarse aggregate; to match approved finish sample.
3. Finish: Match existing monument installed at Elysian Field (VanBuren and Halsted)
4. Color Admixture: Match existing monument installed at Elysian Field (VanBuren and Halsted) ASTM C 979/C 979M, synthetic or natural mineral-oxide pigments or colored water-reducing admixtures, temperature stable, and nonfading.
5. Water: Potable; free from deleterious material that may affect color stability, setting, or strength of concrete and complying with chemical limits of PCI MNL 116.
6. Air-Entraining Admixture: ASTM C 260, certified by manufacturer to be compatible with other required admixtures.
7. Fly Ash Admixture: ASTM C 618, Class C or F.

## GROUT MATERIALS

Nonmetallic, Nonshrink Grout: Premixed, nonmetallic, noncorrosive, nonstaining grout containing selected silica sands, portland cement, shrinkage-compensating agents, plasticizing and water-reducing agents, complying with ASTM C 1107, of consistency suitable for application.

Epoxy Grout: ASTM C 881, 2-component epoxy resin, of type, grade, and class to suit requirements.

## CONCRETE MIXES

Prepare design mixes for each type of concrete required.

Use a single design mixture for units with more than one major face or edge exposed.

Limit use of fly ash and silica fume to not exceed, in aggregate, 25 percent of portland cement by weight.

Design mixes may be prepared by a qualified independent testing agency or by qualified precast plant personnel at precast structural concrete fabricator's option.

Limit water-soluble chloride ions to the maximum percentage by weight of cement permitted by ACI 318.

Normal-Weight Concrete: Proportion mixes by either laboratory trial batch or field test data methods according to ACI 211.1, with materials to be used on Project, to provide normal-weight concrete with the following properties:

Compressive Strength (28 Days): 5000 psi.

Maximum Water-Cementitious Materials Ratio: 0.50.

Add air-entraining admixture at manufacturer's prescribed rate to result in normal-weight concrete at point of placement having an air content as follows, with a tolerance of plus or minus 1-1/2 percent:

Concrete Mix Adjustments: Concrete mix design adjustments may be proposed if characteristics of materials, Project conditions, weather, test results, or other circumstances warrant.

## FABRICATION

Formwork: Accurately construct forms, mortar tight, of sufficient strength to withstand pressures due to concrete-placement operations and temperature changes and for pretensioning and detensioning operations. Maintain formwork to provide completed precast concrete units of shapes, lines, and dimensions indicated, within fabrication tolerances.

Coat surfaces of forms with bond-breaking compound before reinforcement is placed. Provide commercial-formula, form-coating compounds that will not bond with, stain, or adversely affect concrete surfaces and that will not impair subsequent treatments of concrete surfaces requiring bond or adhesion. Apply in compliance with manufacturer's written instructions.



Accurately position for attachment of loose hardware, and secure in place during precasting operations. Locate anchorage hardware where it does not affect position of main reinforcement or concrete placement.

Weld-headed studs and deformed bar anchors used for anchorage according to AWS D1.1/D1.1M and AWS C5.4, "Recommended Practices for Stud Welding."

Furnish loose hardware items including steel plates, clip angles, seat angles, anchors, dowels, cramps, hangers, and other hardware shapes for securing architectural precast concrete units to supporting and adjacent construction.

Cast-in reglets, slots, holes, and other accessories in architectural precast concrete units as indicated on the Contract Drawings.

Cast-in openings larger than 10 inches (250 mm) in any dimension. Do not drill or cut openings or prestressing strand without Landscape Architect's approval.

Reinforcement: Comply with recommendations in PCI MNL 117 for fabricating, placing, and supporting reinforcement.

1. Clean reinforcement of loose rust and mill scale, earth, and other materials that reduce or destroy the bond with concrete. When damage to epoxy-coated reinforcing exceeds limits specified in ASTM A 775/A 775M, repair with patching material compatible with coating material and epoxy coat bar ends after cutting.
2. Accurately position, support, and secure reinforcement against displacement during concrete-placement and consolidation operations. Completely conceal support devices to prevent exposure on finished surfaces.
3. Place reinforcing steel and prestressing strands to maintain at least 3/4-inch (19-mm) minimum concrete cover. Increase cover requirements for reinforcing steel to 1-1/2 inches (38 mm) when units are exposed to corrosive environment or severe exposure conditions. Arrange, space, and securely tie bars and bar supports to hold reinforcement in position while placing concrete. Direct wire tie ends away from finished, exposed concrete surfaces.
4. Install welded wire reinforcement in lengths as long as practicable. Lap adjoining pieces at least one full mesh spacing and wire tie laps, where required by design. Offset laps of adjoining widths to prevent continuous laps in either direction.

Reinforce architectural precast concrete units to resist handling, transportation, and erection stresses and specified in-place loads.

Prestress tendons for architectural precast concrete units by either pretensioning or post-tensioning methods. Comply with PCI MNL 117.

Delay detensioning or post-tensioning of precast, prestressed architectural concrete units until concrete has reached its indicated minimum design release compressive strength as established by test cylinders cured under same conditions as concrete unit.

1. Detension pretensioned tendons either by gradually releasing tensioning jacks or by heat-cutting tendons, using a sequence and pattern to prevent shock or unbalanced loading.
2. If concrete has been heat cured, detension while concrete is still warm and moist to avoid dimensional changes that may cause cracking or undesirable stresses.
3. Protect strand ends and anchorages with bituminous, zinc-rich, or epoxy paint to avoid corrosion and possible rust spots.

Comply with requirements in PCI MNL 117 and requirements in this Section for measuring, mixing, transporting, and placing concrete. After concrete batching, no additional water may be added.

Place face mixture to a minimum thickness after consolidation of the greater of 1 inch (25 mm) or 1.5 times the maximum aggregate size, but not less than the minimum reinforcing cover specified. Place concrete in a continuous operation to prevent cold joints or planes of weakness from forming in precast concrete units.

Place backup concrete mixture to ensure bond with face-mixture concrete.

Thoroughly consolidate placed concrete by internal and external vibration without dislocating or damaging reinforcement and built-in items, and minimize pour lines, honeycombing, or entrapped air voids on surfaces. Use equipment and procedures complying with PCI MNL 117.

Place self-consolidating concrete without vibration according to PCI TR-6, "Interim Guidelines for the Use of Self-Consolidating Concrete in Precast/Prestressed Concrete Institute Member Plants." Ensure adequate bond between face and backup concrete, if used.

Comply with PCI MNL 117 for hot- and cold-weather concrete placement.

Identify pickup points of architectural precast concrete units and orientation in structure with permanent markings, complying with markings indicated on Shop Drawings. Imprint or permanently mark casting date on each architectural precast concrete unit on a surface that does not show in finished structure.

Cure concrete, according to requirements in PCI MNL 117, by moisture retention without heat or by accelerated heat curing using low-pressure live steam or radiant heat and moisture. Cure units until compressive strength is high enough to ensure that stripping does not have an effect on performance or appearance of final product.

Discard and replace architectural precast concrete units that do not comply with requirements, including structural, manufacturing tolerance, and appearance, unless repairs meet requirements in PCI MNL 117 and Department's approval.

## METAL LETTERS, LOGO AND LEDGE

Metal Surfaces, General: Provide materials with smooth, flat surfaces unless otherwise indicated. For metal fabrications exposed to view in the completed Work, provide materials without seam marks, roller marks, rolled trade names, or blemishes.

Aluminum Plate and Sheet: ASTM B 209 (ASTM B 209M), Alloy 6061-T6.

Aluminum Extrusions: ASTM B 221 (ASTM B 221M), Alloy 6063-T6.

### Fabrication, General:

1. Shop Assembly: Preassemble items in the shop to greatest extent possible. Disassemble units only as necessary for shipping and handling limitations. Use connections that maintain structural value of joined pieces. Clearly mark units for reassembly and coordinated installation.
2. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/32 inch (1 mm) unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.
3. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.
4. Form exposed work with accurate angles and surfaces and straight edges.
5. Weld corners and seams continuously to comply with the following:
  - a) Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
  - b) Obtain fusion without undercut or overlap.
  - c) Remove welding flux immediately.
  - d) At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.
6. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners or welds where possible. Where exposed fasteners are required, use Phillips flat-head (countersunk) fasteners unless otherwise indicated. Locate joints where least conspicuous.
7. Fabricate seams and other connections that are exposed to weather in a manner to exclude water. Provide weep holes where water may accumulate.
8. Cut, reinforce, drill, and tap metal fabrications as indicated to receive finish hardware, screws, and similar items.
9. Provide for anchorage of type indicated; coordinate with supporting structure. Space anchoring devices to secure metal fabrications rigidly in place and to support indicated loads.
10. Where units are indicated to be cast into concrete or built into masonry, equip with integrally welded steel strap anchors, 1/8 by 1-1/2 inches (3.2 by 38 mm), with a minimum 6-inch (150-mm) embedment and 2-inch (50-mm) hook, not less than 8 inches (200 mm) from ends and corners of units and 24 inches (600 mm) o.c., unless otherwise indicated.

Submittals

1. Product Data: For each type of product submit the following:
  - a. Manufacturer's Product Literature and Specification Data.
  - b. Manufacturer's written instructions for recommended maintenance practices.
  - c. Color and finish samples for verification and selection.
  - d. Written manufacturer's warranty.
  - e. Product liability insurance certificate with project owner as certificate holder.
2. Design Mixtures: For each precast concrete mixture. Include compressive strength and water-absorption tests
3. Samples: Design reference samples for initial verification of design intent, for each type of finish indicated on exposed surfaces of architectural precast concrete units, in sets of three, representative of finish, color, and texture variations expected; approximately 12 by 12 by 2 inches (300 by 300 by 50 mm).
4. Shop Drawings
5. Material Test Reports: For aggregates.
6. Retain "Preconstruction test reports" Paragraph below if specifying preconstruction testing in "Preconstruction Testing" Article as Contractor's responsibility and submittal is required.
7. Preconstruction test reports.
8. Retain "Source quality-control test reports" Paragraph below if submittal is required.
9. Source quality-control test reports.
10. Retain "Field quality-control( and special inspection) reports" Paragraph below if Contractor is responsible for field quality-control testing and inspecting. Retain option if Contractor is responsible for special inspections.
11. Field quality-control and special inspection reports.
12. Minutes of pre-installation conference.
13. Maintenance Instructions.
14. Warranty: Written manufacturer's warranty.
  
15. Paper Installation template with marked stud locations should be provided.
16. Warranty that letters will be guaranteed for the life of the wall against defects.

### Installation

Erect architectural precast concrete level, plumb, and square within specified allowable tolerances. Provide temporary supports and bracing as required to maintain position, stability, and alignment of units until permanent connections are completed.

Install temporary steel or plastic spacing shims as precast concrete units are being erected. Tack weld steel shims to each other to prevent shims from separating.

Maintain horizontal and vertical joint alignment and uniform joint width as erection progresses. Remove projecting lifting devices and grout fill voids within recessed lifting devices flush with surface of adjacent precast surfaces when recess is exposed.

Unless otherwise indicated, maintain uniform joint widths of 3/4 inch (19 mm).

Connect architectural precast concrete units in position by bolting, welding, grouting, or as otherwise indicated on Shop Drawings. Remove temporary shims, wedges, and spacers as soon as practical after connecting and grouting are completed.

Grouting or Dry-Packing Connections and Joints: Grout connections where required or indicated. Retain flowable grout in place until hard enough to support itself. Alternatively, pack spaces with stiff dry-pack grout material, tamping until voids are completely filled. Place grout and finish smooth, level, and plumb with adjacent concrete surfaces. Promptly remove grout material from exposed surfaces before it affects finishes or hardens. Keep grouted joints damp for not less than 24 hours after initial set.

A qualified installer shall install cut metal letters. Install letters level, plumb, and at the height indicated with letter surfaces free from distortion or other defects in appearance. Ensure no unfinished aluminum is in contact with concrete surface.

Method of Measurement: GATEWAY MONUMENT SIGN COMPLETE will be measured for payment for EACH sign furnished and installed.

Basis of Payment: Gateway Monument Sign COMPLETE will be paid for at the contract unit price per EACH, which will include furnishing and installing the complete sign including but not limited to precast concrete, painted aluminum letters, ledge and logo, anti-graffiti coating, cast-in-place foundation and all labor required. All equipment, labor, and materials necessary to construct the concrete barrier wall including all reinforcement bars in the concrete wall and foundation will be included in the cost of Gateway Monument Sign complete.

### **CURB WALL (SPECIAL)**

#### Description

This work shall follow the details in the plans and Section 503 of the Standard Specifications. Reinforcement shall be epoxy coated. PVC inserts shall meet the requirements of Article 1088.01(b).

#### Method of Measurement

CURB WALL (SPECIAL) shall be measured in place in square feet along the outward-facing face of the wall for the full height of concrete formed. PVC inserts shall be considered included in the item.

#### Basis of Payment

This work will be paid for at the contract unit price per square foot for CURB WALL (SPECIAL).

### **CURB AND GUTTER (SPECIAL)**

Description: Work under this item shall be performed according to Section 606 of the IDOT Standard Specifications for Road and Bridge Construction, and to the City of Chicago Department of Transportation Regulations for Openings, Construction and Repair in the Public Way. The work consists of constructing variable height Portland Cement Concrete (PCC) combination curb and gutter greater than 3" in height and less than 9" in height and a gutter flag varying from 12" to 15"

Materials: Materials shall meet the applicable requirements of Division 1000 of the Standard Specifications.

Construction Requirements: Meet applicable requirements of Section 606 of the Standard Specifications. Construct concrete curb and gutter (special) at the locations, widths and thickness shown on the Plans. The width of the gutter flag shall vary as necessary to abut the back of curb to the sidewalk to remain.

Method of Measurement: CURB AND GUTTER (SPECIAL) will be measured for payment in feet along the flow line of the gutter and along the face of the concrete curb, which measurement will include drainage castings incorporated in various curbs and curbs and gutters.

Basis of Payment: This work will be paid for at the contract unit price per foot for CURB AND GUTTER (SPECIAL).

## **CATCH BASINS (CITY OF CHICAGO)**

Description. Work under this item shall be performed according to Sections 602 and 604 of the IDOT Standard Specifications for Road and Bridge Construction and the current City of Chicago Department of Water Management Standard Specifications for Water and Sewer Main Construction, except as herein modified. Catch basins shall be constructed as shown in the plans.

Materials. Materials shall be according to the following:

- (a) Coarse aggregate for bedding material shall meet a CA 11 gradation in accordance with Article 1004.05 of the IDOT Standard Specifications.
- (b) Fine aggregate for backfilling material shall meet a FA 6 gradation in accordance with Article 1003.04 of the IDOT Standard Specifications.
- (c) City of Chicago standard frame and lid shall meet be in accordance with the City of Chicago Department of Water Management Standard Specifications for Water and Sewer Main Construction.

General Requirements. An ADA compliant open lid shall be placed on all catch basins located within the cross walk or as directed by the Engineer.

The City of Chicago Department of Water Management's (DOWM) Rain Blocker Restrictor Program shall be maintained with any roadway improvement. The restrictors shall be installed in all catch basins outside of the Central Business District. Restrictors must not be installed in catch basins in close proximity to viaduct areas, bus stops, or emergency entrances. The City of Chicago Department of Water Management (DOWM) must approve the non-installation or removal of any restrictor. The restrictors can be obtained from City of Chicago Department of Water Management Central District at 3901 S. Ashland Avenue. The Contractor should arrange for pick up by contacting 312-747-1177 (7am to 3pm, Monday to Friday). The furnishing and installing of a restrictor shall be included in the contract unit price for catch basins.

Requirements for restrictor installation are as follows:

- Arterial Streets: 3-inch Orifice Restrictor
- Bus Routes: 3-inch Orifice Restrictor
- Residential Streets: 3-inch Vortex Restrictor
- Alleys: 3-inch Orifice Restrictor in the last catch basin

When using an orifice restrictor, insert it into the half-trap. Upon tightening of the center nut on the face of the restrictor, the rubber O-rings will expand inside the half trap providing a water-tight seal. Pull on the restrictor to verify a tight fit is made.

When applying a vortex restrictor, insert it with the opening down. Upon tightening of the 2 bolts on the face of the restrictor, the rubber O-rings will provide a water-tight seal. Pull on the restrictor to verify a tight fit is made.

Basis of Payment. This work will be paid for at the contract unit price per each for CATCH BASINS, of the type, diameter specified, type of frame and grate or type of frame and lid specified (CITY OF CHICAGO).

## **MANHOLES (CITY OF CHICAGO)**

Description. Work under this item shall be performed according to Sections 602 and 604 of the IDOT Standard Specifications for Road and Bridge Construction and the current City of Chicago Department of Water Management Standard Specifications for Water and Sewer Main Construction, except as herein modified.

Materials. Materials shall be according to the following:

- (a) Coarse aggregate for bedding material shall meet a CA 11 gradation in accordance with Article 1004.05 of the IDOT Standard Specifications
- (b) Fine aggregate for backfilling material shall meet a FA 6 gradation in accordance with Article 1003.04 of the IDOT Standard Specifications.
- (c) City of Chicago standard frame and lids shall be in accordance with the City of Chicago Department of Water Management Standard Specifications for Water and Sewer Main Construction.

General Requirements. An ADA compliant manhole frame and closed lid shall be placed on all manholes located within the cross walk or as directed by the Engineer.

QC/QA Requirements. All precast structures shall be from an IDOT approved source.

Basis of Payment. This work will be paid for at the contract unit price per each for MANHOLES, of the type, diameter specified, type of frame and grate or type of frame and lid specified (CITY OF CHICAGO).



## **TREE GRATES & TREE GRATE REMOVAL**

Description. This work consists of furnishing and installing tree grates and frames or removing tree grates as shown on the plans or as directed by the Engineer. Work under this item shall conform to the requirements of applicable portions of the Standard Specifications and the details in the plans.

### General Requirements.

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

The existing tree grates shall be removed at the time the existing sidewalk is demolished. The Contractor shall be careful in removing the frames and grates so as not to damage the trees. The removed frames and grates shall become the property of the Contractor.

Design. Grate pattern must comply with ADA Guidelines for equal access. Tree grates will be 1.5" thick with accompanying frame. Grates will consist of two halves with 24" minimum diameter opening for trees. Retrofit grates will be 1.5" thick with a 3/4" thick lip extending 2" beyond the edge of the tree pit opening. Grate openings must meet or exceed ADA Standard. Grate dimensions will be specified in plans or by the Engineer. Grate halves must be able to be bolted together with tamperproof bolts, and the grate must also be bolted to the frame with tamperproof bolts.

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

### Finish (applies to all tree grates, new and retrofit)

#### 1. Surface Preparation:

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

#### 2. Coating:

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

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

Manufacturer. Tree grates can be supplied by the following suggested manufacturers:

1. Neenah Foundry, Neenah, WI
2. Urban Accessories, Woodinville, WA
3. Ironsmith, Palm Desert, CA
4. Fairweather/Olympic Foundry, Seattle, WA
5. Approved Equal

Grates shall match Neenah tree grate style (square) R-8713 or (rectangle) R-8811.

Fasteners. Tree grate halves must be joined together with tamper resistant bolts and fastened to grate frame with tamper resistant bolt assembly packages as provided by the manufacturer.

Inspection. Installation assumes responsibility for performance.

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

Opening to receive grates. The SUBBASE GRANULAR MATERIAL, TYPE B 4" below the grate and sidewalk shall be placed and compacted prior to installation of frame. Frame will then be placed on top of compacted subgrade. Wood forms must be placed inside frame to prevent concrete seepage into pit area, and expansion joints place on the outside of the frame. PORTLAND CEMENT CONCRETE SIDEWALK 5 INCH will then be poured around frame, and allowed to set until firm. The installation of SUBBASE GRANULAR MATERIAL, TYPE B 4" and PORTLAND CEMENT CONCRETE SIDEWALK 5 INCH will be paid for separately.

When installing grate at the back of curb, a C-channel shall be installed at the curb to accept tree grate frame. Hilti-type Anchoring system for C-channel shall have a minimum shear capacity of 12 kips live wheel load. Detailed product information shall be submitted for approval prior to installation.

Join Grate Halves. Bring tree grate halves together around tree at a level to allow easy access to underside. Join sections at preformed holes using temper-resistant bolt packages provided by manufacturer as suggested. Lower grate into place and bolt to frame with tamper-proof resistant bolts. If grate manufacturer cannot accomplish this, then the grates and frame shall be tapped, field drilled, and bolted on site.

Warranty. Manufacturer's written warranty shall be provided to the Engineer prior to installation of grates.

Material under Grate. Mulch shall be Volcanic Rock, Large Rock, Black, 2" in depth, free of foreign materials.

The Contractor shall remove all litter and plant debris before mulching. The Contractor shall repair grade by raking and adding topsoil as needed, before mulching. Care shall be taken not to bury leaves, stems, or vines under mulch material. All finished mulch areas shall be left smooth and level to maintain a uniform surface and appearance. All tree grate areas or work areas shall be clean of debris and mulch.

Method of Measurement. TREE GRATES will be measured for payment per each, complete in place. TREE GRATE REMOVAL will be measured for payment per each.

Basis of Payment. Tree grate installation will be paid for at the contract unit price per each for TREE GRATES which price will include all labor, materials and equipment necessary to install the tree grates and frames as described herein and shown on the plans, including surface and opening preparation, topsoil fill, and mulch.

Tree grate removal will be measured for payment at the contract unit price per each for TREE GRATE REMOVAL, which price shall include all equipment, labor, and materials necessary to remove and dispose of the existing frames and grates.

## **SEWER SETTLEMENT MONITORING**

Description. This work shall consist of monitoring portions of the existing 54", 84" and 108" combined sewer siphons north of Monroe Street for settlement during any construction within a minimum of 100' of the siphon sewer.

General Requirements. Sewer settlement monitoring shall occur at intervals no greater than 10 feet apart along the 54", 84" and 108" combined sewer siphons. All monitoring locations shall be installed a minimum of one (1) week prior to the start of any work within 100 feet of any monitoring location. The work under this item is independent of the requirements under TELEVISION INSPECTION OF SEWER, but findings under that item may be utilized in conjunction with data produced under this work.

Submittals. The Contractor must submit a Sewer Settlement Monitoring plan to the Engineer for approval. The Plan must be approved prior to the start of construction within 100' of the 54", 60", 84" and 108" combined sewer siphons. The plan must include, but is not limited to the following:

- Intended monitoring techniques
- Locations of all monitoring points
- Monitoring point protection plan
- Shop drawings and product data for all materials and instruments
- Monitoring point installation plan, procedures and equipment
- Calibration reports for all survey instrumentation (reports shall be updated during construction to be no greater than 180 days old while instrumentation is in use)
- Procedure and outline for how the data will be provided to the Engineer
- Monitoring location abandonment plan
- Other pertinent data or procedures that the Contractor will use or employ

Monitoring Requirements. The Contractor shall monitor settlement monitoring points on a daily basis during any construction activity within 50 feet of the 54", 84" and 108" combined sewer siphons. After all pavements are complete, monitoring shall be performed on a weekly basis until construction is complete or as directed by the Engineer. Daily construction activities may proceed without monitoring if the planned construction activities are believed to have minimal chances to disturb the sewer, at the Engineer's discretion.

After initial monitoring locations have been installed and accepted, the baseline value (x,y,z coordinates) shall be recorded in logs and identified at each monitoring location. The following values are considered offsets from the baseline values. Vertical displacement shall be considered the difference between the measured elevation and the baseline elevation. Horizontal displacement shall be considered the arithmetic difference between the measured x,y coordinate and the baseline x,y coordinate.

- Threshold Value – 1/8 inches vertical
- Response Value – 3/16 inches vertical
- Shutdown Value – 1/4 inches vertical

When measurements indicate that the Threshold Value has been reached, the Engineer shall be notified. After reconfirming measurements that led to reaching the Threshold Value, the Contractor shall provide a review of the activities that transpired prior to the Threshold Value being reached. Contractor means and methods shall be reviewed to determine what changes, if any, shall be made to better control movement that may contribute to the displacement reading. Monitoring readings shall be made daily for five (5) consecutive days after the Threshold Value was reached, regardless of daily construction activities.

When measurements indicate that the Response Value has been reached, the Engineer shall be notified. After reconfirming measurements that led to reaching the Response Value, the Contractor shall provide a review of the activities that transpired prior to the Response Value being reached. The Contractor shall provide a plan to actively control ground movements and any other contributing factors to the Response Value being reached. Monitoring readings shall be made daily for five (5) consecutive days after the Response Value was reached, regardless of daily construction activities, or until measurement values below the Threshold Value are observed.

When measurements indicate that the Shutdown Value has been reached, the Engineer shall be notified and all work within 150 feet from the monitoring point that recorded the Shutdown Value must be stopped immediately. If in the Engineer's judgement, the Shutdown Value was determined to be due to an anomaly, work may resume with monitoring at the monitoring location in question occurring every hour. If the Engineer determines that the Shutdown Value was reached due to a settlement/deflection incident, all work within 150 feet from the monitoring location shall remain stopped. The Contractor shall meet with the Engineer to develop a plan of action before work can resume.

Completion. At the completion of monitoring activities, the Contractor shall abandon all monitoring locations to the satisfaction of the Engineer and in accordance with the approved plan for abandonment.

Method of Measurement. The work under this item will not be measured separately.

Basis of Payment. This work will not be paid for directly, but shall be considered as included in the various elements of work in the area surrounding the existing Monroe Street combined sewer siphon.

## **SELECT GRANULAR BACKFILL, SPECIAL**

Description. This work shall consist of backfilling at locations shown on the Plans.

Materials. Backfill shall be clean angular stone meeting IDOT Gradation requirements CA 6 and compacted in a manner approved by the Engineer.

Construction Requirements. Stone shall be placed in maximum 1 foot lifts. Each lift shall be compacted to achieve proper interlocking as determined by the Engineer.

Method of Measurement. SELECT GRANULAR BACKFILL, SPECIAL shall be measured for payment in cubic yards in place.

Basis of Payment. This work shall be measured and paid for at the contract unit price per cubic yard for SELECT GRANULAR BACKFILL, SPECIAL.

## **TEMPORARY CHAIN LINK FENCE WITH SCREENING**

Description. Work under this item shall consist of furnishing, installing, maintaining, relocating and removing chain link fence with screening, of the height specified on the Plans, or as directed by the Engineer onto the precast temporary concrete barrier. Work under this item shall be performed according to Section 664 of the IDOT Standard Specifications for Road and Bridge Construction, except as herein modified.

General Requirements. The individual fence panels shall be securely fastened together and the stands or other mounting devices shall be permanently installed onto the temporary concrete barrier. The chain link fence shall be anchored sufficiently to resist wind loads of 30 pounds per square foot without deflection of more than three inches between top and bottom fence. The base shall not interfere with pedestrian and/or vehicular traffic, and shall be approved by the Engineer.

Opaque fabric meshing shall be affixed to the chain link fence face. The fabric meshing shall allow passage of air but shall contain dust and dirt. The mesh fabric shall be the full height of the fence and cover the entire length of the fence. The fabric meshing and fence shall not contain any advertisement. The color of the fabric shall be approved by the Engineer.

The Contractor shall submit a catalog cut or details of the fence, mounting stands, hardware, opaque fabric meshing or other appurtenances for approval by the Engineer.

Method of Measurement. Chain link fence will be measured for payment in feet along the top of fence from center to center of end posts.

Basis of Payment. This work will be paid at the contract unit price per foot for TEMPORARY CHAIN LINK FENCE WITH SCREENING, of the height specified, which price shall include furnishing, installing, maintaining, relocating and removing the chain link fence with screening during construction.

## **CLEANING EXISTING MANHOLE OR HANDHOLE**

Description. This item consists of cleaning an existing hand hole or manhole for the installation of new conduit(s) and cable(s).

General Requirements. General requirements must be in accordance with Section 801 of the Standard Specifications, except as herein modified.

Installation. Existing cable hooks must be relocated and existing cables must be retrained as required prior to drilling the existing manhole or hand hole. Existing and new debris must be removed and disposed of off-site by the Contractor. Existing and new gas and water must be pumped out as directed by the Engineer. Debris removal, de-gassing and water pumping must be included in this item; separate payment will not be made.

The Contractor must furnish and install cable racks and/or cable hooks for new and existing cables in all manholes and hand holes as required to facilitate new cable installation. This Work must be included in this item and separate payment will not be made.

Coordination with ComEd for ComEd handholes or manholes, and coordination with the Bureau of Electricity for city electric handholes or manholes must be performed by the Contractor prior to starting any Work. Coordination must be included in this item; separate or additional payment will not be made.

Drilling the existing manhole or handhole will not be included in this item and will be paid for under a separate pay item.

Method of Measurement. Each manhole or handhole that is cleaned (relocating existing cable hooks, installing new cable hooks, retraining cables, removing debris, and pumping out gas and water) as indicated will be counted as a unit for payment. Each manhole or handhole that is drilled will be measured for payment for cleaning, and will be measured for cleaning only once.

Basis of Payment. This work will be paid for at the contract unit price each for CLEANING EXISTING MANHOLE OR HANDHOLE, which will be payment in full for performing the work described herein.

## **FRAMES AND LIDS TO BE ADJUSTED (SPECIAL)**

Description. This work shall be performed according to Section 602 of the Standard Specifications, except as herein modified.

This work shall consist of the adjustment of existing catch basins, manholes, inlets, valve vaults, City electric manholes, water meter vaults or other structures. This work shall include the first two feet of masonry required to be added, removed or rebuilt to bring the specified casting to the finished grade of the proposed improvement.

Materials. The Cement Factor shall be a minimum of 7.35 cwt. The mix shall be designed according to Section 3.0 of the IDOT QC/QA PCC Level III Technician Manual. High early strength concrete must achieve a minimum compressive strength of 3,500 psi within 3 days of placement.

The use of HMA for pavement patching is not allowed.

The use of HDPE plastic adjusting rings (602.02(l)) is not allowed.

The use of Recycled Rubber Adjusting rings (602.02(m)) is not allowed.

General Requirements. Under no circumstance will an adjustment not be completed in the same day as it is started.

Under no circumstance will any debris be left in the street overnight.

The Contractor must stage adjustment work so that the traffic flows in a safe manner.

Prior to starting construction, an inspection of all the existing structures, shall be made by the Engineer and the Contractor to determine the amount of existing debris in these structures.

All existing drainage structures which are to be adjusted or reconstructed shall be cleaned in Accordance with Article 602.15. This work will be paid for in accordance with Article 602.16.

Basis of Payment. This work will be paid for at the contract unit price per each for FRAMES AND LIDS TO BE ADJUSTED (SPECIAL).



## **TEMPORARY CHAIN LINK FENCE**

Description. This work shall consist of furnishing, installing, maintaining, relocating and removing temporary chain link fence and gates. Temporary chain link fence shall be used to provide access control around various staging areas during construction. The fence and gates are to be installed at locations as specified on the plans or as directed by the Engineer Work under this item shall be performed according to Section 664 of the IDOT Standard Specifications for Road and Bridge Construction, except as herein modified.

General Requirements. The Temporary Chain Link Fence shall be at least 8 feet in height. The Temporary Chain Link Fence shall be self-standing without the need to disturb the surface ground by excavation when adjacent to areas where no proposed work is to take place. The stand shall be made of galvanized steel pipe or similar materials. The Temporary Chain Link Fence may be anchored into existing pavement or sidewalk where the sidewalk or pavement is shown to be removed. Each fence panel shall be made from welded wire panels or out of chain link fence materials. All the necessary bases, panel clamps and bolts shall be included and installed in accordance to the manufacturer specifications and to the satisfaction of the Engineer.

The Temporary Chain Link Fence shall utilize opaque fabric meshing affixed to the chain link fence face. The fabric meshing shall allow passage of air but shall contain dust and dirt. The mesh fabric shall be the full height of the fence and cover the entire length of the fence including any gated opening. The fabric meshing and fence shall not contain any advertisement. The color of the fabric shall be approved by the Engineer.

Gates shall be installed where stabilized construction entrances are proposed or at locations approved by the Engineer to provide Contractor access to the work area. The gates shall be locked at the end of each work day.

Method of Measurement. Temporary Chain Link Fence shall be measured for payment in feet, along the top of the fence from center to center of end posts, including the length occupied by gates.

Basis of Payment. Temporary Chain Link Fence will be paid for at the contract unit price per foot for TEMPORARY CHAIN LINK FENCE for which said price shall include all labor, materials, equipment, furnishing, installing, maintaining and incidentals necessary for placement, relocation and removal and disposal of the temporary chain link fence and gates. No additional payment will be made for the temporary relocation of the fence in order to allow ingress/egress of Contractor personnel, vehicles or equipment.

## **SLOPE INCLINOMETER**

Description. This work shall consist of furnishing, installing, and maintaining slope inclinometer casings to obtain measurements of lateral movements of foundation and retained soils during the construction of permanent retaining walls. The contract plans show approximate locations of Slope Inclinometers. The Contractor shall evaluate these locations for any possible conflicts prior to installation. The Contractor shall submit exact location of Slope Inclinometer locations to the Engineer for approval. Slope inclinometer casing locations, elevations, and periods of monitoring for each device will be determined by the Engineer.

Materials. The slope inclinometer casing is comprised of nominal 2.75-inch diameter PVC casing with a coupling system that produces strong, flush joints that won't pull apart, twist out of alignment, or break if subjected to bending. The casing joints shall be equipped with o-ring seals and shall not leak or break under the pressure of grout. The casing joints shall be able to withstand 1,200 pounds of tension, 20 foot-pounds of torque, and a bending moment of 120 foot-pounds, and a pressure of 160 pounds per square inch (psi).

The inside of the casing shall have spiral-free, machine broached grooves spaced at 90 degrees that are continuously aligned along the full length of the casing. The grooves shall be of sufficient depth, width, and consistency to provide repeatable positioning of the inclinometer probe used to measure lateral movement of the casing at various depths.

The casing shall be capped top and bottom. A lockable, protective cover shall be installed at the ground surface to protect the inclinometer casing. Locations with construction traffic shall be protected by at least three (3) bumper posts.

Construction Requirements. The inclinometer borehole shall be drilled from the top of existing grade elevation to a minimum of 5 feet into the bedrock with a minimum nominal inside diameter of 4.0 inches. The inclinometer casing shall be installed in the borehole with the guide grooves aligned parallel and perpendicular to the excavation face. The casing sections shall be assembled at the borehole. Use pipe clamps to hold the casing at the borehole collar while adding the next section of casing. Do not pre-connect the entire length of casing and drop into the hole, as this can result in damage to the casing.

Casing will float in a water-filled borehole, so the casing shall be filled with water to install it down hole. When grout is pumped into the hole, however, the casing will again begin to float. Hold the casing in place by using a casing anchor or lowering a steel pipe to the bottom of the casing. Do not force or hold the casing collar down using the drill rig or other top-down method, or the casing is likely to be compressed and lose its straightness.

Grouting shall be performed using a mixer, grout pump, and a pipe or hose for delivering the grout. Grout shall not be mixed by hand, and the water pump on the drill rig shall not be used to deliver the grout. A properly mixed grout shall be free of lumps and thin enough to pump but thick enough to set in a reasonable length of time. If the grout is too watery, it will shrink excessively, leaving the upper portion of the borehole un-grouted.

Grout mixes are provided in the following tables for hard to medium stiff soils and for soft soils. Mix the cement with water first. Then mix in the bentonite. Adjust the amount of bentonite to produce a grout with the consistency of heavy cream. The mix for hard to medium stiff soils has a 28-day compressive strength of about 100 psi, similar to hard clay. The mix for soft soils has a 28-day compressive strength of about 4 psi, similar to very soft clay.

Bentonite-Cement Grout for Hard to Medium Stiff Soils		
Materials	Weight	Ratio by Weight
Portland Cement	94 lb (1 bag)	1
Bentonite	25 lb (as required)	0.3
Water	30 gallons	2.5

Bentonite-Cement Grout for Soft Soils		
Materials	Weight	Ratio by Weight
Portland Cement	94 lb (1 bag)	1
Bentonite	39 lb (as required)	0.4
Water	75 gallons	6.6

The grout can be installed by either pre-grouting the hole or using an external grout pipe. In pre-grouting, the grout is pumped into the hole first, the grout pipe retrieved, and then the inclinometer casing lowered into the hole. Keep the casing filled with water to counteract buoyancy and grout pressure. Lower a steel pipe to the bottom of the casing to counteract buoyancy, allow the grout to set, top off the borehole with grout, and install the protective cover. When using an external grout pipe, first lower the inclinometer casing to the specified depth, then lower the grout pipe to the bottom of the hole and pump in grout. Add water into the casing to match the grout level. Take measures to counteract buoyancy but do not force the inclinometer casing down from the top, let the grout set with inclinometer casing anchored from the bottom, and install the protective cover.

The protective cover shall have an approximate 2.5-foot stickup beyond the highest ground level during construction and be lockable. The top of the inclinometer casing must extend 1 to 2 inches above the protective cover when the cover is opened, so that a pulley system can be installed on the casing when taking measurements with the inclinometer probe.

Inclinometer Measurements and Records. The contractor will make and record all observations and measurements required to determine ground movements during wall construction. Inclinometer probe measurements are made by lowering the inclinometer probe to the bottom of the casing and then slowly raising the probe by recording measurements every two feet up the casing.

A baseline set of readings shall be taken at least seven days before the beginning of wall construction to be used as a reference to determine ground movements. The baseline set will be the average of three sets of readings. Each set of readings will consist of inclinometer probe measurements made in the direction of anticipated ground movement (0 degrees) and measurements made in the opposite direction (180 degrees).

During the installation of drilled shafts, piles, or sheeting, the Contractor will take a minimum of one reading per week. After the completion of drilled shafts, piles, or sheeting installation and the start of excavation in front of the wall, the Contractor will take a minimum of two readings each day (preferable one in the morning and one at the end of working day) until the wall completion. The Contractor will make all records of slope inclinometer measurements readily available to the Engineer. More frequent monitoring may be required by the Engineer as field conditions warrant.

Over time, if the measured displacements are small in magnitude, monitoring frequency can be reduced as established by the Engineer. If displacements become random in nature and/or large in magnitude, the frequency shall be increased as directed by the Engineer. The frequency of readings will be dictated by the phase of current construction but must be sufficient to detect serious movements so that corrective measures can be initiated immediately.

Displacement measurements shall be dated, recorded, and reported to the Engineer the same day the readings are taken.

The Contractor shall control the work in such a manner that cumulative movements do not exceed the design maximum movements as stated in this Specification. The maximum outward deflection of the wall shall be measured along the exposed height of the wall or soil retention system. The maximum downward deflection of adjacent structures shall be measured at the bottom of structure foundation closest to the retaining wall. If measured ground movements in slope inclinometers begin to accelerate between readings, work shall be suspended and the Engineer informed immediately.

Retaining Wall	Maximum outward deflection of wall	Maximum downward deflection of adjacent structures
Adams St (SN 016-1701)	1 inch	0.25 inch
Jackson Blvd (SN 016-1702)	1 inch	0.25 inch
Wall 37 (SN 016-1826)	2 inch	0.25 inch
Wall 24 (SN 016-Z016)	1 inch	0.25 inch
Wall 51 (SN 016-Z048)	0.30 inch	0.25 inch

After the wall has been completed, the monitoring shall continue weekly for at least 3 months. After all monitoring has been completed, and at the direction of the Engineer, the cap shall be removed and the casing shall be grouted to final ground surface prior to restoration.

Submittals: The Contractor must submit daily reports of all slope inclinometer readings to the Engineer.

Method of Measurement: The work under this item as described herein will not be measured separately and shall be paid for as each.

Basis of Payment: This work will be paid for at the contract unit price per each for SLOPE INCLINOMETER. The contract unit price shall include all materials, labor, and impacts due to possible restraints inherent in the use of these devices upon the rate of construction. No additional compensation will be made for any impact, inefficiency, or any costs incurred as a result of compliance with this requirement.

## **SOIL RETENTION SYSTEM**

Description: This item shall consist of furnishing all labor, equipment and materials necessary for the installation and subsequent partial removal of Soil Retention System at locations shown in the plans. This work shall be done as described herein, as detailed in the plans and as directed by the Engineer. The system shall remain in place at the end of the contract.

General Requirements: The soil retention system shall be designed by the Contractor as a minimum, to retain the exposed surface area specified on the plans or the exposed surface area needed by the Contractor to complete the work.

The Contractor shall design a temporary soil retention system such that at any location the maximum total lateral deflection at the top of the temporary soil retention system shall not exceed 0.30 inch. The Plans include soil boring log data within the vicinity of the project. If deemed necessary, the Contractor shall obtain additional geotechnical data at no additional cost to the contract.

The design calculations and shop drawings for the soil retention system proposed by the Contractor shall be submitted to the Engineer for review and approval according to Article 522.05. This approval will not relieve the Contractor of responsibility for the safety of the excavation and structural adequacy of adjacent properties and/or utilities.

The Soil Retention System shall be installed without the use of impact-type pile drivers. The proposed equipment and procedures used for the installation of Soil Retention System shall be submitted to the Engineer for approval prior to their use. If vibratory equipment utilized, the Contractor shall also submit documentation regarding the operating noise levels and operating vibration characteristics of the equipment proposed. The approval of the equipment and procedure by the Engineer does not guarantee the performance in the field of the equipment will be acceptable. All provisions and requirements required under CONSTRUCTION VIBRATION MONITORING, MONITORING ADJACENT STRUCTURES AND NOISE COMPLIANCE shall apply to work performed under this item. The costs incurred finding suitable equipment and procedures shall be included in the cost of Soil Retention System. No additional costs shall be paid for this effort.

The Contractor shall verify locations of all underground utilities before installing any of the soil retention system components or commencing major excavation. Any disturbance or damage to existing structures, utilities or other property, caused by the Contractor's operation, shall be repaired by the Contractor in a manner satisfactory to the Engineer at no additional cost to the Department. Existing utility and structural information shown on the drawings was collected from information available at the time of the design. There is no guarantee of complete accuracy with the existing utility and/or structure locations.

The soil retention system shall be installed according to the Contractor's approved design, or as directed by the Engineer, prior to commencing any related excavation, outside of excavation in order to identify the location of the utilities. If unable to install the soil retention system as specified in the approved design, the Contractor shall re-evaluate the adequacy of the design. Any re-evaluation shall be submitted to the Engineer for approval prior to commencing the excavation adjacent to the area in question. The Contractor shall not excavate below the maximum excavation line shown in the approved design without the prior approval of the Engineer. Once installed by the Contractor and approved by the Engineer, the soil retention system shall remain in place. When allowed, as noted in the plans, the Contractor shall partially remove portion of the soil retention system, to elevations specified on the Plans, leaving the remainder in place.

Method of Measurement: Soil retention systems furnished and installed will be measured for payment in place, in square feet. The area measured shall be the minimum of vertical exposed surface area envelope of the excavation supported by soil retention system.

Portions of the soil retention system left in place will not be measured for payment.

Any soil retention system installed beyond dimensions shown on the Plans or the approved Contractor's design without the written permission of the Engineer, shall not be measured for payment but shall be done at the Contractor's own expense.

All excavation required to positively locate existing utilities will not be measured for payment.

Basis of Payment: This work will be paid for at the contract unit price per square foot for SOIL RETENTION SYSTEM.

Payment for any excavation, related solely to the installation and removal of the soil retention system and/or its components, shall not be paid for separately but shall be included in the unit bid price for SOIL RETENTION SYSTEM. Other excavation, performed in conjunction with this work, will not be included in this item but shall be paid for as specified elsewhere.

Payment for additional work required in design or construction to adequately protect any utilities shall be included in the bid price for SOIL RETENTION SYSTEM.

Obstruction mitigation will be paid for according to Article 109.04.

Any costs related to obtaining technical assistance for the construction a wall system from a particular supplier will not be paid for separately.

## STAINLESS STEEL CABLE PLANT SUPPORT SYSTEM

Description. This work consists of furnishing and installing Stainless Steel wire rope assembly, fittings, anchors, hardware and accessories of the type specified at locations shown on the Plans or directed by the Engineer, and in accordance with the details shown in the Plans.

### Materials.

Wire Rope: Cable: ASTM A492 Type 316 4mm Ø 4mm stainless steel 7x7 wire rope.  
Length:

Provide optimum adjustment in both directions by calculating final tendon lengths with allowance for tensioning fittings with 2/3 open and with 1/3 of thread length engaged.

Measure tendon length from center of pin to center of pin, or center of eye to center of eye.

Anchor Points: Fittings, Anchors, Hardware, and Accessories: AISI 304, 316 or 316L stainless steel

1. Rope End Fittings, Terminals, and Tensioners: External Thread-Swaged
2. Support Components: Spacer Bar, Clamp Screw, Ground Plate
3. Anchors and Hardware: Washer, Hex Nut, Threaded Rod, Wall Anchor for Masonry
4. Accessories: Provide grommet, bushings, nuts, washers, turnbuckles, fittings and other components as required for system installation, Clamps and Plant Supports

### Finish.

Clean and/or descale cables and fittings in accordance with ASTM A380.

Passivate in accord with ASTM B912, to provide the following finish: Exterior and Interior: 330 grain satin finish (equiv. to #4 satin finish).

### General.

Performance Requirements: Provide Stainless Steel Cable Railing System and mounting hardware which have been manufactured and installed to meet or exceed manufacturer's and project performance criteria.

Submittals.

1. Product Data: Submit Manufacturer's product data sheet for specified products.
2. Shop Drawings: Show layout, sizes, dimensions, details, and installation of wire rope system components. Include Details of rope attachment, tensioning methods, hardware, and tensioning and mounting methodology.
3. Samples: Submit samples of rope and/or hardware
4. Quality Assurance/Control Submittals:
5. Test reports: Submit any test report demonstrating compliance with intended use and code requirements.
6. Certificates: Submit manufacturer's certificate that product meets or exceeds specified requirements
7. Closeout Submittals: Submit the Following:
  - (a) Warranty: Submit manufacturer's standard warranty documents
  - (b) Maintenance Data: Include manufacturer's standard cleaning and maintenance instructions to avoid detrimental actions to finishes and performance
8. Mock-Ups: Mock-Ups: Install at project site or appropriate location a job mock-up using acceptable products and manufacturer approved installation methods

Quality Assurance:

1. Installer Qualifications: Installer should be experienced in performing work of this section and should have specialized in installation of work similar to that required for this project.
2. Coordination: Coordinate with Noise Wall and MSE wall manufacturer,



Construction Requirements:

1. Stainless Steel Cables and Fittings shall be dimensioned and fabricated to specified size and labeled according to shop drawings and installer's specifications.
2. Preassemble items in shop to greatest extent practicable to minimize assembly at project site. Disassemble units only to extent necessary for shipping and handling limitations. Mark units for reassembly.
3. Compliance: Comply with manufacturer's product data, including product technical bulletins, product catalog installation instructions and product carton instructions for installation.
4. Compliance: Comply with manufacturer's product data, including product technical bulletins, product catalog installation instructions and product carton instructions for installation.
5. Specifier Note: Specify actions required to physically determine that conditions are acceptable to receive primary products of the section.
6. Site Verification of Conditions: Verify mounting condition of previously installed surfaces to ensure it is acceptable for product installation in accordance with manufacturer's instructions. Do not begin installation until backup surfaces are in satisfactory condition.
7. Supply items required to be cast into concrete or embedded in masonry with setting templates, to appropriate sections.
8. Take field measurements after permanent end terminations are in place and prior to preparation of shop drawings and fabrication, to ensure fitting of work.
9. Install cable plant support system in accordance with manufacturer's instructions and the approved shop drawings.
10. Provide anchorage devices and fittings to secure to in-place construction; including threaded fittings for concrete inserts, toggle bolts and through-bolts. Install all rope assemblies plumb, level, square, and taut.
11. Anchor system to mounting surfaces as indicated on the drawings.
12. Separate dissimilar materials with bushings, grommets or washers to prevent electrolytic corrosion.
13. Use manufacturer's supplied mounting hardware.
14. Terminate and tension cable system in accordance with manufacturer's instructions.
15. Ensure ropes are clean, and without kinks or sags.
16. After final adjustment provide tamper resistant locktight materials on all fittings.
17. Remove temporary coverings and protection of adjacent work areas.
18. Clean installed products in accordance with manufacturer's instructions before owner's acceptance. Do not use chlorine-based or abrasive cleaners.
19. Remove from project site and legally dispose of construction debris associated with this work.
20. Protection: Protect installed product from damage during subsequent construction activities.
21. Manufacturer's Warranty: Submit, for Owner's acceptance, manufacturer's standard warranty document executed by authorized company official.

Acceptable Stainless Steel Wire Rope Assembly to use Made in USA products:

1. Façade Greenery I-SYS by Décor Cable
2. Cable Trellis Systems by Ronstan
3. Green Wall Trellis System by Hayn Lines
4. Approved Equal

Method of Measurement. All work shown on plans will be included for payment. This includes all cables measured for payment, complete in place, per Linear Feet of Wire Rope installed, and Anchor Points installed in place measured per Each of Anchor Points.

Basis of Payment. This work will be paid for at the lump sum price for STAINLESS STEEL CABLE PLANT SUPPORT SYSTEM – per wall, which price includes furnishing and placing all material required, including all labor, equipment and incidentals necessary to complete the work as herein specified and on the Plans.

## **PLANTING SOIL MIX FURNISH AND PLACE**

Work under this item shall be performed in accordance with Section 200 of the Standard Specifications for Road and Bridge Construction except as modified herein.

Description: This work shall consist of furnishing, transporting, testing, preparing, and placing planting soil including finish grading to the depth specified in areas as shown in the plans or as directed by the Engineer.

General Requirements: In general the planting soil shall be two (2) parts top soil and one (1) part coarse sand. The sand, in the amount required to produce an acceptable planting soil, shall be added and mixed during the pulverization process only. The sand shall be of an FA 2 gradation.

Soil Stockpiling: The Contractor shall obtain the total quantity of planting soil required for this project and stockpile this material at an acceptable offsite location a minimum of 30 days in advance of placement. The stockpile must be covered to avoid excessive moisture content and erosion. The Contractor shall have the material tested following the guidelines presented below under Soil Testing and, if approved, this stockpile shall be the sole source for planting soil to be delivered to site. The test results and a Request for Inspection form should be sent to the Engineer prior to delivering the material to site. This transmittal must also identify the location of the stockpile. If there are any changes in the source the Contractor shall notify the Engineer immediately. No additional time will be allowed for the completion of this project in order to substitute, test, and approve a new source of planting soil.

Delivery, Storage and Handling: Protect soil from absorbing excess water and from erosion at all times. Do not store materials unprotected from large rainfall events. Do not allow excess water to enter site prior. Remove weeds prior to inspection.

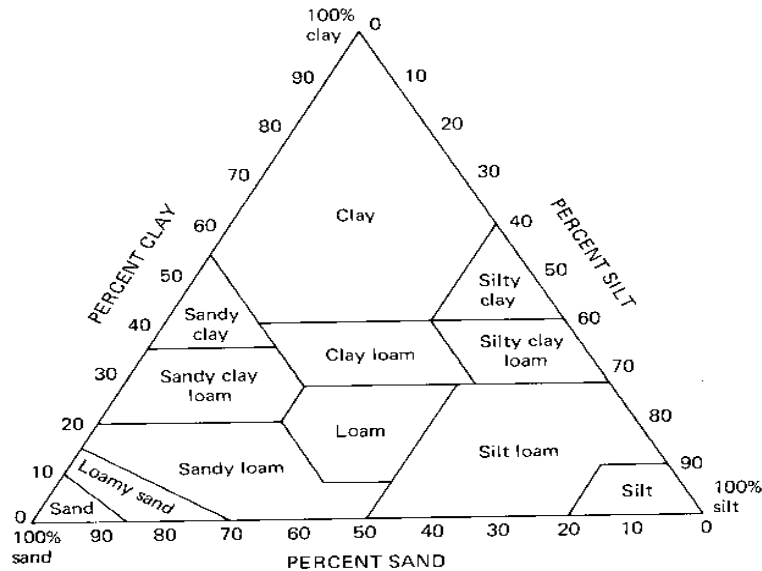
Soil Testing: No planting soil shall be delivered to the site until the Engineer has reviewed test results and has accepted the planting soil. The Contractor shall employ a soil testing agency acceptable to the Engineer, which uses test methods approved by the Association of Agricultural Chemists. Test frequency shall be as follows:

<u>Quantity of Soil Placed (CY)</u>	<u>Number of Tests</u>
1 - 200	1
200 – 1000	3
1000 <	((Quantity – 1000) / 500) + 3 round up to whole number

When more than one test is performed, the average of the test results will be used to determine acceptance.

The planting soil test report must obtain the following information:

	HIGH	LOW
1. Chemical Analysis:		
a) pH	7.0	6.5
2. Mechanical Analysis		
a) a. % clay	25%	0%
b) b. % silt	77%	45%
c) c. % sand	33%	25%
3. Additionally the following variables are required.		
a) cation exchange capacity (CEC)		
b) soluble salts		
c) organic matter		
d) phosphorous		
e) available potassium		
f) nutrients		
g) residual chemicals		
h) Recommendations to mitigate any issues from the results in items 3a through 3g.		



The mechanical analysis should show that the % sand, % silt, and the % clay must yield a silt loam soil. See the attached Textural Classes diagram above. To determine the class plot a line parallel to the % clay axis starting the line at the value of the % silt. Plot another line parallel to the % sand axis starting the line at the value of the % clay. The intersection of these lines should be in the silt loam or loam region, for the soil to be approved.

Preparation and Placement:

1. Perform or coordinate final adjustments of any utility structure.
2. Clean planting areas of all trash and debris before placement of soil mix. Remove and legally dispose of debris off site in accordance with Article 202.03. Repair to the satisfaction of the Engineer any portion of the geotechnical fabric or drainage layers prior to installation of planting soil mix.
3. Place, spread and rough grade specified planting soil to depths specified in all areas to be planted. Place planting soil mix in two level (2) lifts. The first lift shall contain 2/3 of the planter soil depth. After placing each lift, moisten the surface at a rate sufficient to hydraulically settle the soil, as determined by the Engineer. Allow water to thoroughly percolate through the soil before placing the next lift. Allow for settling, and place additional planting soil as necessary. Allow for placement and mixing of compost, as determined by the Engineer, but place enough soil mix to meet finish grades within  $\pm 0.10$  foot of design grades.
4. Rake smooth and finish grade all planted areas. The removal of excess material or the addition of planting soil may be required prior to landscaping. This shall be considered incidental to planting soil. Grading will be to a tolerance  $\pm .10$  foot of design grades. Any grade disturbed by irrigation installation shall be restored to finish grade and raked smooth.
5. All debris, litter, tire tracks, dirt, and unintended materials shall be removed, swept or washed off of all landscape, hard surfaces, and pavement on a daily basis.

Planting Soil Acceptance:

The Engineer retains the right to visually inspect planting soil mix on site before placement. The Engineer may ask that material suspected of not meeting specification be removed from the site, until the material can be mechanically tested.

The final determination of the planter soil quality shall be based upon soil tests taken by the Engineer. The samples shall be taken at the time of planting soil installation. The samples will be tested by independent accredited agencies, for the Engineer. The test frequency shall be the same as listed above. When more than one test is required, the percentages of sand, silt and clay will be averaged. This averaged value will be used to determine the soil quality.

If the averaged test result for sand or silt content is outside the range specified by less than five (5%) percent, an adjusted unit price will be used in computing payment for the planting soil. The adjusted unit price will be a percentage of the contract unit price as given in the following schedule:

<u>Average Sand or Silt Deficiency</u>	<u>Percent of Contract Payment</u>
0 to 2	80
2.1 to 4	66
4.1 to 5	50

Clay content in excess of this specification by two (2%) percent or less: If the averaged result for clay is outside the range specified by less than two (2%) percent an adjusted unit price will be used in computing payment for the planting soil. The adjusted unit price will be sixty-six (66%) percent of the contract unit price.

The Contractor shall remove all planting soil and install material meeting this specification. The Contractor shall be responsible for all costs incurred to remove deficient material and install acceptable planting soil. The Contractor shall be responsible for any damage to plant material, irrigation system, waterproof membrane, or any other damage caused by this work. The Contractor shall be responsible for all additional traffic control. No addition time will be provided in the contract to perform remedial work.

Method of Measurement: Planting Soil Mix Furnish and Place will be measured for payment in place to the depth specified in square yards. Areas not meeting the depth specified shall not be measured for payment.

Basis of Payment: This work will be paid for at the contract unit price per square yard for PLANTING SOIL MIX FURNISH AND PLACE, of the thickness specified. Payment shall include all testing, furnishing, stockpiling, transporting of materials, all labor and equipment necessary, disposal and incidentals required to complete the work as specified herein and to the satisfaction of the Engineer.

## **ERECTION OF COMPLEX STEEL STRUCTURES**

Effective: April 11, 2007

Description: In addition to the requirements of Article 505.08(e), the following shall apply.

The Contractor or sub-Contractor performing the erection of the structural steel is herein referred to as the Erection Contractor.

Erector Qualifications: The Erection Contractor shall be certified as an Advanced Certified Steel Erector (ACSE), by the AISC Certification Program. The Erection Contractor shall submit evidence of current ACSE certification to the Engineer with the submittal of the proposed erection plan.

Erection Plan: The Erection Contractor shall retain the services of an engineering firm, prequalified with the Illinois Department of Transportation in the Complex Structures category, for the completion of a project-specific erection plan. An Illinois Licensed Structural Engineer employed by this pre-qualified engineering firm, herein referred to as the Erection Engineer, shall sign and seal the erection plan, drawings, and calculations for the proposed erection of the structural steel.

The erection plan shall be complete in detail for all phases, stages, and conditions anticipated during erection. The erection plan shall include structural calculations and supporting documentation necessary to completely describe and document the means, methods, temporary support positions, and loads necessary to safely erect the structural steel in conformance with the contract documents and as outlined herein. The erection plans shall address and account for all items pertinent to the steel erection including such items as sequencing, falsework, temporary shoring and/or bracing, girder stability, crane positioning and movement, means of access, pick points, girder shape, permissible deformations and roll, interim/final plumbness, cross frame/diaphragm placement and connections, bolting and anchor bolt installation sequences and procedures, and blocking and anchoring of bearings. The Erection Contractor shall be responsible for the stability of the partially erected steel structure during all phases of the steel erection.

The erection plans and procedures shall be submitted to the Engineer for review and acceptance prior to starting the work. The plan shall be submitted a minimum of eight (8) weeks prior to the planned mobilization efforts for erection tasks. Final acceptance of the erection plan shall be a minimum of three (3) weeks prior to the start of erection activities. Review, acceptance and/or comments by the Department shall not be construed to guarantee the safety or final acceptability of the work or compliance with all applicable specifications, codes, or contract requirements, and shall neither relieve the Contractor of the responsibility and liability to comply with these requirements, nor create liability for the Department. Significant changes to the erection plan in the field must be approved by the Erection Engineer and accepted by the Engineer for the Department.

Basis of Payment: This work shall not be paid for separately but shall be included in the applicable pay items according to Art. 505.13 of the Standard Specifications.

## **AIR QUALITY COMPLIANCE**

Description. This work includes meeting or exceeding air quality requirements described herein, other Special Provision sections and the Standard Specifications.

General. The Contractor shall meet standards established to minimize air quality impacts due to construction activities. The obligations by the Contractor include the following:

**Air Quality Plan** – Prior to the start of construction activities, the Contractor will be supplied an Air Quality Plan developed by the Engineer. The Plan will serve as a guidance document for the duration of construction activities. The Air Quality Plan is intended to identify maximum thresholds of dust levels, particulate matter and diesel components in the air in and around the project site and will incorporate requirements identified within the Special Provisions. Baseline sampling in nearby areas without construction activity will be performed by the IEPA. Real-time monitoring will be conducted at the two locations adjacent to Circle Interchange. If during real-time monitoring there are exceedances of the screening standards, the Engineer will contact the Contractor and activities will cease and corrective actions will be developed.

**Dust Control Plan** – The Contractor shall comply with the requirements of CONSTRUCTION AIR QUALITY – DUST CONTROL in addition to Article 107.36 of the Standard Specifications.

**Diesel Emissions** – The maximum concentration of Diesel Components (PAHs) in sampled air shall not exceed  $1 \mu\text{g}/\text{m}^3$ , which is above the Chicago background level according to the IEPA. Following receipt of laboratory data that indicate exceedances of screening standards for diesel components as PAHs, IDOT will investigate the activity that was being performed at the time of the exceedance. IDOT will document the exceedance in the monthly report. Observations of consistent patterns in exceedances and potential corresponding work activities will assist in developing measures to manage the activity that caused the exceedance. Factors that will be evaluated include the activity being performed, the equipment being used for the activity, weather conditions, and general air quality at the time of the exceedance.



Construction Requirements. To ensure a prompt response to incidents involving the integrity of work zone Air Quality, the Contractor shall provide a telephone number where a responsible individual can be contacted on a 24 hour a day basis.

When the Engineer is notified, or determines, that an environmental control deficiency exists, he/she will notify the Contractor in writing, and direct the Contractor to correct the deficiency within a specified time frame. The specified time frame, which begins upon Contractor notification, will be from 1/2 hour to 24 hours long, and is based on the urgency of the situation and the nature of the deficiency. The Contractor may appeal the indicated deficiency to the Engineer on the grounds that the deficiency was caused by actions by a separate contractor, agency or public entity. The Engineer shall be the sole judge of these conditions and any appeal by the Contractor.

The deficiency may include lack of repair, maintenance or non-compliance with the related Articles of the Standard Specifications, the CONSTRUCTION AIR QUALITY – DUST CONTROL Special Provision and this Special Provision.

If the Contractor fails to respond within the allotted time frame, the Engineer may take action to correct the deficiency, or may cause the correction of the deficiency to be made by others, the cost thereof being deducted from monies due or which may become due the Contractor. This corrective action will in no way relieve the Contractor of his/her contractual requirements or responsibilities, and shall not be grounds for any claim.

If the Contractor accumulates three (3) environmental deficiency deductions for the same deficiency, all related Contractor activities will be shut down until the deficiency is corrected. Such a shutdown will not be grounds for any extension of the completion date, waiver of penalties, or be grounds for any claim.

Basis of Payment. This work will not be paid for separately. All obligations described herein are included associated pay items. No extension of the completion date, waiver of penalties or claims shall arise from any Contractor activity shut down enacted due to deficiencies described herein.

**GEOTECHNICAL REINFORCEMENT**

Description. This work shall consist of furnishing and installing integrally-formed polypropylene biaxial or multi axial geogrid reinforcement material. The geogrid shall have aperture, rib, and junction cross section sufficient to permit significant mechanical interlock with the material being reinforced. There shall be a high continuity of tensile strength through all ribs and junctions of the geogrid material to reinforce the subbase or subgrade in identified locations. The contractor shall present design calculations showing the geogrid can fulfil the project requirements as shown on the plans and other projects documents.

Materials.

(a) Geogrid - The geogrid shall conform to the requirement listed in Table 1. The supplier/contactor shall provide a certification that the product meets the requirements.

Table 1 – Required Geogrid Properties

<b>MATERIAL CHARACTERISTICS</b>	<b>TEST METHOD</b>	<b>DATA</b>
Polymer type		polypropylene
Carbon Black Content	ASTM D 4218	0.50% (min.)

<b>DIMENSIONAL CHARACTERISTICS</b>	<b>TEST METHOD</b>	<b>DATA</b>
Open Area	COE-CW 02215	75 % (max.)
Aperture Area	Measured	1.3 sqin (min)
Unit Weight	ASTM D 5261	5.0 oz/yd <sup>2</sup> (min.)

<b>TECHNICAL CHARACTERISTICS</b>	<b>TEST METHOD</b>	<b>DATA</b>
Junction Efficiency	GRI-GG2 or ASTM D6637 and ASTM D7737	93% (min.)
Min. Radial Stiffness @ 0.5% Strain	ASTM D6637	23,989 lb/ft (min)
Resistance to UV Light and Weathering	ASTM D4355	70% at 500 Hours (min)

(b) Aggregates - The aggregates shall conform to the AGGREGATE SUBGRADE IMPROVEMENT (D-1) Special Provision.

Submittals. A minimum of 60 calendar days prior to proposed installation, the Contractor shall submit the following information:

- a. Design calculations, certified by the manufacturer, identifying that the combination of the proposed geogrid material(s) and the aggregate subgrade improvement material provide an equivalent bearing capacity of 24" of aggregate subgrade improvement material meeting both installation conditions:
  - 12" of Aggregate Subgrade Improvement and geogrid reinforcement material(s) over Geotechnical Fabric for Ground Stabilization.
  - 9" of Aggregate Subgrade Improvement and geogrid reinforcement material(s) over Geotechnical Fabric for Ground Stabilization.
- b. Project specific installation plan describing subgrade preparation, the proposed layout and orientation of geogrids, loading, transportation and unloading requirements, storage requirements, requirements for field cutting and manipulation of geogrid, minimum overlap and joint treatments, requirements for securing the geogrid materials prior to and during aggregate placement, aggregate placement requirements – including minimum/maximum lift thicknesses, maximum vehicle loading and aggregate compaction requirements, and any additional manufacturer recommended data.
- c. Project specific quality control plan prepared by or approved by the manufacturer.
- d. Name and contact information of manufacturer representative responsible throughout material procurement, delivery and installation. This representative shall be available to the Engineer for all inquiries, including as needed, to be present during a portion of product installation.

Installation. The geogrid reinforcement shall be transported, stored, and placed as described herein and as shown on the plans. Geogrids shall meet the requirements of ASTM D 4873 "Standard Guide for Identification, Storage, and Handling of Geosynthetic Rolls and Samples."

Geogrids shall be delivered to the jobsite in such a manner as to facilitate handling and incorporation into the work without damage. Geogrids shall be stored in such a manner as to prevent exposure to direct sunlight and damage by other construction activities. During periods of shipment and storage, the geogrid shall be protected from temperatures greater than 140°F, mud, dirt, dust, and debris. Each geogrid roll shall be labeled or tagged to provide product identification. The manufacturer's recommendations shall be followed with regard to protection from direct sunlight. At the time of installation, the geogrid will be rejected if it has defects, tears, punctures, flaws, deterioration, or damage incurred during manufacture, transportation, or storage. All damaged portions of geogrid shall be replaced for the entire width of the roll. The Contractor shall furnish the product labels that clearly show the manufacturer's or supplier's name, product identification, lot number, manufactured date, roll dimension and provide a document that the material is in accordance with manufacturer's or supplier's certificate.

Prior to the installation of the geogrid, the application surface shall be cleared of debris, sharp objects and trees. Tree stumps shall be cut to the level of the ground surface. If the stumps cannot be cut to the ground level, they shall be completely removed. In the case of subgrades, all wheel tracks or ruts in excess of 3 inches in depth shall be graded smooth or otherwise filled with soil to provide a reasonably smooth surface.

The geogrid shall be placed with the "roll length" parallel to the pavement. Fabric of insufficient width or length to fully cover the specified area shall be lapped a minimum of 24 inches. The geogrid should be secured in place.

The granular blanket shall be constructed to the width and depth required on the plans. Unless otherwise specified, the material shall be back-dumped on the geogrid in a sequence of operations beginning at the outer edges of the treatment area with subsequent placement towards the middle.

Placement of material on the geogrid shall be accomplished by spreading dumped material off of previously placed material with a bulldozer blade or endloader, in such a manner as to prevent tearing or shoving of the geogrid. Dumping of material directly on the geogrid will only be permitted to establish an initial working platform. No construction equipment shall be allowed on the geogrid prior to placement of the granular blanket. If the geogrid develops wrinkles or moves significantly, an alternative method of securing it shall be used.

Unless otherwise specified in the plans or Special Provisions, the granular material, shall be placed to the full required thickness and compacted.

Geogrid which is damaged during installation or subsequent placement of granular material, due to failure of the Contractor to comply with these provisions, shall be repaired or replaced at no additional cost to the Department, including costs of removal and replacement of the granular material. Torn geogrid may be patched in-place by cutting and placing a piece of the same geogrid over the tear. The dimensions of the patch shall be at least 2 feet larger than the largest dimension of the tear and it shall be weighted or otherwise secured to prevent the granular material from causing lap separation.

Method of Measurement. GEOTECHNICAL REINFORCEMENT will be measured in square yards for the installed surface area below the proposed pavement, barrier base, curb and gutter, or shoulder, plus as needed along the sides of the excavation. No measurement of overlapping material will be made. If more than one layer is placed due to design considerations, only one layer will be measured for payment. All excavation and placements and compaction of the AGGREGATE SUBGRADE IMPROVEMENT shall be measured and paid for separately.

Basis of Payment. The work will be paid for at the contract unit price per Square Yard for GEOTECHNICAL REINFORCEMENT.

### **FREIGHT TUNNEL FILLING**

Description. Work under this item shall consist of furnishing all labor, equipment, tools, excavation, backfill and items required to locate, remove existing filled material, construct a concrete bulkhead within, and fill the existing Jackson Boulevard freight tunnel as detailed in the plans and this special provision.

Work to locate the tunnel shall consist of all labor, equipment, tools, excavation, backfill and items required to create and maintain the shaft excavations, all materials, and incidentals necessary within the designated area on the Plans.

This item shall also consist of the installation of a permanent casing. The permanent casing will be used as a shaft excavation support method. The permanent casing shall be installed using the method described in the Special Provision for Foundation Drilling Procedures. After construction, if voids are present between the permanent casing and the drilled excavation, the voids shall be filled with grout.

This item shall also consist of the complete removal of the fill material and existing rails and rail chairs within the Jackson Boulevard freight tunnel that was previously filled at the location as shown in the Plans. This work shall also include the placement of Class SI Concrete where the existing rails and rail chairs are removed within the bottom of the tunnel.

This item shall also consist of furnishing all labor, tools, equipment, and materials required to construct a cast-in-place concrete bulkhead at the location and according to the notes and details shown on the plans or as determined by the Engineer.

This item shall also consist of the materials, proportioning, mixing, transporting, and placement of a flowable fill material to completely fill the Jackson Boulevard freight tunnel to the limits detailed in the plans.

Construction Requirements.

All work to Locate Tunnel, Chicago shall be performed as shown on the Plans and as directed by the Engineer. This work shall be performed in accordance with the applicable portions of Sections 501, 502, and 516 of the Standard Specifications, except as herein modified. The Contractor shall field locate the tunnel within the limits specified on the Plans. The procedures described herein are consistent with tunnel location procedures developed and utilized by the Chicago Department of Transportation (CDOT).

Procedure for locating the existing freight tunnel:

1. The exact location of the tunnel is unknown and documentation of the tunnel location is restricted to designations on bridge and expressway record drawings.
2. At a minimum of two locations along the estimated alignment, accurately locate center of tunnel cross-section with probes. This is necessary as the exact location of the tunnel is not documented. If the alignment of the tunnel is not considered to be on a consistent and expected bearing, additional locations should be considered.
3. The foundation drawing showing the tunnel location submitted for review must show the probe locations and the locations that "hit" the tunnel to confirm the Contractor has accurately located the tunnel.
4. Drill hole to top of tunnel with 10" drill and note exact elevation of top of tunnel. Install casing to maintain opening. A casing must be installed in all cases - no exceptions will be allowed.
5. Drill through top of tunnel; determine elevation of invert of tunnel. **Note if a substantial amount of water comes out of the hole notify the Engineer immediately.**
6. A video or sonar survey must be performed after the completion of the cased holes into the tunnel at each location. The survey must be done to:
  - a. Verify the location of the tunnel,
  - b. Verify the casing is located near the center of the tunnel so the bulkhead can be successfully installed,
  - c. Ensure the tunnel is clear between the existing and proposed bulkhead locations as shown on the Plans. If it is discovered that the casing is located to the side of the tunnel, a new casing must be installed nearer to the center of the tunnel to ensure a successful bulkhead installation, and the old casing abandoned by filling with concrete.
  - d. The existing tunnel fill material shall be removed. Once removed, the existing condition of the tunnel should be surveyed to identify if the integrity of the tunnel to be filled will prevent the flowable fill material from migrating into the portion of the tunnel that is already filled.
7. The Contractor shall perform a survey showing the location of the tunnel and the fill limits. The survey shall be provided to the Engineer.

The work for removing the filled material from the tunnel shall be according to Section 501 of the Standard Specifications and the following:

Any existing material within the tunnel shall be removed. This material consists of flowable fill with a minimum compressive strength of 50 psi. The Contractor may also encounter material consisting of concrete, reinforcement bars, steel rails, steel rail cars, steel doors, and/or other debris. The existing cast iron rail chairs are embedded in the concrete tunnel floor and the space between the rails is likely covered with a layer of concrete. The existing tunnel walls and concrete ledges shall be cleaned to be free of debris prior to placing the concrete bulkhead and flowable fill to provide a clean contact zone between the existing tunnel liner and the fill material.

Any damage to the existing freight tunnel resulting from removal of the existing fill material and/or debris or cleaning the tunnel of debris shall be repaired by the Contractor and no additional compensation will be allowed.

All rail removal shall be removed in sections of five feet or less at a time.

#### Materials.

Permanent casing shall follow the requirements of Section 516 and the Drilled Shafts special provision included in the plans.

Materials for the concrete bulkhead shall be according to the following:

The concrete shall be Class SI, in accordance with Section 1020 of the Standard Specifications except as specified herein.

The strength shall be a minimum 4000 psi compressive at 28 days with a minimum slump of 1 inch and a maximum slump of 3 inches, unless otherwise noted on the drawings.

The water-cement ratio by weight shall be a maximum of 0.45.

All concrete shall be air entrained to contain between 4 and 7 percent total air.

Reinforcement bars shall be in accordance with Article 1006.10 of the Standard Specifications except that the bars shall be according to ASTM A 615 Grade 60.

Chemical adhesive for dowel bars shall be in accordance with Section 1027 of the Standard Specifications.

Materials for the concrete patch to fill the voided space where the existing rails and rail chairs shall be removed shall be Class SI concrete in accordance with Section 1020 of the Standard Specifications.

Materials for the flowable fill to fill the tunnel shall be according to Article 1019.02 of the Standard Specifications and the following:

Equipment shall be according to Article 1019.03 of the Standard Specifications.

Mix Design Criteria. Replace Article 1019.04 of the Standard Specifications with:

Flowable Fill Mix Design Requirements	
Flow <sup>1</sup>	≥ 20 inches
Air Content	0 – 25%
Compressive Strength	Minimum 80 psi @ 7 days and Minimum 125 psi @ 28 days

Note 1 – The flow shall be determined by using an Illinois Department of Transportation approved slump cone in the inverted position.

Mix Design Development. Article 1019.05 of the Standard Specifications shall not apply. Mix Design Development shall be according to Article 1019.06 of the Standard Specifications, except for the following:

Replace Article 1019.06(f) of the Standard Specifications with:

“(f) Test data indicating compressive strength at 7 and 28 days.”

Replace the last two paragraphs of Article 1019.06 of the Standard Specifications with:

“Trial batches will not be required as long as the Contractor certifies that the mixture will comply with the Flowable Fill Mix Design Requirements as detailed under the Mix Design Criteria Section. If the Contractor refuses to certify the mixture, a trial batch will be required and shall be conducted as determined by the Engineer and Chicago Department of Transportation. Regardless of option, any Contractor developed mixture submitted shall be approved by the Engineer and Chicago Department of Transportation prior to use.”



Sampling and Testing. All QC/QA Testing shall be according to Check Sheet 25 of the Supplemental Specifications and Recurring Special Provisions, Adopted January 1, 2020; except that the test type and frequency for the field shall be according to the table below, Flowable Fill Field QC Testing Requirements. Quality Assurance testing will be a minimum of 10% of the Quality Control testing frequency.

Article 1019.07 of the Standard Specifications shall be replaced with:

Flowable Fill Field QC Testing Requirements	
Flow	First Load and One test every 100 cy thereafter
Air Content <sup>1</sup>	First Load and One test every 100 cy thereafter
Strength Specimens	One set of six 6" x 12" cylinders per half day (Includes 2 extra cylinders for backup)

Note 1 – Air Content testing will not be required if the mixture does not contain any air entrainment admixture.

Placement. The Contractor shall meet the specific requirements as determined by the Engineer. All methods of placement shall be approved by the Engineer prior to any placements occurring.

Method of Measurement. The work under this item as described herein and shown on the plans will not be measured separately. It will be paid for as lump sum. All work under this item shall consist of furnishing all labor, equipment, tools, excavation, backfill and items required to locate, install a permanent casing, remove existing filled material, rails, and rail chairs, construct a concrete bulkhead within, and fill the existing Jackson Boulevard freight tunnel as detailed in the plans and this special provision.

Basis of Payment. This work will be paid for at the contract unit price for Lump Sum of FREIGHT TUNNEL FILLING, which will include all labor, excavation, backfilling, materials, and equipment necessary to execute the work as detailed herein. Locating the tunnel includes all exploration, restoration, samples, surveys, video, sonar, probes, drilling, and/or any other means necessary to locate the tunnel within the designated area on the Plans.

Permanent casing will not be paid for separately at this location but will be included in the lump sum cost. Reinforcement bars, joint fillers, grout, water seals, drain holes, concrete patch, chemical adhesive, formwork and any other material necessary to construct the concrete bulkhead will not be measured for payment but will be included as part of this item.

## **ABANDONED FOUNDATION REMOVAL**

Description. This work shall consist of furnishing all labor, equipment and materials necessary for the removal and disposal of portions of abandoned foundation elements that obstruct construction of the proposed project elements, proposed bridges, retaining walls, roadway drainage, roadway subbase, or other elements, within the project limits. The work shall be done in accordance with the applicable portions of Section 501 of the Standard Specifications, as described herein, as detailed in the Plans and as directed by the Engineer. All elements identified for removal within the various Removal of Existing Structures Plans and special provisions, shall be included within those items, and will not be measured for payment under this item.

The scope of this work shall include, but is not limited to, partial or complete removal and disposal of abandoned bridge substructure elements, drilled shafts, steel piles, timber piles, steel sheet piling, reinforced concrete slabs, retaining walls, ground anchors, light pole foundations, sign structure foundations, miscellaneous masonry and other uncovered elements not specifically identified in the Plans for removal. All elements to be removed under the items described herein shall be removed to an elevation one (1) foot below the elevation sufficient to establish the subgrade for proposed improvements.

The Contractor shall immediately notify the Engineer when obstructions are encountered that appear to impede construction of proposed improvements. The Engineer shall verify if removal is required and determine limits of removal necessary based upon the planned proposed improvements. The Contractor may elect to use Ground Penetrating Radar or other means, as approved by the Engineer, to determine the location of buried obstructions in advance of excavation activities. These exploration efforts will not be paid for separately.

The Contractor shall identify equipment and methods proposed for the removal and disposal of the existing obstructions to the Engineer for approval prior to starting this Work. The approval of the equipment and procedures by the Engineer does not guarantee the performance in the field of the equipment will be acceptable. All provisions and requirements required under CONSTRUCTION VIBRATION MONITORING, MONITORING ADJACENT STRUCTURES and NOISE COMPLIANCE shall apply to work performed under this item. The costs incurred finding suitable equipment and procedures will not be paid for separately..

Prior to commencing work under this Item, the Contractor shall verify the location of all existing utilities in the area. The Contractor shall submit drawings and written documentation to the Engineer of such verification. All Work under this item shall be executed in such a manner so as not to disturb or damage the existing utilities. The Contractor shall exercise extreme caution not to damage adjacent existing facilities that remain in-service and adjacent properties during the construction. Any damage to the existing facilities and/or adjacent properties is the responsibility of the Contractor and Contractor shall repair any such damage to the satisfaction of the Department and at no cost to the Department.

The work shall conform in every respect to all environmental, state and local regulations regarding construction requirements, the protection of adjacent properties, as well as dust and noise control. All materials removed under this Item shall become the property of the Contractor and shall be disposed of by the Contractor off the site and in a lawful manner meeting all IDOT Policies and Procedures.

The Plans identify estimated locations of possible conflicts. Original plans for the previously demolished existing structures that may be encountered may be included in the Plans for reference. The original plans, however, may not show all modifications that have been made to the structures over the years. The completeness of the provided information is not guaranteed and no responsibility is assumed by the Department for their accuracy. Information is furnished for the Contractor's convenience and is to be used solely at the Contractor's risk.

#### Concrete Removal (Special)

Concrete to be removed may consist of non-reinforced or reinforced concrete identified as portions of abandoned structures. Any steel or wood piles embedded within the abandoned concrete shall be removed as part of the concrete. Concrete to be removed may include heavily reinforced abandoned drilled shafts or other foundation elements. All cutting of the existing concrete elements shall be included in these efforts. The Contractor shall probe as needed to determine the extents of the abandoned concrete outside the limits of the required excavation for the proposed elements.

#### Pile Removal, Special

No specific information about existing piles that may be encountered is included. Piles that may be uncovered during excavations for proposed elements would either be standalone after previous removals by others or below abandoned slab footing type foundations to be removed as described herein. Piles may be wood or various steel shapes and be located vertically or at a batter.

Only piles that conflict with proposed excavations as described above require removal. The pile shall be cut utilizing appropriate equipment at the elevation described herein. Multiple cuts to the same pile due to the length of the portion of pile to be removed will not be measured for payment. The remainder of any piles below the proposed improvements shall be left in place. Prior to cutting and removing the existing pile, the Contractor shall expose the pile down to the proposed excavation line. The pile length shall be measured prior to any cutting and removal operations. All abandoned piles removed under this Work shall become the property of the Contractor.

Sheet Pile Removal, Special

No specific information about sheet piling that may be encountered is included. Abandoned sheet piling or vertical sheet plates may consist of any material type, material properties and dimensions. Walers, bracing, anchors and other structural components tied to the sheet piling may be encountered.

All abandoned steel sheet piling or plates that conflicts with the construction of proposed elements shall be removed to elevations described herein at a minimum. When allowed by the Engineer, the Contractor may elect to cut off a portion of the sheet piling leaving the remainder in place. Removed sheet piling components shall become the property of the Contractor.

The Contractor shall exercise extreme caution not to damage elements of existing structures, pavements or other items not specifically identified for removal. Any damage to the existing elements or adjacent utilities and/or properties is the responsibility of the Contractor and Contractor shall repair any such damage to the satisfaction of the Department and at no cost to the Department.

Traffic Operations. Traffic using Interstates I-90/94 and I-290 and associated ramps must remain open to all lanes of traffic during demolition activities unless the Contractor has secured the necessary permits from the Illinois Department of Transportation to allow for temporary closure of lanes.

Method of Measurement. CONCRETE REMOVAL (SPECIAL), as described above will be measured for payment in place prior to removal and volume computed in cubic yards.

PILE REMOVAL, SPECIAL shall be measured for payment in place prior to removal per foot of pile removed, regardless of pile size or material.

SHEET PILE REMOVAL, SPECIAL shall be measured for payment in place prior to removal per square foot of sheet piling to be removed, regardless of sheet piling dimensions or properties.

Earth excavation necessary to perform the removal of existing foundation elements will not be measured for payment. All excavation in order to access the obstruction to be removed shall be considered required in order to perform construction of the proposed project elements.

Basis of Payment. Removal of concrete will be paid for at the Contract unit price per cubic yard for CONCRETE REMOVAL(SPECIAL) which payment shall be full compensation for the work described herein and as directed by the Engineer.

Removal of piles will be paid for at the contract unit price per foot for PILE REMOVAL, SPECIAL which payment shall be full compensation for the work described herein and as directed by the Engineer.

Removal of sheet piling will be paid for at the contract unit price per square foot for SHEET PILE REMOVAL, SPECIAL which payment shall be full compensation for the work described herein and as directed by the Engineer.

## **FOUNDATION CONSTRUCTION AT EXISTING OBSTRUCTIONS**

Description. This work shall consist of providing all labor, materials, and equipment necessary to construct drilled shafts at locations where man-made obstructions are encountered. The drawings have identified locations where new foundations are anticipated to be in conflict with existing concrete footings, timber piles, or abandoned tunnel. If additional man-made obstruction locations are encountered, as determined in the field by the Engineer, they shall also be covered by this specification.

Furnishing, fabricating and installing of drilled shafts shall be completed and paid for as described in their respective pay items.

The work under this item is considered additional compensation for the resources required to install drilled shafts through the identified obstructions. The Engineer shall determine applicability of this specification in the field when an obstruction is encountered.

This Special Provision applies to man-made obstructions. Non-manmade obstructions are covered in Standard Specification Article 516.14. Obstruction mitigation for non-manmade obstructions is paid for in accordance with Article 109.04 of the Standard Specifications.

Equipment. The Contractor shall be responsible to provide the equipment required to advance the drilled shafts through previously constructed structures such as, but not limited to, concrete footings, timber piles, and abandoned tunnel that are present. The Construction tolerances and requirements for the drilled foundations shall not be relieved due to the presence of an obstruction. The Contractor is cautioned that although a best effort was made to identify the locations of the existing structures, additional obstructions may be found during the construction.

The drilling equipment shall have adequate capacity, including power, torque and down thrust, to create a shaft excavation of the maximum diameter specified to a depth of 20 percent beyond the depths shown on the plans.

The equipment shall be capable of drilling a straight and true shaft as required by the specifications through existing reinforced concrete structures, timber piles and other man-made obstructions that are encountered in the drilling.

Construction Requirements. The Contractor is alerted to the following known obstructions:

- Existing reinforced concrete footing and timber piles for west abutment and wingwall of S.N. 016-0588 at location of proposed drilled shafts for the Jackson Blvd. west abutment (S.N. 016-1702).
- Existing reinforced concrete footing and timber piles for east abutment and wingwall of S.N. 016-0588 at location of proposed drilled shafts for the Jackson Blvd. east abutment and southeast wingwall (S.N. 016-1702).
- Existing reinforced concrete abandoned freight tunnel at location of proposed drilled shafts for the Jackson Blvd. east abutment (S.N. 016-1702).

See contract drawings for plans for the existing structures involved in this work. The plans, however, may not show all modifications that have been made to the structures over the years. The completeness of these plans is not guaranteed and no responsibility is assumed by IDOT for their accuracy. Information is furnished for the Contractor's convenience and is to be used solely at the Contractor's risk. No additional compensation shall be permitted for any variances from existing plans.

The Contractor shall submit to the Engineer a proposed construction sequence for approval prior to the beginning of this work. The submittal shall include the methods and equipment used in accomplishing the work.

Method of Measurement. The Contractor shall provide equipment, labor and materials as required to install drilled shafts at the locations shown on the drawings. Where man-made obstructions are encountered, as determined by the Engineer, the Contractor will be paid the unit price per each for each proposed shaft affected by obstructions, in addition to the applicable pay items for Drilled Shaft as specified elsewhere.

Basis of Payment. The drilling of foundations through obstructions as described above will be paid for at the contract unit bid price per each proposed shaft affected for FOUNDATION CONSTRUCTION AT EXISTING OBSTRUCTIONS.

## **PREFORMED JOINT FILLER**

Description. This work shall consist of removing existing damaged joint material, preparing the joint opening faces and furnishing and installing a bonded preformed joint seal with the necessary bonding epoxy into retaining wall joints.

Materials. The material may be any one of the types specified in Section 1051 of the Standard Specifications. The adhesive used to bond the joint sealer shall be supplied by the manufacturer of the bonded preformed joint seal and shall meet the following requirements:

The adhesive shall be epoxy base, dual component, which resists salt, diluted acids, alkalis, solvents, greases, oils, moisture, sunlight and weathering. Temperatures up to 200 °F (93 °C) shall not reduce bond strength. At 68 °F (20 °C), the bond strength shall be a minimum of 1000 psi (6.9 MPa) within 24 hours.

Pot Life; min.	40 minutes @ 68 °F (20 °C)
Tensile Strength; min.	4000 psi (28 MPa)
Solids Hardness; max.	5 mohs
Flash Point; min.	200 °F (93 °C)
Axial Compression; min.	8760 psi (60 MPa)
Complete Cure; max.	7 days @ 68 °F (20 °C)
Concrete Bond Strength; min.	4000 psi (28 MPa)
Steel Bond Strength; min.	4000 psi (28 MPa)

Any primers or cleaning solutions used on the faces of the joint or on the profile of the sides of the bonded preformed joint seal shall be supplied by the manufacturer of the bonded preformed joint seal. Any additional installation materials and adhesive for splicing joint sections, shall be as supplied by the manufacturer of the bonded preformed joint seal.

Installation. The inside surfaces of the joint opening shall be roughened by sand blasting clean elastomeric polymer concrete on an elastomeric polymer concrete walled joint. The depth of roughening of the joint shall equal the depth of the bonded portion of the preformed joint material. After roughening, the joint shall be cleaned with compressed air. The compressed air shall be according to the cleanliness requirements of ASTM D 4285. The bonded preformed joint seal shall be wiped with a primer that promotes adhesion when recommended by the joint manufacturer. The epoxy adhesive shall then be applied, both to the inner walls of the joint, and to the exterior surfaces of the joint seal. Immediately after blow down, the primer and adhesive shall be applied in the amounts recommended by the joint manufacturer. Maximum application lengths of joints for a pound (kilogram) of epoxy shall be supplied by the joint seal manufacturer.

The joint filler shall be cut from the least practicable number of pieces to fit exactly and completely fill the space shown on the plans. Loose-fitting or open points between sections of filler or between filler and concrete will not be permitted.

The joint seal with epoxy shall be inserted into the joint and held tightly against both sides of the joint until sufficient bond strength has been developed to resist the expected expansion forces. The seal shall be placed so the top of the seal is approximately 1/8 in. (3 mm) recessed.

Bonded preformed joint seals shall not be installed when temperatures below 50 °F (10 °C) are predicted within a 48-hour period.

Method of Measurement. The bonded preformed joint seal will be measured in place, in feet along the centerline of the joint.

Basis of Payment. This work will be paid for at the contract unit price per foot for PREFORMED JOINT FILLER, of the size specified. Such payment shall constitute payment in full for removal of existing damaged joint material, preparation of existing concrete, and furnishing and installing the preformed joint filler as detailed in the plans and as directed by the Engineer.

## **REMOVE ABANDONED GAS MAIN**

Description. This work shall consist of the excavation, removal, satisfactory disposal, plugging and backfilling of the existing abandoned gas main at locations as shown on the Plans or as directed by the Engineer.

### Construction Requirements:

Prior to any utility removal, the Contractor shall verify with the respective utility company that the subject utility structure is no longer in service. The abandoned gas main shall be removed within the limits where it conflicts with the proposed improvements, and as directed by the Engineer. The abandoned gas main that has been determined to not be affected by the proposed improvements may remain abandoned in-place. All pipes to be abandoned under this item shall have all openings sealed with a one (1) foot minimum length concrete plug. Gas valves, Gas vaults, Elbows and Tees and Collars and Temporary plugs are incidental to this pay item.

### Backfilling for Utility Removals:

Suitable excavated material from the utility removal excavation trench shall be used as backfill for the voids created by the same excavation. Excavated material from utility removal will not be allowed as backfill or embankment at other locations on the project site. Backfilling the void left by the removal operation shall be included in the cost of the item.

Method of Measurement. This work will be measured for payment in feet along the centerline of the abandoned gas main.

Basis of Payment. This work will be paid for at the contract unit price per foot for REMOVE ABANDONED GAS MAIN, which price shall include materials, equipment and labor to complete the work as described and includes excavation, removal and proper disposal of the existing abandoned gas main, valves, vaults, elbows, Tee, collars and plugging the ends of the sections of pipe to remain in-place and backfilling.



**CLASS SI CONCRETE (MISCELLANEOUS)**

Description. This work shall consist of providing equipment, materials and labor required to install a cast-in-place concrete fascia wall with concrete reveals at locations shown on the drawings and/or designated by the Engineer. It includes all reinforcing bars, stud shear connectors, timber lagging, waterproofing, preformed joint filler, and drainage-related elements required for the construction of the complete wall as shown on the drawings.

General. Contractor shall construct completely the fascia wall as shown on the drawings and in conformance with Standard Specifications. The Contractor shall construct the timber lagging and all connections to the drilled shaft (henceforth referred to as the lagging system). The Contractor shall submit calculations and details of the connections to the Engineer for approval. The calculations shall be prepared and sealed by an Illinois Licensed Structural Engineer. This task is included in CLASS SI CONCRETE (MISCELLANEOUS).

Construction Requirements. Construction requirements for elements of the fascia wall complete shall conform to the following:

- a) Falsework..... Section 503.05
- b) Forms.....Section 503.06
- c) Placing and Consolidating..... Section 503.07
- d) Construction Joints .....Section 503.09
- e) Expansion Joints.....Section 503.10
- f) Drainage Openings ..... Section 503.11
- g) Non-Metallic Water Seals .....Section 503.12
- h) Surface Finish.....Section 503.15
- i) Curing .....Section 503.17
- j) Waterproofing .....Section 503.18
- k) Protective Coat Application.....Section 503.19
- l) Stud Shear Connectors ..... Section 505.08
- m) Timber Structures .....Section 507
- n) Reinforcing Bars..... Section 508

Fascia Wall shall be constructed in accordance with the requirements of Section 503.

After installation of the drilled shafts and after excavation has exposed the shafts to plan dimensions, inspect the shafts for quality of concrete and suitability of surface for installation of dowel bars. Patch all honeycombed or voided areas in order to provide sound surface for installation of dowel bars and drainage materials. Concrete repair materials and installation methods shall be submitted for approval to the Engineer. This work is considered included in this pay item.

Where timber lagging is called for in the drawings and /or the approved design, the Contractor shall furnish lagging materials and all connections to drilled shafts as required. Remove loose soil from and between caissons. Install lagging from the top down as excavation proceeds. Minimize over-excavation and backfill voids created using dry loose sand. Nominal thickness of the lagging shall not be less than 3 inches. The Contractor shall be responsible for the performance of the lagging system until the facing is installed. Alternative equivalent systems may be submitted for approval by the Engineer.

Furnish and install reinforcing bars, dowel bars, and stud shear connectors. Furnish and install drainage structures as shown on the drawings. Alternative equivalent systems shall account for drainage.

Contractor shall provide calculations and drawings for the concrete fascia formwork support during installation and curing. The calculations shall be stamped by an Illinois Licensed Structural Engineer. The formwork support system shall be reinforced against bulging and shall maintain the plumb and line of the wall as described in the contract documents.

Place expansion and/or control joints as described on the drawings and Standard Specifications. Horizontal construction joints are not allowed.

Formwork shall become the property of the Contractor after use.

Materials. Materials shall be as designated in Section 503.02 except as modified herein.

Concrete shall conform to Section 1020, and shall conform to Class SI concrete mix.

Furnishing and installing dowels into drilled shafts that support or reinforce the wall as shown on drawings or is needed in lagging design is included in this pay item.

Stud shear connectors shall conform to Section 1006.32. Furnishing and installing stud shear connectors onto permanent casing is included in this pay item.

Preformed flexible foam expansion joint filler shall conform to Section 1051.09, and is included in this pay item.

Drainage related items as shown on the drawings are included in this pay item, including drainage board, geo-composite wall drains, water-stops, vapor barrier and other separator sheets. Wall drainage-related items shall conform to Standard Specification 1040. Installation of geo-composite wall drain materials shall conform to Standard Specifications section 591, except that the drains shall be fastened to the shafts with wall nails or other suitable method as directed by the Engineer.

Untreated timber lagging shall meet the requirements of Section 1007.03 and the inspection requirements of Section 1007.01. Timber fastenings shall meet the requirements of Section 1006.17. Minimum design strength of the structural timber shall be 1000 PSI.

Method of Measurement. The work included in CLASS SI CONCRETE ( MISCELLANEOUS) shall be measured in place and the volume computed in cubic yards of fascia wall from base of wall to the top of the poured wall. The width of the wall varies from point of tangency to drilled shafts to maximum thickness between drilled shafts as shown on the drawings. Concrete reveals will not be measured, but shall be considered included in the pay item. Additional concrete required due to out of alignment of the drilled shafts shall not be included in the measurement.

Dowel bars, reinforcing bars, stud shear connectors, untreated timber lagging, preformed joint filler, drainage board, additional backfill for voids created during construction, geo-composite wall drains or any other appurtenances required for the completed wall will not be measured separately but shall be included in this pay item.

Untreated Timber Lagging shall not be measured or paid for separately but shall be included in this pay item.

Basis of Payment. The work will be paid for at the contract unit price per furnished and installed CUBIC YARD of concrete for CLASS SI CONCRETE (MISCELLANEOUS).

### **DECORATIVE RAILING (PARAPET MOUNTED)**

The railing shall conform to Section 503 and 509 of the Standard Specifications except as herein modified.

Description. This Work consists of furnishing and installing Chicago Barrier aluminum railing system of the type specified at locations shown on the Plans or directed by the Engineer, and in accordance with the details shown in the Plans.

Materials. Aluminum alloys 6063-T6 and 6061-T6 can be used interchangeably at the option of the manufacturer, with the requirements that the minimum physical properties must be 2500 PSI yield, 30,000 PSI Ultimate yield, and 10% elongations.

Color and finish: Clear anodized with minimum 1.0 mil thickness. Color samples are to be submitted to the Engineer for approval.

General. The rail sections must be factory pre-bent into curves to form radii rather than employing angular splices at the expansion joints. Any bending must be done prior to finishing to avoid distortion of the rail and/or damage to the finishing properties of the alloy.

#### Submittals.

1. Manufactures certification that aluminum rail and connections meet IDOT and CDOT specifications.
2. Shop drawings including wall and railing system.
3. Color and finish sample of railing.
4. Mockup of railings. One 10' panel including stanchions.
5. Calculations signed and sealed by an Illinois Registered Professional Structural Engineer

Coordination: Coordinate with Chicago Wall concrete barrier manufacturer, fence manufacturer, electrical and traffic surveillance requirements to install conduit and junction boxes.

Complete shop drawings and calculations by an Illinois Registered Professional Structural Engineer, and field installation drawings must be submitted to the Engineer for approval prior to ordering materials, commencement of any shop fabrication, and/or finishing.

Aluminum Railing. The aluminum rail system must be in accordance with the Plans and with AASHTO-AGC-ARTBE Joint Committee Task Force 13 Report "A Guide to Standardized Highway Barrier Hardware." This system must meet and match the shape, and composition of the Aluminum Railing as furnished and installed for the North Lake Shore Drive Project. Alternate systems that meet all requirements and specifications will be considered by the Engineer if submitted for approval at the time of the Pre-Bid Conference.

There will be a single source responsibility for the aluminum rail system, which will include but not be limited to the aluminum railing, the aluminum supports (stanchion system), anodizing, splices, finish, thief protection system, structural calculations, and the design of all components above the top horizontal plane of the concrete wall system, bolts, fasteners, welding, shop fabrication, field erection, anchoring system, and freight etc. Bolts, studs, and embedment required must also be by the Contractor.

Design Requirements. The design requirements must be as set forth in the AASHTO Task Force 13 Report ("A Guide to Standardized Highway Barrier Hardware")

The cross section must conform to an ellipse 4" x 7 7/8".

Exposed fasteners must be stainless steel. All bolts must be A307.

No field welding will be permitted.

Structural Requirements: The aluminum railing system must conform to the requirements of AASHTO "Standard Specifications for Highway Bridges" Section 2.7.

All thickness and material specifications requirements, unless otherwise approved by the Engineer, must be based on certifications based on structural calculations provided by the Contractor.

Acceptable Rail Manufactures:

1. Valentine & Company, Middletown, OH.
2. Approved Equal.

Method of Measurement. This Work will be measured for payment, complete in place, per foot.

Basis of Payment. This Work will be paid for at the Contract Unit Price per foot for DECORATIVE RAILING (PARAPET MOUNTED), which price includes furnishing and placing all material required, including all labor, equipment and incidentals necessary to complete the Work as herein specified.

## **STEEL RAILING REMOVAL**

Description. This work shall consist of all material, labor and equipment required for the removal and disposal of existing steel railing attached to Existing Jackson Bridge east and west wignwalls. The work shall be done in accordance with the applicable portions of Section 501 of the Standard Specifications, as described herein, and as shown on the Plans.

General. The existing steel railing, including, but not limited to, posts and connecting hardware, shall be removed and disposed of by the Contractor as indicated on the Plans.

All materials removed under this Item shall become the property of the Contractor and shall be disposed of by the Contractor off the site and in a lawful manner meeting all IDOT Policies and Procedures.

Method of Measurement. The removal of steel railing shall be measured for payment in place in feet. The length measured will be the overall length along the top longitudinal rail element through all posts and gaps.

Basis of Payment. This work shall be paid for at the contract unit price per foot for STEEL RAILING REMOVAL.

**BRIDGE DECK GROOVING (LONGITUDINAL)**

Effective: December 29, 2014

Revised: March 29, 2017

Revise Article 503.16(a)(3)b. to read as follows.

b. Saw Cut Grooving. The grooving operation shall not be started until after the expiration of the required curing or protection period and after correcting excessive variations by grinding or cutting has been completed.

The grooves shall be cut into the hardened concrete, parallel to the centerline of the roadway, using a mechanical saw device equipped with diamond blades that will leave grooves 1/8 in. wide and 3/16 in.  $\pm$  1/16 in. deep (3 mm wide and 5 mm  $\pm$  1.5 mm deep), with a uniform spacing of 3/4 in.  $\pm$  1/16 in. (20 mm  $\pm$  1.5 mm) centers. The grooving shall terminate 1.5 ft. from the faces of curbs or parapet. If the bridge has a variable width traffic lane, the grooving shall remain parallel to the centerline of the main roadway. Any staggering of the groove terminations to accommodate the variable width shall be within the shoulders. Grooves shall not be cut closer than 3 inches (75 mm) nor further than 6 inches (150 mm) from any construction joint running parallel to the grooving. In addition, grooves shall not be cut within 6 in.  $\pm$  1 in. (150 mm  $\pm$  25 mm) from deck drains and expansion joints.

The grooving machine shall contain diamond blades mounted on a multi-blade arbor on a self-propelled machine built for grooving hardened concrete surfaces. The grooving machine shall have a depth control device that detects variations in the deck surface and adjusts the cutting head height to maintain a specified depth of groove. The grooving machine shall have a guide device to control multi-pass alignment.

The removal of slurry shall be continuous throughout the grooving operations. The grooving equipment shall be equipped with vacuum slurry pickup equipment which shall continuously pick up water and sawing dust, and pump the slurry to a collection tank. The slurry shall be disposed of offsite according to Article 202.03.

Cleanup shall be continuous throughout the grooving operation. All grooved areas of the deck shall be flushed with water as soon as possible to remove any slurry material not collected by the vacuum pickup. Flushing shall be continued until all surfaces are clean.

Method of Measurement. This work shall be measured for payment according to Article 503.21(b) except no measurement will be made for any grooving of the shoulders to accommodate a variable width traffic lane.

Basis of Payment. This work will be paid for at the contract unit price per square yard (square meter) for BRIDGE DECK GROOVING (LONGITUDINAL).

## **DRAINAGE SYSTEM**

Description. This work shall consist of furnishing and installing a bridge drainage system as shown on the plans, including all piping, fittings, support brackets, inserts, bolts, and splash blocks when specified. This work shall also include all work for connections underground to existing or proposed systems as show in the plans.

Material. The pipe and fitting material shall be either ductile iron or reinforced fiberglass as shown on the plans.

Ductile Iron pipe shall confirm to ANSI/AWWA C150/A21.50. Push-on joints, mechanical joints, and boltless restrained joints shall conform to ANSI/AWWA C111/A21.11. Manufacture fittings for ductile iron pipe shall be according to ANSI/AWWA C110/A21.10 or ANSI/AWWA C153/A21.53, and ANSI/AWWA C111/A21.11. Provide gaskets conforming to ANSI/AWWA for each length of pipe and suitable for the type of joint of the pipe.

The pipe and fittings shall be reinforced fiberglass according to ASTM D 2996 RTRP with a 30,000 psi (207 MPa) minimum short-time rupture strength hoop tensile stress. The reinforced fiberglass shall also have an apparent stiffness factor at 5 percent deflection exceeding 200 cu in.-lb/sq. in. (22.6 cu mm-kPa) and a minimum wall thickness of 0.10 in. (2.54 mm). The adhesive for joining pipe and fittings shall be as recommended by the manufacturer. All pipe supports and associated hardware shall be hot dip galvanized according to AASHTO M 232 (M232M). The fiberglass pipe and fittings furnished shall be pigmented throughout, or have a resin-rich pigmented exterior coat, specifically designed for overcoating fiberglass, as recommended by the manufacturer. The color shall be as specified by the Engineer. The resin in either case shall have an ultraviolet absorber designed to prevent ultraviolet degradation. The ultraviolet protection shall be designed to withstand a minimum of 2,500 hours of accelerated weathering when tested in conformance with the requirements in ASTM Designation: G 154. Lamps shall be UV-8 (313 nm wavelength). The resting cycle shall be 4 hours of ultraviolet exposure at 140°F (60°C), and then 4 hours of condensate exposure at 120°F (49°C). After testing, the surface of the pipe shall exhibit no fiber exposure, crazing, or checking, and only a slight chalking or color change. The supplier shall certify the material supplied meets or exceeds these requirements.

Design. The drainage system shall be designed as an open system with allowances for the differential expansion and contraction expected between the superstructure and the substructure to which the drainage system is attached. This work shall also include all work for connections underground to existing or proposed systems as show in the plans.



Installation. All connections of pipes and fittings shown on the plans to facilitate future removal for maintenance cleanout or flushing shall be made with a threaded, gasketed coupler or a bolted gasketed flange system. Adhesive bonded joints will be permitted for runs of pipe between such connections. The end run connection shall feature a minimum nominal 6 in. (150 mm) female threaded fiberglass outlet. Straight runs may utilize a 45 degree reducing saddle bonded to the pipe. The female outlet shall be filled with a male threaded PVC plug.

Runs of pipe shall be supported at spacings not exceeding those recommended by the manufacturer of the pipe. Supports that have point contact or narrow supporting areas shall be avoided. Standard slings, clamps, clevis hangers and shoe supports designed for use with steel pipe may be used. A minimum strap width for hangers shall be 1 1/2 in. (40 mm) for all pipe under 12 in. (300 mm) in diameter and 2 in. (50 mm) for diameters 12 in. (300 mm) or greater. Straps shall have 120 degrees of contact with the pipe. Pipes supported on less than 120 degrees of contact shall have a split fiberglass pipe protective sleeve bonded in place with adhesive.

All pipe, fittings, and expansion joints shall be handled and installed according to guidelines and procedures recommended by the manufacturer or supplier of the material.

Basis of Payment. This work will be paid for at the contract lump sum price for DRAINAGE SYSTEM.

## **MECHANICALLY STABILIZED EARTH RETAINING WALL, SPECIAL**

**Description.** This work shall consist of preparing the design, furnishing the materials, and constructing the mechanically stabilized earth (MSE) retaining wall to the lines, grades and dimensions shown in the contract plans and as directed by the Engineer. The work shall be done in accordance with the applicable portions of Section 522 of the Standard Specifications, as described herein, as detailed in the plans and as directed by the Engineer.

The MSE wall consists of a MSE wall design, concrete leveling pad, precast concrete face panels, textured formliners for precast concrete face panels, architectural treatment, sacrificial fascia, a soil reinforcing system, concrete coping and any other construction accessories necessary to construct the wall.

**Submittals.** The wall system supplier shall submit complete design calculations and shop drawings to the Engineer per Article 522.05 of the Standard Specifications no later than 90 days prior to beginning construction of the wall. No work or ordering of materials for the structure shall be done by the Contractor until the submittal has been approved in writing by the Engineer. All submittals shall be sealed by an Illinois Licensed Structural Engineer and shall include all details, dimensions, quantities and cross sections necessary to construct the wall and shall include, but not be limited to, the following items:

(a) Plan, elevation and cross section sheet(s) for each wall showing the following:

- (1) A plan view of the wall indicating the offsets from the construction centerline to the face of the wall at all changes in horizontal alignment. The plan view shall show the limits of soil reinforcement and stations where changes in length and/or size of reinforcement occur. The centerline shall be shown for all drainage structures or pipes behind or passing through and/or under the wall.
- (2) An elevation view of the wall indicating the elevations of the top of the panels. These elevations shall be at or above the top of exposed panel line shown on the contract plans. This view shall show the elevations of the top of the leveling pads, all steps in the leveling pads and the finished grade line. Each panel type, the number, size and length of soil reinforcement connected to the panel shall be designated. The equivalent uniform applied service (unfactored) nominal bearing pressure shall be shown for each designed wall section.
- (3) Elevation views of entire wall indicating layout of all panel types and architectural treatment and formliner.
- (4) A listing of the summary of quantities shall be provided on the elevation sheet of each wall.

- (5) Typical cross section(s) showing the limits of the reinforced fill volume included within the wall system, soil reinforcement, embankment material placed behind the fill, precast face panels, and their relationship to the right-of-way limits, excavation cut slopes, existing ground conditions and the finished grade line.
- (6) All general notes required for constructing the wall.
- (b) All details for the concrete leveling pads, including the steps, shall be shown. The top of the leveling pad shall be located at or below the theoretical top of the leveling pad line shown on the contract plans. The theoretical top of leveling pad line shall be 3.5 ft. (1.1 m) below finished grade line at the front face of the wall, unless otherwise shown on the plans.
- (c) Where concrete coping or barrier is specified, the panels shall extend up into the coping or barrier as shown in the plans. The top of the panels may be level or sloped to satisfy the top of exposed panel line shown on the contract plans. Cast-in-place concrete will not be an acceptable replacement for panel areas below the top of exposed panel line. As an alternative to cast in place coping, the Contractor may substitute a precast coping, the details of which must be included in the shop drawings and approved by the Engineer.
- (d) All panel types shall be detailed. The details shall show all dimensions necessary to cast and construct each type of panel, architectural treatment, all reinforcing steel in the panel, and the location of soil reinforcement connection devices embedded in the panels. These panel embed devices shall not be in contact with the panel reinforcement steel.
- (e) All details of the wall panels and soil reinforcement placement around all appurtenances located behind, on top of, or passing through the soil reinforced wall volume such as parapets with anchorage slabs, approach slabs, coping, foundations, and utilities etc. shall be clearly indicated. Any modifications to the design of these appurtenances to accommodate a particular system shall also be submitted.
- (f) When specified on the contract plans, all details of architectural panel treatment, including color, texture and form liners shall be shown.
- (g) The details for the connection between cast-in-place concrete fascia, embed devices, and soil reinforcement shall be shown.

- (h) When pile sleeves are specified, the pile sleeve material, shape, and wall thickness shall be submitted to the Engineer for approval. It shall have adequate strength to withstand the fill pressures without collapse until after completion of the wall settlement. The annulus between the pile and the sleeve shall be as small as possible while still allowing it to be filled with loose dry sand after wall erection.
- (i) Sample: 2'x2' sample for each formliner type indicated on drawings for approval of texture and finish. If the test samples are not approved, additional samples shall be furnished until a satisfactory texture and finish is obtained, at no additional cost to the Department.
- (j) Mock up: Full size sample of all panel types as show in the contract plans, including final appearance of texture and finish. The mock-up approved by the Engineer shall then be the standard of comparison for the remaining finishes

The initial submittal shall include three sets of shop drawings and one set of calculations. One set of drawings will be returned to the Contractor with any corrections indicated. After approval, the Contractor shall furnish the Engineer with ten (10) sets of corrected plan prints for distribution by the Department. No work or ordering of materials for the structure shall be done until the submittal has been approved by the Engineer.

**Materials.** The material shall be in accordance with the applicable portions of Article 522.02 of the Standard Specifications except as modified herein:

- (a) Lightweight fill, defined as the material placed in the reinforced volume behind the cast-in-place concrete fascia, shall be according to the Special Provision for LIGHTWEIGHT CELLULAR CONCRETE FILL (D-1).

**Design Criteria.** MSE wall shall be designed according to Article 522.09 of the Standard Specifications.

**Construction.** MSE wall shall be constructed according to Article 522.09 of the Standard Specifications.

**Method of Measurement.** Mechanically Stabilized Earth Retaining Wall, Special will be measured for payment in square feet (square meters). The MSE retaining wall will be measured from the top of exposed panel line to the theoretical top of leveling pad line for the length of the wall as shown on the contract plans.

**Basis of Payment.** This work will be paid for at the contract unit price per square foot (square meter) for MECHANICALLY STABILIZED EARTH RETAINING WALL, SPECIAL.

Furnishing and placing Lightweight Cellular Concrete Fill shall be as measured and paid in accordance with the special provision LIGHTWEIGHT CELLULAR CONCRETE FILL (D-1).

Concrete coping, when specified on the plans, will not be paid separately. Other concrete appurtenances such as anchorage slabs, approach slab, parapets, abutment caps, etc. will not be included in this work, but will be paid for as specified elsewhere in this contract, unless otherwise noted on the plans.

Excavation necessary to place the fill for the MSE wall shall be paid for as STRUCTURE EXCAVATION, according to Section 502.

Obstruction mitigation will be paid for according to Article 109.04.

Any costs related to obtaining technical assistance for the construction a wall system from a particular supplier will not be paid for separately but shall be included in the unit price bid for that item of work.

## **REMOVAL OF ASBESTOS CEMENT CONDUIT**

Description: This work consists of the removal and disposal of friable asbestos cement electrical conduits owned by the City of Chicago and Illinois Department of Transportation (IDOT). which are buried under streets and sidewalks. All work shall be done in accordance with the requirements of the U.S. Environmental Protection Agency (USEPA), the Illinois Environmental Protection Agency (IEPA), the Occupational Safety and Health Administration (OSHA), and as outlined herein.

Under the existing Adams Street bridge and in the Adams Street right-of-way, the City of Chicago (OEMC) has 1-4 duct package that provides connections for their Office of Emergency Management and Communications (OEMC). In the existing Jackson Boulevard right-of-way, the City of Chicago (OEMC) has 2-4 duct packages that provides connections for their Office of Emergency Management and Communications (OEMC). The City of Chicago Division of Electric Operations and IDOT (both roadway lighting and Intelligent Transportation Systems) also have duct packages that provide connections for facilities across I-90/94. There are active facilities in these ducts that will be rerouted during construction.

The City of Chicago and IDOT have identified that records are unclear if asbestos concrete is present in the existing conduits. Prior to any removal of any conduit material, the existing conduits must be tested for the presence of asbestos content by qualified personnel and/or qualified testing firm. Tests should be comprehensive, and include detailed visual inspection, sampling as determined by qualified testing firm or personnel and laboratory testing of samples in order to determine if conduits include asbestos cement. Each of the existing conduits should be independently reviewed due to unknown installation or maintenance improvement records. No separate payment for testing of the existing conduits will be made. The testing of existing conduits shall be included as part of REMOVAL OF EXISTING STRUCTURES for bridge-attached conduits or EARTH EXCAVATION for buried conduits. All testing records and results shall be provided to the Engineer prior to any removal of existing City of Chicago or IDOT conduits.

If testing identifies that asbestos cement is not present in the existing conduits, the conduits shall be demolished as part of REMOVAL OF EXISTING STRUCTURES or removed as part of EARTH EXCAVATION. If testing identifies that asbestos cement is present in the existing conduits, the removal of the conduits shall follow the procedures identified within this specification.

The work involved in the removal and disposal of friable or non-friable asbestos done prior to demolition of the Adams Street Bridge structure and any proximate excavation in the Adams Street or Jackson Boulevard shall be performed by a qualified Contractor or Sub-Contractor.

The Contractor shall provide a shipping manifest to the Engineer for the disposal of all asbestos containing material wastes.

Permits: The Contractor shall apply for permit(s) in compliance with applicable regulations of the Illinois Environmental Protection Agency. Any and all other permits required by other federal, state, or local agencies for carrying on the work will be the responsibility of the Contractor. Copies of these permits must be sent to the district office and the Engineer.

Notifications: The “Demolition/Renovation Notice” form, which can be obtained from the IEPA office, shall be completed and submitted to the agencies listed below at least 10 days prior to commencement of any asbestos removal or demolition activity.

- A. Asbestos Demolition/Renovation Coordination  
Illinois Environmental Protection Agency  
Division of Air Pollution Control  
P. O. Box 19276  
Springfield, Illinois 62794-9276  
(217) 785-1743
  
- B. U. S. Environmental Protection Agency  
Air Compliance Branch  
77 W. Jackson Blvd  
Chicago, Illinois 60604  
Attention: Asbestos Coordinator

Notices must be updated if there is a change in the starting date or the amount of asbestos changes by more than 20 percent.

Submittals

- A. All submittals and notices shall be made to the Engineer except where otherwise specified herein.
  
- B. Submittals that shall be made prior to start of work:
  - 1. Submittals required under Asbestos Abatement Experience.
  
  - 2. Submit documentation indicating that all employees have had medical examinations and instruction on the hazards of asbestos exposure, on use and fitting of respirators, on protective dress, on use of showers, on entry and exit from work areas, and on all aspects of work procedures and protective measures as specified in Worker Protection Procedures.
  
  - 3. Submit manufacturer's certification stating that vacuums, ventilation equipment, and other equipment required to contain airborne fibers conform to ANSI 29.2.
  
  - 4. Submit to the Engineer the brand name, manufacturer, and specification of all sealants or surfactants to be used. Testing under existing conditions will be required at the direction of the Engineer.

5. Submit proof that all required permits, site locations, and arrangements for transport and disposal of asbestos-containing or asbestos-contaminated materials, supplies, and the like have been obtained (i.e., a letter of authorization to utilize designated landfill).
    - i. Information about vehicles and equipment utilized for transport of material designated for disposal shall be submitted. This should include methods for restricting loose fibers from being released during travel.
  6. Submit a list of penalties, including liquidated damages, incurred through non-compliance with asbestos abatement project specifications.
  7. Submit a project specific Health and Safety plan for the removal operations. The Health and Safety Plan must be approved and signed by sub-contractor and Contractor personnel, and shall be provided to the Engineer prior to commencing site work activities. The Contractor shall be and remain liable for compliance by and subcontractors with the Contractor's Health and Safety Plan and procedures for the site and shall hold Engineer and Department harmless from all claims, damages, suits, losses and expenses in any way arising from non-compliance with the Health and Safety Plan.
    - i. In particular, the Health and Safety Plan shall address personal protection from asbestos fiber releases during asbestos abatement.
  8. Submit a detailed plan of the procedures proposed for use in complying with the requirements of this specification. Include in the plan the location and layout of decontamination units, the sequencing of work, the respiratory protection plan to be used during this work, a site safety plan, a disposal plan including the location of an approved disposal site, and a detailed description of the methods to be used to control pollution. The plan must be submitted to the Engineer prior to the start of work.
  9. Submit proof of written notification and compliance with Paragraph "Notifications."
- C. Submittals that shall be made upon completion of abatement work:
1. Submit copies of all waste chain-of-custodies, trip tickets, and disposal receipts for all asbestos waste materials removed from the work area;
  2. Submit daily copies of work site entry logbooks with information on worker and visitor access;
  3. Submit logs documenting filter changes on respirators. HEPA vacuums, negative pressure ventilation units, and other engineering controls; and
  4. Submit results of any bulk material analysis and air sampling data collected during the course of the abatement including results of any on-site testing by any federal, state, or local agency.



Certificate of Insurance:

- A. The Contractor shall document general liability insurance for personal injury, occupational disease and sickness or death, and property damage.
- B. The Contractor shall document current Workmen's Compensation Insurance coverage.
- C. The Contractor shall supply insurance certificates as specified by the Department.

Asbestos Abatement Experience:

A. Company Experience:

- 1. Prior to start of work, the Contractor shall supply:

- a. Evidence that he/she has been qualified with the State of Illinois and he/she are included on the Illinois Department of Public Health's list of approved Contractors.

B. Personnel Experience:

- 1. For Superintendent, the Contractor shall supply:

- a. Evidence of knowledge of applicable regulations in safety and environmental protection is required as well as training in asbestos abatement as evidenced by the successful completion of a training course in supervision of asbestos abatement as specified in 40 CFR 763, Subpart E, Appendix C, EPA Model Contractor Accreditation Plan. A copy of the certificate of successful completion must be provided to the Engineer prior to the start of work.
- b. Documentation of experience with abatement work in a supervisory position as evidenced through supervising at least two asbestos abatement projects; provide names, contact, phone number, and locations of two projects in which the individual(s) has worked in a supervisory capacity.
- c. The superintendent shall be thoroughly familiar with and experienced at asbestos abatement, characterization, bulking, transportation, and disposal activities and other related work, and shall be familiar with and shall enforce the use of all applicable safety procedures and equipment. The Supervisor shall be knowledgeable of, and enforce, all applicable, USEPA, IEPA, and OSHA requirements and guidelines.

2. For Workers involved in the Removal of Friable and Nonfriable Asbestos the Contractor shall provide:
  - a. Training as evidenced by the participation and successful completion of an accredited training course for asbestos abatement workers as specified in 40 CFR 763, Subpart E, Appendix C, EPA Model Contractor Accreditation Plan. A copy of the certificate of successful completion must be provided to all employees who will be working on this project.
  - b. Workers shall be familiar with and experienced at asbestos abatement, characterization, bulking, transportation, and disposal activities and other related work; and Asbestos Workers shall be familiar with the use of applicable safety procedures and equipment.

Abatement Air Monitoring:

The Contractor shall comply with the following:

A. Personal Monitoring:

1. All personal monitoring shall be conducted per specifications listed in OSHA regulation, Title 29, Code of Federal Regulation 1926.58. All area sampling shall be conducted in accordance with 40 CFR Part 763.90. All air monitoring equipment shall be calibrated and maintained in proper operating condition. Excursion limits will be monitored daily. Personal monitoring is the responsibility of the Contractor. Additional personal samples may be required by the Engineer at any time during the project.

B. Contained Work Areas for Removal of Friable Asbestos

1. Area samples shall be collected for the department within the work area daily. A minimum of one sample shall be taken outside of the abatement area removal operations. The Engineer will also have the option to require additional personal samples and/or clearance samples during this type of work.

C. Air Monitoring Professional

1. All air sampling will be conducted by a qualified Air Sampling Professional supplied by the Contractor. The Air Sampling Professional must submit documentation of successful completion of the National Institute for Occupational Safety and Health (NIOSH) course #582 – “Sampling and Evaluating Airborne Asbestos Dust”.
2. Air Sampling will be conducted in accordance with NIOSH Method 7400. The results of these tests will be provided to the Engineer within 24 hours of the collection of air samples.

Method of Measurement: This work will be measured for payment per foot for REMOVAL OF ASBESTOS CEMENT CONDUIT, as shown for each individual conduit, which price shall include furnishing all labor, materials, equipment and services required to remove and dispose of the friable asbestos cement conduits, hangers, and conduit supports. No separate payment will be made for any testing of existing conduits for the presence of asbestos cement prior to the removal of any conduit material.

Basis of Payment: Removal of conduits which contain asbestos will be paid for at the contract unit price per foot for REMOVAL OF ASBESTOS CEMENT CONDUIT.

Removal of conduit that does not contain asbestos will be included in the cost of REMOVAL OF EXISTING STRUCTURES or EARTH EXCAVATION.

## **REMOVAL OF ORNAMENTAL CLADDING**

Description. This item shall consist of furnishing all labor, equipment and materials necessary for the removal, temporary storage and delivery to IDOT Maintenance Yards of the existing ornamental cladding attached to the front face of various existing structures at locations shown in the Plans and as directed by the Engineer. The work shall be performed in accordance with the applicable portions of Section 501 of the Standard Specifications.

All elements of the ornamental cladding including, but not limited to, connecting elements and bolts shall be included in Removal of Ornamental Cladding.

The existing cladding anchor bolts shall be removed such that no protrusions are present at the front face of the existing wall. Localized spalls/holes at the front face of existing retaining wall resulting from removal of the cladding connecting bolts shall be repaired by the Contractor and all associated costs shall be included in this item.

All removal operations shall be performed in a manner to prevent damage to the existing retaining wall and other elements of the structure to remain (such as the Chicago Red Rail attached to top of wall). In the event that any element to remain is damaged by the Contractor in the performance of his/her work, that element shall be repaired to the satisfaction of the Engineer and at no additional cost to the Department.

The work shall conform in every respect to all environmental, state and local regulations regarding construction requirements, the protection of adjacent properties, as well as dust and noise control.

The ornamental cladding shall be temporarily stored (as required) and delivered to an IDOT Maintenance Yard as directed by the Department. All costs associated with temporary storage and delivery of the removed ornamental cladding shall not be paid separately but shall be included in this item.

Traffic Operations. The traffic using Interstate I-90/94 must remain open to all lanes of traffic during demolition activities unless the Contractor has secured the necessary permits from the Illinois Department of Transportation to allow for temporary closure of lanes.

**Method of Measurement.** Removal of Ornamental Cladding shall be measured for payment by linear foot of the existing cladding removed including additional elements noted above.

**Basis of Payment.** The work under this Item will be paid for at the Contract unit price per linear foot for REMOVAL OF ORNAMENTAL CLADDING, as indicated on the Plans and as specified herein.

## **REMOVAL AND DISPOSAL OF REGULATED SUBSTANCES (PROJECT SPECIFIC)**

**Description.** This work shall consist of the removal and disposal of regulated substances according to Section 669 of the Standard Specifications as revised below.

**Contract Specific Sites.** The excavated soil and groundwater within the areas listed below shall be managed as either “uncontaminated soil”, hazardous waste, special waste or non-special waste. For stationing, the lateral distance is measured from centerline and the farthest distance is the offset distance or construction limit, whichever is less.

### **Site 2615V2-1: ROW, I-90/I-94 between Grand Avenue and 14th Street, Chicago, Cook County**

- Station 1305+20 to Station 1306+25 (CL Proposed BL Ramp SW), 0 to 100 feet RT. The Engineer has determined this material meets the criteria of and shall be managed in accordance with Article 669.05(a)(3). Contaminants of concern sampling parameter: Benzo(a)pyrene.
- Station 1307+10 to Station 1308+10 (CL Proposed BL Ramp SW), 0 to 100 feet RT. The Engineer has determined this material meets the criteria of and shall be managed in accordance with Article 669.05(a)(3). Contaminants of concern sampling parameter: Benzo(a)pyrene.
- Station 1309+05 to Station 1310+00 (CL Proposed BL Ramp SW), 10 to 175 feet RT. The Engineer has determined this material meets the criteria of and shall be managed in accordance with Article 669.05(a)(5). Contaminants of concern sampling parameters: Benzo(a)anthracene, Benzo(a)pyrene, Benzo(b)fluoranthene, Dibenzo(a,h)anthracene, Indeno(1,2,3-cd)pyrene, and Manganese.
- Station 1310+00 to Station 1310+85 (CL Proposed BL Ramp SW), 0 to 100 feet RT. The Engineer has determined this material meets the criteria of and shall be managed in accordance with Article 669.05(a)(2). Contaminants of concern sampling parameters: Lead, and Manganese.
- Station 1310+85 to Station 1311+75 (CL Proposed BL Ramp SW), 0 to 100 feet RT. The Engineer has determined this material meets the criteria of and shall be managed in accordance with Article 669.05(a)(4). Contaminants of concern sampling parameters: Benzo(a)anthracene, Benzo(a)pyrene, Benzo(b)fluoranthene, Dibenzo(a,h)anthracene, Lead, and Manganese.
- Station 1310+00 to Station 1310+35 (CL Proposed BL Ramp SW), 95 to 175 feet RT. The Engineer has determined this material meets the criteria of and shall be managed in accordance with Article 669.05(a)(5). Contaminants of concern sampling parameters: Benzo(a)anthracene, Benzo(a)pyrene, Benzo(b)fluoranthene, Dibenzo(a,h)anthracene.

- Station 1309+30 to Station 1310+40 (CL Proposed BL Ramp SW), 0 to 10 feet RT, and 0 to 135 feet LT. The Engineer has determined this material meets the criteria of and shall be managed in accordance with Article 669.05(a)(3). Contaminants of concern sampling parameter: Benzo(a)pyrene.
- Station 1310+40 to Station 1311+75 (CL Proposed BL Ramp SW), 0 to 60 feet LT. The Engineer has determined this material meets the criteria of and shall be managed in accordance with Article 669.05(a)(4). Contaminants of concern sampling parameters: Benzo(a)anthracene, Benzo(a)pyrene, Benzo(b)fluoranthene, Dibenzo(a,h)anthracene, Lead, and Manganese.
- Station 1311+75 to Station 1312+75 (CL Proposed BL Ramp SW), 0 to 115 feet RT, and 0 to 60 feet LT. The Engineer has determined this material meets the criteria of and shall be managed in accordance with Article 669.05(a)(1). Contaminants of concern sampling parameter: Benzo(a)pyrene.
- Station 1312+75 to Station 1313+75 (CL Proposed BL Ramp SW), 0 to 60 feet RT, and 0 to 15 feet LT. The Engineer has determined this material meets the criteria of and shall be managed in accordance with Article 669.05(a)(3). Contaminants of concern sampling parameters: Benzo(a)anthracene, Benzo(a)pyrene, Benzo(b)fluoranthene, Dibenzo(a,h)anthracene, Lead, and Manganese.
- Station 1313+75 to Station 1314+60 (CL Proposed BL Ramp SW), 0 to 140 feet RT, and 0 to 15 feet LT. The Engineer has determined this material meets the criteria of and shall be managed in accordance with Article 669.05(a)(5). Contaminants of concern sampling parameters: Benzo(a)anthracene, Benzo(a)pyrene, Benzo(b)fluoranthene, Dibenzo(a,h)anthracene, Indeno(1,2,3-cd)pyrene, Lead, and Manganese.
- Station 1314+60 to Station 1315+55 (CL Proposed BL Ramp SW), 0 to 100 feet RT, and 0 to 15 feet LT. The Engineer has determined this material meets the criteria of and shall be managed in accordance with Article 669.05(a)(4). Contaminants of concern sampling parameters: Benzo(a)anthracene, Benzo(a)pyrene, Benzo(b)fluoranthene, Dibenzo(a,h)anthracene, and Manganese.
- Station 1314+60 to Station 1315+20 (CL Proposed BL Ramp SW), 100 to 140 feet RT. The Engineer has determined this material meets the criteria of and shall be managed in accordance with Article 669.05(a)(5). Contaminants of concern sampling parameters: Benzo(a)anthracene, Benzo(a)pyrene, Benzo(b)fluoranthene, Dibenzo(a,h)anthracene, Indeno(1,2,3-cd)pyrene, Lead, and Manganese.
- Station 1313+75 to Station 1314+60 (CL Proposed BL Ramp SW), 15 to 130 feet LT. The Engineer has determined this material meets the criteria of and shall be managed in accordance with Article 669.05(a)(3). Contaminants of concern sampling parameters: Benzo(a)pyrene, and Manganese.
- Station 1314+60 to Station 1315+55 (CL Proposed BL Ramp SW), 0 to 130 feet LT. The Engineer has determined this material meets the criteria of and shall be managed in accordance with Article 669.05(a)(3). Contaminants of concern sampling parameters: Benzo(a)pyrene, and Manganese.
- Station 6337+10 to Station 6338+55 (CL Proposed BL NB C-D Road), 0 to 110 feet LT, and 0 to 55 feet RT. The Engineer has determined this material meets the criteria of and shall be managed in accordance with Article 669.05(a)(1). Contaminants of concern sampling parameters: Benzo(a)pyrene, Arsenic, and Manganese.

- Station 6337+10 to Station 6338+55 (CL Proposed BL NB C-D Road), 55 to 130 feet RT. The Engineer has determined this material meets the criteria of and shall be managed in accordance with Article 669.05(a)(5). Contaminants of concern sampling parameters: Benzo(a)anthracene, Benzo(a)pyrene, Benzo(b)fluoranthene, Dibenzo(a,h)anthracene, Lead, and Manganese.
- Station 6338+55 to Station 6339+85 (CL Proposed BL NB C-D Road), 0 to 90 feet LT, and 0 to 30 feet RT. The Engineer has determined this material meets the criteria of and shall be managed in accordance with Article 669.05(a)(3). Contaminants of concern sampling parameters: Benzo(a)pyrene, and Manganese.
- Station 6339+85 to Station 6341+15 (CL Proposed BL NB C-D Road), 0 to 90 feet LT, and 0 to 50 feet RT. The Engineer has determined this material meets the criteria of and shall be managed in accordance with Article 669.05(a)(5). Contaminants of concern sampling parameters: Tetrachloroethene, Benzo(a)pyrene, and Manganese.

At the ROW property, Tetrachloroethene was detected at concentrations exceeding the TACO Tier 1 soil remediation objectives for the Construction Worker exposure route in soil boring 2615V2-1-B29, from the sample interval 0 to 6 feet deep, as noted in the Final Preliminary Site Investigation Report for this project, submitted February 26, 2020 by Andrews Engineering, Inc. Procedures shall be implemented to protect site workers and observers from hazards encountered during construction activities in locations containing contaminated materials, pursuant to Article 669 of the Standard Specifications for Road and Bridge Construction manual.

- Station 6341+15 to Station 6343+35 (CL Proposed BL NB C-D Road), 0 to 90 feet LT, and 0 to 45 feet RT. The Engineer has determined this material meets the criteria of and shall be managed in accordance with Article 669.05(a)(3). Contaminants of concern sampling parameters: Benzo(a)pyrene, Lead, and Manganese.
- Station 6340+85 to Station 6342+15 (CL Proposed BL NB C-D Road), 45 to 105 feet RT. The Engineer has determined this material meets the criteria of and shall be managed in accordance with Article 669.05(a)(3). Contaminants of concern sampling parameters: Benzo(a)pyrene, Lead, and Manganese.
- Station 6342+15 to Station 6343+25 (CL Proposed BL NB C-D Road), 45 to 140 feet RT. The Engineer has determined this material meets the criteria of and shall be managed in accordance with Article 669.05(a)(5). Contaminants of concern sampling parameters: Benzo(a)anthracene, Benzo(a)pyrene, Benzo(b)fluoranthene, Dibenzo(a,h)anthracene, Indeno(1,2,3-cd)pyrene, Lead, and Manganese.
- Station 6344+00 to Station 6344+90 (CL Proposed BL NB C-D Road), 0 to 90 feet RT. The Engineer has determined this material meets the criteria of and shall be managed in accordance with Article 669.05(a)(3). Contaminants of concern sampling parameter: Benzo(a)pyrene.
- Station 6344+90 to Station 6345+90 (CL Proposed BL NB C-D Road), 0 to 85 feet RT. The Engineer has determined this material meets the criteria of and shall be managed in accordance with Article 669.05(a)(4). Contaminants of concern sampling parameters: Benzo(a)anthracene, Benzo(a)pyrene, Benzo(b)fluoranthene, Dibenzo(a,h)anthracene, and Arsenic.
- Station 6345+90 to Station 6347+25 (CL Proposed BL NB C-D Road), 0 to 85 feet RT. The Engineer has determined this material meets the criteria of and shall be managed in accordance with Article 669.05(a)(3). Contaminants of concern sampling parameters: Benzo(a)pyrene, Benzo(b)fluoranthene, and Dibenzo(a,h)anthracene.

- Station 6344+60 to Station 6347+25 (CL Proposed BL NB C-D Road), 0 to 135 feet LT. The Engineer has determined this material meets the criteria of and shall be managed in accordance with Article 669.05(a)(2). Contaminants of concern sampling parameter: Manganese.

### **Work Zones**

Three distinct OSHA HAZWOPER work zones (exclusion, decontamination, and support) shall apply to projects adjacent to or within sites with documented leaking underground storage tank (LUST) incidents, or sites under management in accordance with the requirements of the Site Remediation Program (SRP), Resource Conservation and Recovery Act (RCRA), or Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), or as deemed necessary. For this project, the work zones apply for the following ISGS PESA Sites: **None**

Additional information on the above sites collected during the Phase I Engineering process is available through the District's Environmental Studies Unit (DESU).

### **GENERAL ELECTRICAL REQUIREMENTS**

Effective: January 1, 2020

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.

Within 30 calendar days after contract execution, the Contractor shall submit, for approval, through the Traffic Operations Construction Submittals Application (TOCS) system 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.

For further information and requirements regarding the TOCS system, the Contractor should reference the *TOCS Contractors User Guide*.

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.

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 Department may provide a list of pay items broken out by discipline upon request for a particular contract.

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.

Certifications. When certifications are specified and are available prior to material manufacture, the certification shall be included in the submittal information. When specified and only available after manufacture, the submittal shall include a statement of intent to furnish certification. All certificates shall be complete with all appropriate test dates and data.

Authorized Project Delay. See Article 801.08

Maintenance transfer and Preconstruction Inspection:

General. Before performing any excavation, removal, or installation work (electrical or otherwise) at the site, the Contractor shall request a maintenance transfer and preconstruction site inspection, to be held in the presence of the Engineer and a representative of the party or parties responsible for maintenance of any lighting and/or traffic control systems which may be affected by the work. The request for the maintenance transfer and preconstruction inspection shall be made no less than fourteen (14) calendar days prior to the desired inspection date. The maintenance transfer and preconstruction inspection shall:

Establish the procedures for formal transfer of maintenance responsibility required for the construction period.

Establish the approximate location and operating condition of lighting and/or traffic control systems which may be affected by the work

Marking of Existing Cable Systems. The party responsible for maintenance of any existing lighting and/or traffic control systems at the project site will, at the Contractor's request, mark and/or stake, once per location, all underground cable routes owned or maintained by the State. A project may involve multiple "locations" where separated electrical systems are involved (i.e. different controllers). The markings shall be taken to have a horizontal tolerance of at least 1 foot (304.8 mm) to either side. The request for the cable locations and marking shall be made at the same time the request for the maintenance transfer and preconstruction inspection is made. The Contractor shall exercise extreme caution where existing buried cable runs are involved. The markings of existing systems are made strictly for assistance to the Contractor and this does not relieve the Contractor of responsibility for the repair or replacement of any cable run damaged in the course of his work, as specified elsewhere herein. Note that the contractor shall be entitled to only one request for location marking of existing systems and that multiple requests may only be honored at the contractor's expense. No locates will be made after maintenance is transferred, unless it is at the contractor's expense.

Condition of Existing Systems. The Contractor shall conduct an inventory of all existing electrical system equipment within the project limits, which may be affected by the work, making note of any parts which are found broken or missing, defective or malfunctioning. Megger and load readings shall be taken for all existing circuits which will remain in place or be modified. If a circuit is to be taken out in its entirety, then readings do not have to be taken. The inventory and test data shall be reviewed with and approved by the Engineer and a record of the inventory shall be submitted to the Engineer for the record. Without such a record, all systems transferred to the Contractor for maintenance during construction shall be returned at the end of construction in complete, fully operating condition.”

Maintenance and Responsibility During Construction.

Lighting Operation and Maintenance Responsibility. The scope of work shall include the assumption of responsibility for the continuing operation and maintenance of the existing, proposed, temporary, sign and navigation lighting, or other lighting systems and all appurtenances affected by the work as specified elsewhere herein. Maintenance of lighting systems is specified elsewhere and will be paid for separately

The proposed lighting system must be operational prior to opening the roadway to traffic unless temporary lighting exists which is designed and installed to properly illuminate the roadway.

Energy and Demand Charges. The payment of basic energy and demand charges by the electric utility for existing lighting which remains in service will continue as a responsibility of the Owner, unless otherwise indicated. Unless otherwise indicated or required by the Engineer duplicate lighting systems (such as temporary lighting and proposed new lighting) shall not be operated simultaneously at the Owner's expense and lighting systems shall not be kept in operation during long daytime periods at the Owner's expense. Upon written authorization from the Engineer to place a proposed new lighting system in service, whether the system has passed final acceptance or not, (such as to allow temporary lighting to be removed), the Owner will accept responsibility for energy and demand charges for such lighting, effective the date of authorization. All other energy and demand payments to the utility shall be the responsibility of the Contractor until final acceptance.

Damage to Electrical Systems. Should damage occur to any existing electrical systems through the Contractor's operations, the Engineer will designate the repairs as emergency or non-emergency in nature.

Emergency repairs shall be made by the Contractor, or as determined by the Engineer, the Department, or its agent. Non-emergency repairs shall be performed by the Contractor within six working days following discovery or notification. All repairs shall be performed in an expeditious manner to assure all electrical systems are operational as soon as possible. The repairs shall be performed at no additional cost to the Department.

Lighting. An outage will be considered an emergency when three or more lights on a circuit or three successive lights are not operational. Knocked down materials, which result in a danger to the motoring public, will be considered an emergency repair.

Temporary aerial multi-conductor cable, with grounded messenger cable, will be permitted if it does not interfere with traffic or other operations, and if the Engineer determines it does not require unacceptable modification to existing installations.

Marking Proposed Locations for Highway Lighting System. The Contractor shall mark or stake the proposed locations of all poles, cabinets, junction boxes, pull boxes, handholes, cable routes, pavement crossings, and other items pertinent to the work. A proposed location inspection by the Engineer shall be requested prior to any excavation, construction, or installation work after all proposed installation locations are marked. Any work installed without location approval is subject to corrective action at no additional cost to the Department.

Inspection of electrical work. Inspection of electrical work shall be according to Article 105.12 and the following.

Before any splice, tap, or electrical connection is covered in handholes, junction boxes, light poles, or other enclosures, the Contractor shall notify and make available such wiring for the Engineer's inspection.

Testing. Before final inspection, the electrical work shall be tested. Tests may be made progressively as parts of the work are completed, or may be made when the work is complete. Tests shall be made in the presence of the Engineer. Items which fail to test satisfactorily shall be repaired or replaced. Tests shall include checks of control operation, system voltages, cable insulation, and ground resistance and continuity.

The forms for recording test readings will be available from the Engineer in electronic format. The Contractor shall provide the Engineer with a written report of all test data including the following:

- Voltage Tests
- Amperage Tests
- Insulation Resistance Tests
- Continuity tests
- Detector Loop Tests

Lighting systems. The following tests shall be made.

- (1) Voltage Measurements. Voltages in the cabinet from phase to phase and phase to neutral, at no load and at full load, shall be measured and recorded. Voltage readings at the last termination of each circuit shall be measured and recorded.
- (2) Insulation Resistance. Insulation resistance to ground of each circuit at the cabinet, with all loads connected, shall be measured and recorded.

On tests of new cable runs, the readings shall exceed 50 megohms for phase and neutral conductors with a connected load over 20 A, and shall exceed 100 megohms for conductors with a connected load of 20 A or less.

On tests of cable runs which include cables which were existing in service prior to this contract, the resistance readings shall be the same or better than the readings recorded at the maintenance transfer at the beginning of the contract. Measurements shall be taken with a megohm meter approved by the Engineer.

- (3) Loads. The current of each circuit, phase main, and neutral shall be measured and recorded. The Engineer may direct reasonable circuit rearrangement. The current readings shall be within ten percent of the connected load based on material ratings.
- (4) Ground Continuity. Resistance of the system ground as taken from the farthest extension of each circuit run from the controller (i.e. check of equipment ground continuity for each circuit) shall be measured and recorded. Readings shall not exceed 2.0 ohms, regardless of the length of the circuit.
- (5) Resistance of Grounding Electrodes. Resistance to ground of all grounding electrodes shall be measured and recorded. Measurements shall be made with a ground tester during dry soil conditions as approved by the Engineer. Resistance to ground shall not exceed 10 ohms.

ITS. The following test shall be made in addition to the lighting system test above.

Detector Loops. Before and after permanently securing the loop in the pavement, the resistance, inductance, resistance to ground, and quality factor for each loop and lead-in circuit shall be tested. The loop and lead-in circuit shall have an inductance between 20 and 2500 microhenries. The resistance to ground shall be a minimum of 50 megohms under any conditions of weather or moisture. The quality factor (Q) shall be 5 or greater.

Fiber Optic Systems. Fiber optic testing shall be performed as required in the fiber optic cable special provision and the fiber optic splice special provision.

All test results shall be furnished to the Engineer seven working days before the date the inspection is scheduled.

Contract Guarantee. The Contractor shall provide a written guarantee for all electrical work provided under the contract for a period of six months after the date of acceptance with the following warranties and guarantees.

- (a) The manufacturer's standard written warranty for each piece of electrical material or apparatus furnished under the contract. The warranty for light emitting diode (LED) modules, including the maintained minimum luminance, shall cover a minimum of 60 months from the date of delivery.
- (b) The Contractor's written guarantee that, for a period of six months after the date of final acceptance of the work, all necessary repairs to or replacement of said warranted material or apparatus for reasons not proven to have been caused by negligence on the part of the user or acts of a third party shall be made by the Contractor at no additional cost to the Department.
- (c) The Contractor's written guarantee for satisfactory operation of all electrical systems furnished and constructed under the contract for a period of six months after final acceptance of the work.

The warranty for an uninterruptable power supply (UPS) shall cover a minimum of two years from date the equipment is placed in operation; however, the batteries of the UPS shall be warranted for full replacement for a minimum of five years.

Record Drawings. Alterations and additions to the electrical installation made during the execution of the work shall be neatly and plainly marked in red by the Contractor on the full-size set of record drawings kept at the Engineer's field office for the project. These drawings shall be updated on a daily basis and shall be available for inspection by the Engineer during the course of the work. The record drawings shall include the following:

- Cover Sheet
- Summary of Quantities, electrical items only
- Legends, Schedules and Notes
- Plan Sheet
- Pertinent Details
- Single Line Diagram
- Other useful information useful to locate and maintain the systems.

Any modifications to the details shall be indicated. Final quantities used shall be indicated on the Summary of Quantities. Foundation depths used shall also be listed.

As part of the record drawings, the Contractor shall inventory all materials, new or existing, on the project and record information on inventory sheets provided by the Engineer.

The inventory shall include:

- Location of Equipment, including rack, chassis, slot as applicable.
- Designation of Equipment
- Equipment manufacturer
- Equipment model number
- Equipment Version Number
- Equipment Configuration
  - Addressing, IP or other
  - Settings, hardware or programmed
- Equipment Serial Number

The following electronic inventory forms are available from the Engineer:

- Lighting Controller Inventory
- Lighting Inventory
- Light Tower Inspection Checklist
- ITS Location Inventory

The information shall be entered in the forms; handwritten entries will not be acceptable; except for signatures. Electronic file shall also be included in the documentation.

When the work is complete, and seven days before the request for a final inspection, the set of contract drawings, stamped "**RECORD DRAWINGS**", shall be submitted to the Engineer for review and approval and shall be stamped with the date and the signature of the Contractor's supervising Engineer or electrician. The record drawings shall be submitted in PDF format on CDROM as well as hardcopy's for review and approval.

In addition to the record drawings, PDF copies of the final catalog cuts which have been Approved and Approved as Noted with applicable follow-up shall be submitted along with the record drawings. The PDF files shall clearly indicate either by filename or PDF table of contents the respective pay item number. Specific part or model numbers of items which have been selected shall be clearly visible. Hard copies of the catalog are not required with this submittal.

The Contractor shall provide three 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 three hardcopies and three CDROMs of the final documentation shall be submitted. The identical material shall also be submitted through the TOCS system utilizing the following final documentation pay item numbers:

<b>Pay Code</b>	<b>Description</b>	<b>Discipline</b>
FDLRD000	Record Drawings - Lighting	Lighting
FDSRD000	Record Drawings - Surveillance	Surveillance
FDTRD000	Record Drawings - Traffic Signal	Traffic Signal
FDIRD000	Record Drawings - ITS	ITS
FDLWL000	Warranty - Lighting	Lighting
FDSWL000	Warranty - Surveillance	Surveillance
FDTWL000	Warranty - Traffic Signal	Traffic Signal
FDIWL000	Warranty - ITS	ITS
FDLTR000	Test Results - Lighting	Lighting
FDSTR000	Test Results - Surveillance	Surveillance
FDTTR000	Test Results - Traffic Signal	Traffic Signal
FDITR000	Test Results - ITS	ITS
FDLINV00	Inventory - Lighting	Lighting
FDSINV00	Inventory - Surveillance	Surveillance
FDTINV00	Inventory - Traffic Signal	Traffic Signal
FDIINV00	Inventory - ITS	ITS
FDLGPS00	GPS - Lighting	Lighting
FDSGPS00	GPS - Surveillance	Surveillance
FDTGPS00	GPS - Traffic Signal	Traffic Signal
FDIGPS00	GPS - ITS	ITS

Record Drawings shall include Marked up plans, controller info, Service Info, Equipment Settings, Manuals, Wiring Diagrams for each discipline.

Test results shall be all electrical test results, fiber optic OTDR, and Fiber Optic power meter as applicable for each discipline.

GPS Documentation. In addition to the specified record drawings, the Contactor shall record GPS coordinates of the following electrical components being installed, modified or being affected in other ways by this contract:

- All light poles and light towers.
- Handholes and vaults.
- Junction Boxes
- Conduit roadway crossings.
- Controllers.
- Control Buildings.
- Structures with electrical connections, i.e. DMS, lighted signs.
- Electric Service locations.
- CCTV Camera installations.
- Roadway Surveillance installations.
- Fiber Optic Splice Locations.
- Fiber Optic Cables. Coordinates shall be recorded along each fiber optic cable route every 200 feet.
- All fiber optic slack locations shall be identified with quantity of slack cable included. When sequential cable markings are available, those markings shall be documented as cable marking into enclosure and marking out of enclosure.

Datum to be used shall be North American 1983.

Data shall be provided electronically and in print form. The electronic format shall be compatible with MS Excel. Latitude and Longitude shall be in decimal degrees with a minimum of 6 decimal places. Each coordinate shall have the following information:

1. District
2. Description of item
3. Designation
4. Use
5. Approximate station
6. Contract Number
7. Date
8. Owner
9. Latitude
10. Longitude
11. Comments

A spreadsheet template will be available from the Engineer for use by the Contractor.

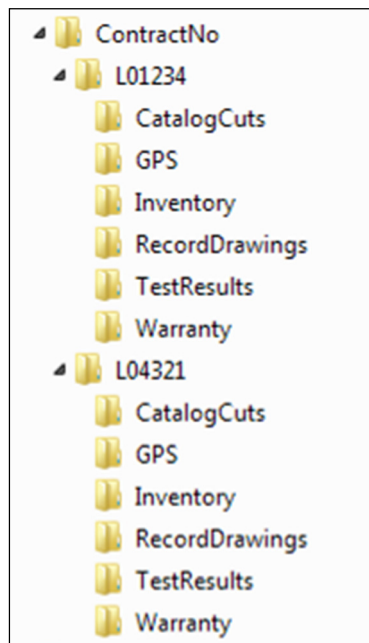
**Prior to the collection of data, the contractor shall provide a sample data collection of at least six data points of known locations to be reviewed and verified by the Engineer to be accurate within 20 feet.** Upon verification, data collection can begin. Data collection can be made as construction progresses or can be collected after all items are installed. If the data is unacceptable the contractor shall make corrections to the data collection equipment and or process and submit the data for review and approval as specified. **Data collection prior to the submittal and review of the sample data of existing data points will be unacceptable and rejected.**

Accuracy. Data collected is to be mapping grade. A handheld mapping grade GPS device shall be used for the data collection. The receiver shall support differential correction and data shall have minimum 5 meter accuracy after post processing.

GPS receivers integrated into cellular communication devices, recreational and automotive GPS devices are not acceptable.

The GPS shall be the product of an established major GPS manufacturer having been in the business for a minimum of 6 years.”

The documents on the CD shall be organized by the Electrical Maintenance Contract Management System (EMCMS) location designation. If multiple EMCMS locations are within the contract, separate folders shall be utilized for each location as follows:



Extraneous information not pertaining to the specific EMCMS location shall not be included in that particular folder and sub-folder.

The inspection will not be made until after the delivery of acceptable record drawings, specified certifications, and the required guarantees.

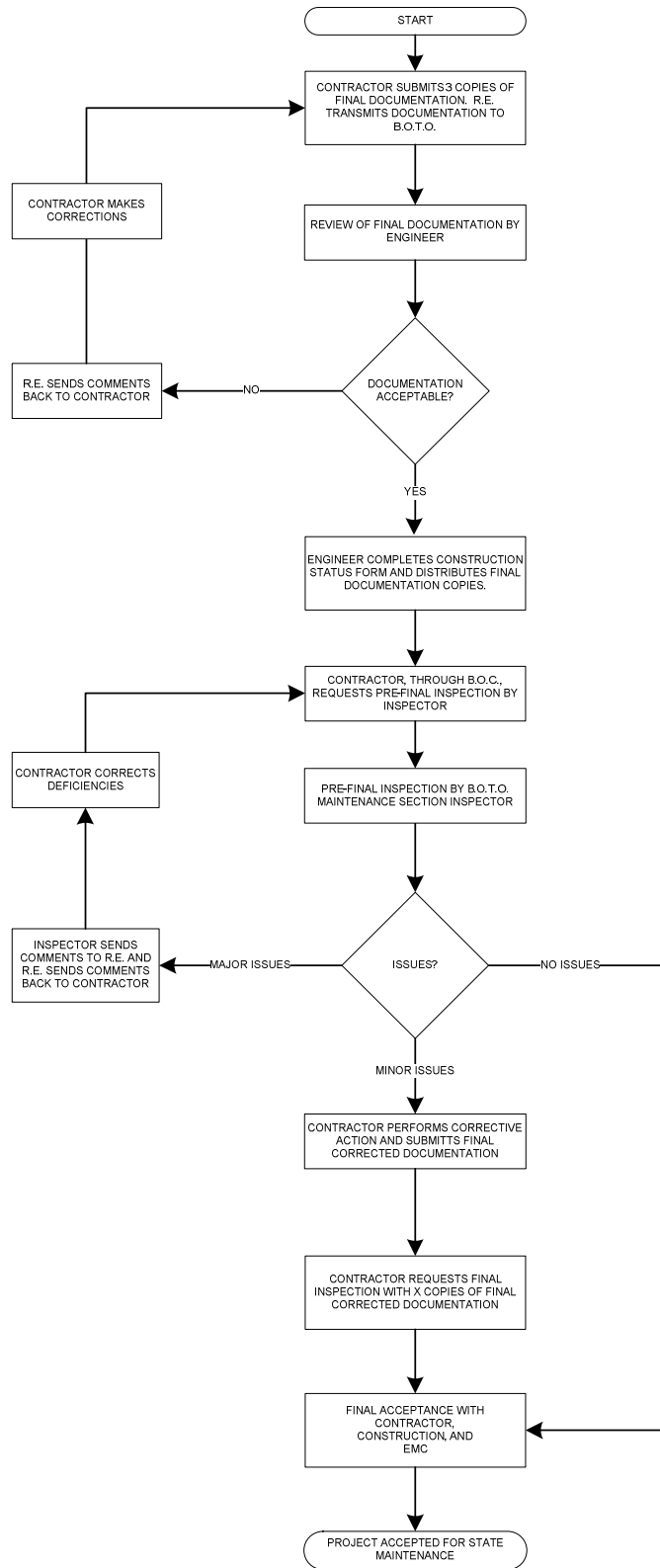
The Final Acceptance Documentation Checklist shall be completed and is contained elsewhere herein.

All CD's shall be labeled as illustrated in the CD Label Template contained herein.

Acceptance. Acceptance of electrical work will be given at the time when the Department assumes the responsibility to protect and maintain the work according to Article 107.30 or at the time of final inspection.

When the electrical work is complete, tested, and fully operational, the Contractor shall schedule an inspection for acceptance with the Engineer no less than seven working days prior to the desired inspection date. The Contractor shall furnish the necessary labor and equipment to make the inspection.

A written record of the test readings taken by the Contractor according to Article 801.13 shall be furnished to the Engineer seven working days before the date the inspection is scheduled. Inspection will not be made until after the delivery of acceptable record drawings, specified certifications, and the required guarantees.



### Final Acceptance Documentation Checklist

LOCATION	
Route	Common Name
Limits	Section
Contract #	County
Controller Designation(s)	EMC Database Location Number(s)

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

Four Hardcopies & scanned to two CD's shall be submitted for all items above. The CD ROM shall be labeled as shown in the example contained herein.

General Notes:

Record Drawings – The record drawings should contain contract cover sheet, summary of quantities showing all lighting pay item sheets, proposed lighting plans and lighting detail sheets. Submit hardcopies 11 x 17 size. Include the original “red-ink” copy. The red-ink markup should be neatly drawn. Record drawings copies should be legible. Blurred copies will not be acceptable. Temporary lighting plans and removal lighting plans should not be part of the set.

Field Inspection Tests – Testing should be done for proposed cables. Testing shall be per standard specifications. Forms shall be neatly filled out.

GPS Coordinates – Check special provisions “General Electrical Requirements”. Submit electronic “EXCEL” file.

Job Warranty Letter – See standard specifications.

Cutsheet Submittal – See special provisions “General Electrical Requirements”. Scan Approved and Approved as Noted cutsheets.

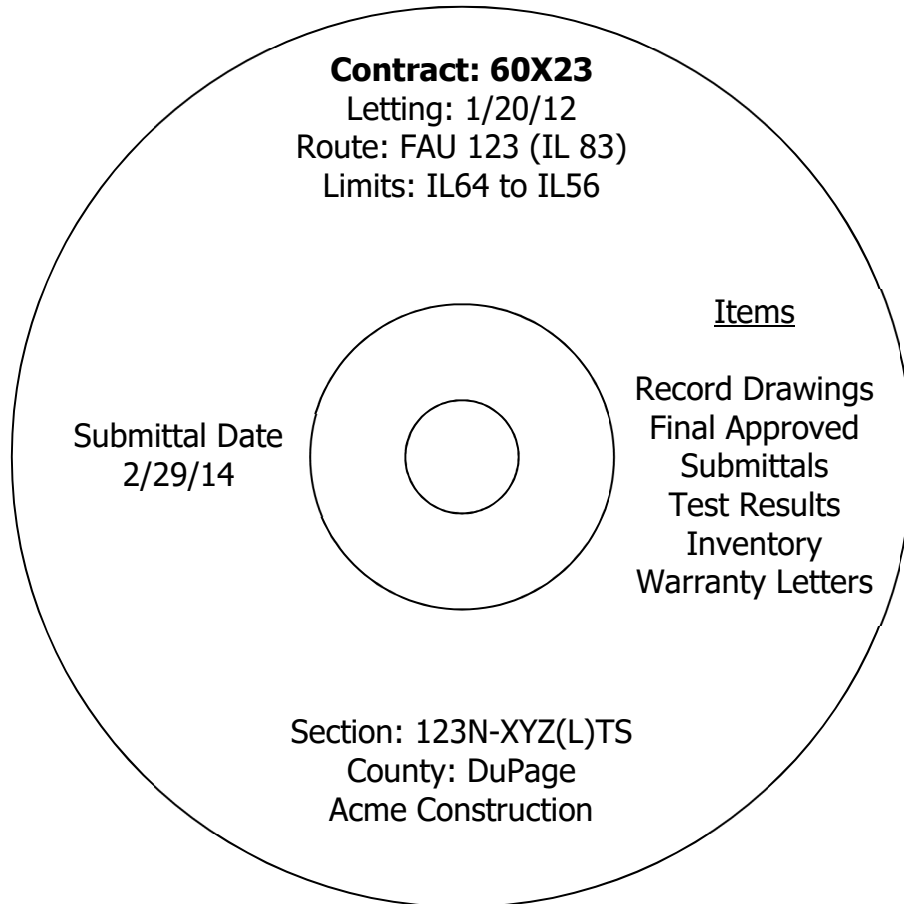
Lighting Inventory Form – Inventory form should include only proposed light poles, proposed light towers, proposed combination (traffic/light pole) lighting and proposed underpass luminaires.

Lighting Controller Inventory Form – Form should be filled out for only proposed lighting controllers.

Light Tower Safety Inspection Form – Form should be filled out for each proposed light tower.

CD LABEL FORMAT TEMPLATE.

**Label must be printed; hand written labels are unacceptable and will be rejected.**





**EXPOSED RACEWAYS**

Effective: January 1, 2012

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

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

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

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

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

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

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

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

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

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

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

- g. The PVC conduit shall pass the following tests:

Exterior PVC Bond test RN1:

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

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

Boil Test:

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

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

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

Heat/Humidity Test:

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

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

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

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

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

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

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

Revise Article 811.05 of the Standard Specifications to read:

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

## **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.”

**UNIT DUCT**

Effective: January 1, 2012

Revise the first paragraph of Article 810.04 to read:

“The unit duct shall be installed at a minimum depth of 30-inches (760 mm) unless otherwise directed by the Engineer.”

Revise Article 1088.01(c) to read:

“(c) Coilable Nonmetallic Conduit.

General:

The duct shall be a plastic duct which is intended for underground use and which can be manufactured and coiled or reeled in continuous transportable lengths and uncoiled for further processing and/or installation without adversely affecting its properties of performance. The duct shall be a plastic duct which is intended for underground use and can be manufactured and coiled or reeled in continuous transportable lengths and uncoiled for further processing and/or installation without adversely affecting its properties of performance.

The duct shall be made of high density polyethylene which shall meet the requirements of ASTM D 2447, for schedule 40. The duct shall be composed of black high density polyethylene meeting the requirements of ASTM D 3350, Class C, Grade P33. The wall thickness shall be in accordance with Table 2 for ASTM D 2447.

The duct shall be UL Listed per 651-B for continuous length HDPE coiled conduit. The duct shall also comply with NEC Article 354.100 and 354.120.

Submittal information shall demonstrate compliance with the details of these requirements.

Dimensions:

Duct dimensions shall conform to the standards listed in ASTM D2447. Submittal information shall demonstrate compliance with these requirements.

Nominal Size		Nominal I.D.		Nominal O.D.		Minimum Wall	
mm	in	mm	in	mm	in	mm	in
31.75	1.25	35.05	1.380	42.16	1.660	3.556 +0.51	0.140 +0.020
38.1	1.50	40.89	1.610	48.26	1.900	3.683 +0.51	0.145 +0.020

Nominal Size		Pulled Tensile	
mm	in	N	lbs
31.75	1.25	3322	747
38.1	1.50	3972	893

Marking:

As specified in NEMA Standard Publication No. TC-7, the duct shall be clearly and durably marked at least every 3.05 meters (10 feet) with the material designation (HDPE for high density polyethylene), nominal size of the duct and the name and/or trademark of the manufacturer.

Performance Tests:

Polyethylene Duct testing procedures and test results shall meet the requirements of UL 651. Certified copies of the test report shall be submitted to the Engineer prior to the installation of the duct. Duct crush test results shall meet or exceed the following requirements:

Duct Diameter		Min. force required to deform sample 50%	
mm	in	N	lbs
35	1.25	4937	1110
41	1.5	4559	1025

**WIRE AND CABLE**

Effective: January 1, 2012

Add the following to the first paragraph of Article 1066.02(a):

“The cable shall be rated at a minimum of 90°C dry and 75°C wet and shall be suitable for installation in wet and dry locations, and shall be resistant to oils and chemicals.”

Revise the Aerial Electric Cable Properties table of Article 1066.03(a)(3) to read:

Aerial Electric Cable Properties

Phase Conductor			Messenger wire		
Size AWG	Stranding	Average Insulation Thickness		Minimum Size AWG	Stranding
		mm	mils		
6	7	1.1	(45)	6	6/1
4	7	1.1	(45)	4	6/1
2	7	1.1	(45)	2	6/1
1/0	19	1.5	(60)	1/0	6/1
2/0	19	1.5	(60)	2/0	6/1
3/0	19	1.5	(60)	3/0	6/1
4/0	19	1.5	(60)	4/0	6/1

Add the following to Article 1066.03(b) of the Standard Specifications:

“Cable sized No. 2 AWG and smaller shall be U.L. listed Type RHH/RHW and may be Type RHH/RHW/USE. Cable sized larger than No. 2 AWG shall be U.L. listed Type RHH/RHW/USE.”

Revise Article 1066.04 to read:

“Aerial Cable Assembly. The aerial cable shall be an assembly of insulated aluminum conductors according to Section 1066.02 and 1066.03. Unless otherwise indicated, the cable assembly shall be composed of three insulated conductors and a steel reinforced bare aluminum conductor (ACSR) to be used as the ground conductor. Unless otherwise indicated, the code word designation of this cable assembly is “Palomino”. The steel reinforced aluminum conductor shall conform to ASTM B-232. The cable shall be assembled according to ANSI/ICEA S-76-474.”



Revise the second paragraph of Article 1066.05 to read:

“The tape shall have reinforced metallic detection capabilities consisting of a woven reinforced polyethylene tape with a metallic core or backing.”

**HIGHMAST LUMINAIRE, LED**

Effective: September 1, 2019

Description.

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

General.

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

The luminaire shall be designed and manufactured for high mast tower use. It shall be designed to withstand constant 80 mph (130 km/hr) wind speeds and 104 mph (167 km/hr) gusts and the physical stresses associated with such duty including shocks and vibrations.

Submittal Requirements.

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

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

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

- a. TM-21 calculator spreadsheet (XLSX or PDF format) and if available, TM-28 report for the specified luminaire or luminaire family. Both reports shall be for 50,000 hours at an ambient temperature of 77 °F (25 °C).
- b. LM-79 report with National Voluntary Laboratory Accreditation Program (NVLAP) current at the time of testing in PDF format inclusive of the following: isofootcandle diagram with half candela contour and maximum candela point; polar plots through maximum plane and maximum cone; coefficient of utilization graph; candela table; and spectral distribution graph and chromaticity diagram.
- c. LM-80 report for the specified LED package in PDF format and if available, LM-84 report for the specified luminaire or luminaire family in PDF format. Both reports shall be conducted by a laboratory with NVLAP certification current at the time of testing.
- d. AGi32 calculation file matching the submittal package.
- e. In Situ Temperature Measurement Test (ISTMT) report for the specified luminaire or luminaire family in PDF format.
- f. Vibration test report in accordance with ANSI C136.31 in PDF format.
- g. ASTM B117/ASTM D1654 (neutral salt spray) test and sample evaluation report in PDF format.
- h. ASTM G154 (ASTM D523) gloss test report in PDF format.
- i. LED drive current, total luminaire input wattage, and current over the operating voltage range at an ambient temperature of 77 °F (25 °C).
- j. Power factor (pf) and total harmonic distortion (THD) at maximum and minimum supply and at nominal voltage for the dimmed states of 70%, 50%, and 30% full power.
- k. Ingress protection (IP) test reports, conducted according to ANSI C136.25 requirements, for the driver and optical assembly in PDF format.
- l. Installation, maintenance, and cleaning instructions in PDF format, including recommendations on periodic cleaning methods.
- m. Documentation in PDF format that the reporting laboratory is certified to perform the required tests.

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

#### Manufacturer Experience.

The luminaire shall be designed to be incorporated into a lighting system with an expected 20 year lifetime. The luminaire manufacturer shall have a minimum of 33 years' experience manufacturing HID roadway luminaires and shall have a minimum of seven (7) years' experience manufacturing LED roadway luminaires. The manufacturer shall have a minimum of 25,000 total LED roadway luminaires installed on a minimum of 100 separate installations, all within the U.S.A.

#### Housing.

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

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

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

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

The luminaire shall slip-fit on a 2 to 2 3/8 in. (50 to 60 mm) O.D. pipe arm and shall have a barrier to limit the amount of insertion. The mounting shall be fully coordinated with the luminaire mounting method indicated in plans.

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

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

The total weight including accessories, shall not exceed 40 lb (18.14 kg). If the weight of the luminaire is less than 20 lb (9.07 kg), weight shall be added to the mounting arm or a supplemental vibration damper installed as approved by the Engineer.

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

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

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

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

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

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

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

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

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

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

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

Driver.

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

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

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

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

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

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

### LED Optical Assembly

The optical assembly shall have an IP66 or higher rating in accordance with ANSI C136.25. The circuiting of the LED array shall be designed to minimize the effect of individual LED failures on the operation of other LEDs. All optical components shall be made of glass or a UV stabilized, non-yellowing material.

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

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

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

The optical assembly shall be capable of being rotated 360 degrees around its vertical axis. The luminaire shall be equipped with identifying markings to indicate the mounted orientation. Luminaire installation shall include engraved banding of the mounting arms to designate proper orientation.

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

Shield. Provide a luminaire shield on the house side (side opposite from the roadway). The shield shall be 180-degrees and be made of the same material and painted the same color as the luminaire housing.

### Photometric Performance.

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

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

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

Photometric Calculations.

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

Complete point-by-point luminance and veiling luminance calculations as well as listings of all indicated averages and ratios as applicable shall be provided in accordance with IESNA RP-8 recommendations. Lighting calculations shall be performed using AGi32 software with all luminance calculations performed to one decimal place (i.e. x.x cd/m<sup>2</sup>). Uniformity ratios shall also be calculated to one decimal place (i.e. x.x:1). Calculation results shall demonstrate that the submitted luminaire meets the lighting metrics specified in the project Luminaire Performance Table(s). Values shall be rounded to the number of significant digits indicated in the luminaire performance table(s).

The AGi32 file used in the submitted calculations shall be provided with the luminaire submittal along with the individual IES photometric files utilized.

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



**IDOT DISTRICT 1 LUMINAIRE PERFORMANCE TABLE  
 HIGH MAST LIGHTING**

<b>GIVEN CONDITIONS</b>		
<b>ROADWAY DATA</b>	Pavement Width	60 (ft)
	Number of Lanes	5
	Median Width	10 (ft)
	I.E.S. Surface Classification	R3
	Q-Zero Value	.07
<b>LIGHT POLE DATA</b>	Mounting Height	130 (ft)
	Mast Arm Length	3 (ft)
	Pole Set-Back From Edge Of Pavement	40 (ft)
<b>LUMINAIRE DATA</b>	Lumens	47,250 – 63,299
	BUG Rating	B5 – U0 – G5 (Max)
	I.E.S. Vertical Distribution	Medium
	I.E.S. Lateral Distribution	Varies (Types 3, 4 or 5)
	Total Light Loss Factor	0.70
<b>LAYOUT DATA</b>	Spacing	400 (ft)
	Configuration	Opposite
	Luminaire Overhang over EOP	-40 (ft)

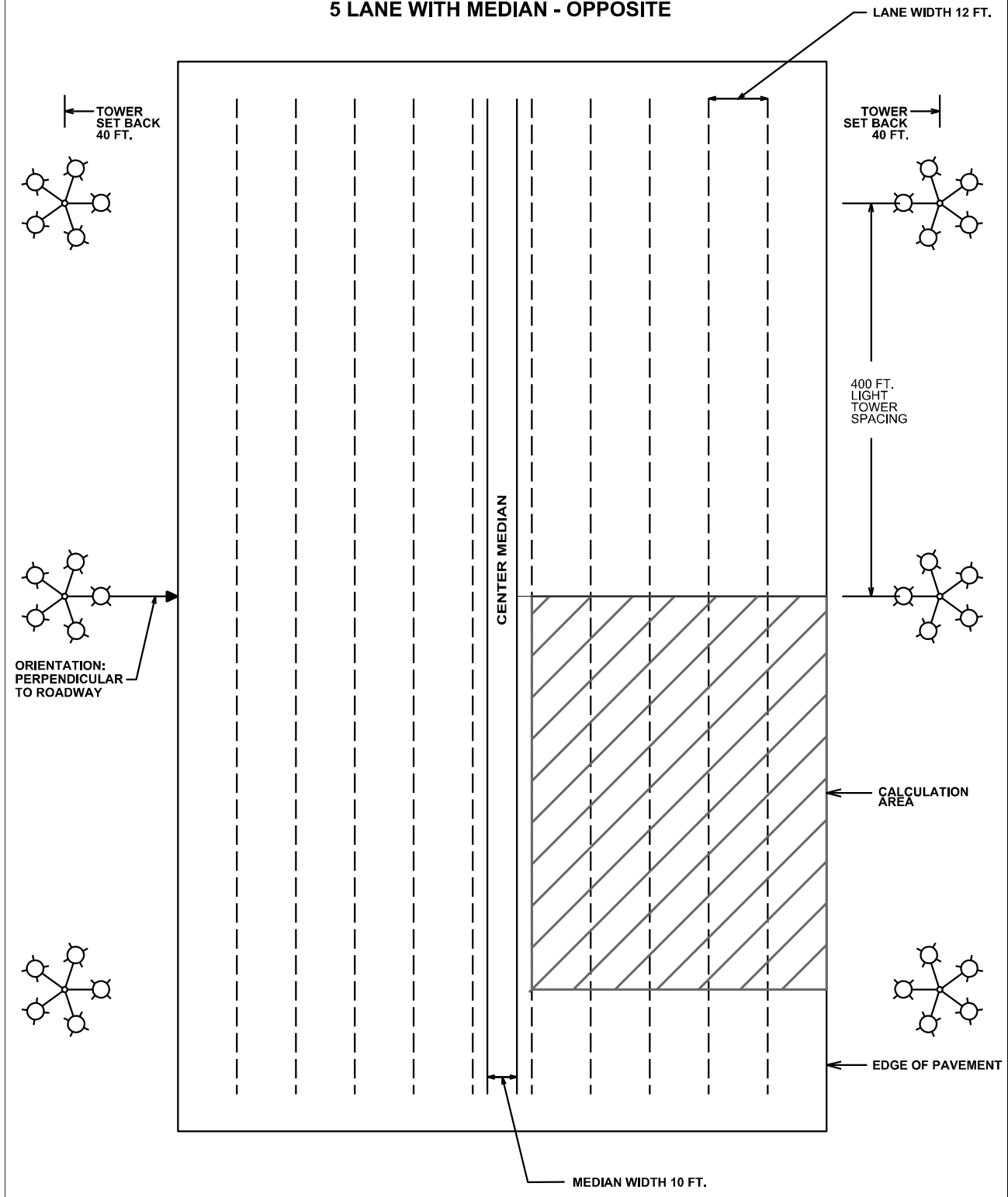
**NOTE:** Variations from the above specified I.E.S. distribution pattern may be requested and acceptance of variations will be subject to review by the Engineer based on how well the performance requirements are met.

<b>PERFORMANCE REQUIREMENTS</b>		
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**NOTE:** These performance requirements shall be the minimum acceptable standards of photometric performance for the luminaire, based on the given conditions listed above.

<b>ROADWAY LUMINANCE</b>	Average Luminance, $L_{AVE}$	1.0 Cd/m <sup>2</sup> (Max)
		0.8 Cd/m <sup>2</sup> (Min)
	Uniformity Ratio, $L_{AVE}/L_{MIN}$	3:1 (Max)
	Uniformity Ratio, $L_{MAX}/L_{MIN}$	5:1 (Max)
	Veiling Luminance Ratio, $L_V/L_{AVE}$	0.3:1 (Max)

**HIGH MAST TOWER LAYOUT  
5 LANE WITH MEDIAN - OPPOSITE**



Independent Testing

When a contract has 30 or more luminaires of the same type (distribution type and lumen output/wattage), that luminaire type shall be independently tested, unless otherwise noted. The quantity of luminaires to be tested shall be as specified in the following table.

<b>Contract Quantity</b>	<b>Luminaires to be Tested</b>
1-29	0 (unless otherwise noted)
30-80	2
81-130	3
131-180	4
181-230	5
231-280	6
281-330	7

Testing is not required for temporary lighting luminaires.

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

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

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

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

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

The testing performed shall include photometric and electrical testing.

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

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

Two copies of the summary report and the test results including IES photometric files (including CDROM) shall be certified by the test laboratory and shall be sent by certified mail directly to the Engineer.

To: District Engineer  
Attn: Bureau Chief of Traffic Operations  
Illinois Department of transportation  
201 West center Ct.  
Schaumburg, IL 60196

The package shall state "luminaire test reports" and the contract number clearly.

A copy of this material shall be sent to the Contractor and the Resident Engineer at the same time.

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

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

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

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

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

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

#### Installation.

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

Luminaires shall be leveled/adjusted before being energized. When mounted on a tenon, care shall be exercised to assure maximum insertion of the mounting tenon. Each luminaire shall be checked to assure compatibility with the project power system. When the night-time check of the lighting system by the Engineer indicates that any luminaires are mis-aligned, the mis-aligned luminaires shall be corrected at no additional cost.

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

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

Luminaires having asymmetrical photometric distributions shall be carefully oriented with respect to the roadway as indicated on the plans and as directed by the Engineer. The Contractor shall confirm all luminaire orientations with the Engineer prior to installation.

For horizontal mounts having rotating optical assemblies, after the orientation of each mast arm tenon is inspected and approved by the Engineer, the position shall be permanently marked in a manner acceptable to the Engineer. The luminaire shall then be leveled to the plane of the luminaire ring.

When the luminaire position and orientation has been confirmed and approved by the Engineer, the luminaire shall be anchored with a minimum size 1/4-20NC stainless steel bolt installed through tapped holes in the tenon and mounting bracket of the luminaire. The bolt shall not penetrate into the tenon more than 1/4 in. (6 mm). Counterweights on un-used tenons shall be mounted in a similar manner. Pre-installed wire on the tower ring shall have the ends of each wire capped at the tenon with butt type crimp-connectors for un-used tenons. The wires shall then be re-inserted into the tenon end and the tenon end shall be capped.

Warranty.

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

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

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

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

Method of Measurement.

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

<b>Designation Type</b>	<b>Minimum Initial Luminous Flux</b>
A	2,200
B	3,150
C	4,400
D	6,300
E	9,450
F	12,500
G	15,500
H	25,200
I	47,250
J	63,300
K	80,000+

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

Basis of Payment.

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

## **LIGHT TOWER**

Effective: April 1, 2016

Description. This work shall consist of furnishing and delivering a light tower complete with lowering device, and all appurtenances required for a complete operating unit.

Definitions.

**Light Tower:** The complete light tower shaft and lowering device as one integral working system.

**Shaft:** The light tower shaft.

**Lowering Device:** The components involved with the mounting, operation, and raising and lowering of the luminaire ring, luminaires.

**Tower Height:** The height of the tower shall be measured from the bottom of the base plate to the center-line of the luminaire tenon arm. This dimension is also referred to as Mounting Height.

Materials. Materials shall be as specified elsewhere herein.

Submittals and Certifications. Shop drawings, product data and certifications shall be submitted. The submitted information shall be complete and shall include information relative to all specified requirements suitable for verification of compliance.

**THE SUBMITTALS SHALL BE ARRANGED AND CROSS-REFERENCED TO THE SPECIAL PROVISIONS. FAILURE TO CROSS-REFERENCE THE SUBMITTAL INFORMATION WITH THE SPECIAL PROVISIONS WILL RESULT IN THE SUBMITTAL BEING RETURNED WITHOUT REVIEW.**

The submittal information shall be dated, current, project specific, identified as to the project, and shall also include the following calculations and certifications:

- Shaft design calculations, including Registered Engineer Certification.
- Lowering device seating force calculations.
- Certification of intent to provide domestic steel in accordance with Article 106.01 of the Standard Specifications.
- Welding details and procedures.
- Letter of intent to provide specified weld inspection reports.
- Confirmation of coordination between anchor rod supplier and tower manufacturer for adequacy of anchor rod assembly.
- Manufacturer's recommended installation procedures.
- Letter of intent to provide manufacturer's representative during installation and to provide specified installation certification.

All certifications shall be notarized. A PDF format copy of the submittal shall be provided with all submittals, including resubmittals, on CDROM. Light tower submittals will require a longer review time than other items as and such the review period referenced in Article 105.04 shall be 60 days.

### Light Tower

General. Light towers (high mast poles) shall consist of any poles 24 m (80 ft) or more in length.

Each light tower shall be complete with internal, integral motorized lowering mechanism, luminaire ring, pole top hood, internal electric power cables, luminaire counter-weight (when applicable), and all appurtenances required for a complete operating unit.

The design shall be based upon AASHTO "LRFD Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals" in effect on the date of invitation for bids, however the width of reinforced opening requirement in Chapter 5, Section 5.6.6.1 shall not apply. Light Towers shall be designed for ADT > 10,000, Risk Category Typical, and Fatigue Importance Category I.

A minimum total combined luminaire weight of 600 lb (272 kg) shall be used plus a combined hood area and lowering ring weight of 400 lb (181 kg). The associated total projected area shall be 24 sq ft (2.23 sq m) and 10 sq ft (0.93 sq m) respectively. Additional weights and areas shall be added when necessary for such things as luminaire shields. Project specific weights and areas shall be used in the design calculations when they exceed the above minimums.

Light towers shall be designed and constructed so no structural member or other component is applied in excess of the manufacturer's recommended rating (when applicable) or the published rating, whichever is lower.

The light towers shall be of a height and luminaire capacity as indicated and shall be of the non-latching ring support design. A latching-type ring support will not be acceptable.

The tower shall be provided as a single coordinated assembly, with one entity responsible as manufacturer of the whole. One entity must be the manufacturer of the lowering device or the tower shaft, or both, shall warrant the entire coordinated assembly.



Deflection. The design of the tower shaft shall achieve a maximum, fully loaded deflection at the top of the pole, which is not greater than the following percentage of the tower height:

<b>Light Tower Maximum Deflection</b>		
Tower Height		Maximum Deflection as % of Tower Height
Meters	Feet	
49	160	13.70
46	150	10.04
43	140	7.80
40	130	6.02
36	120	10.75
33	110	7.80
30	100	5.30
27	90	4.50
24	80	3.50

Shaft.

The tower shaft shall be a low deflection tapered shaft having polysided, circular, or elliptical cross sections. The shaft cross section at the top shall be not less than 7.5 in. (190 mm) in diameter. The shaft cross section at the bottom shall not be greater than that which is compatible with the base plate bolt circle specified, and shall not be less than 24 in. (600 mm) in diameter for new installations. The minimum wall thickness of the bottom portion of the tower shaft shall be 0.2391 in. (3 gauge).

All tower shaft components shall be fabricated from high strength, low alloy, steel according to AASHTO M 270 (M 270M); ASTM A 595 (A 595M), Grade A or B; ASTM A 1011 (A 1011M); ASTM A 606 (A 606M); ASTM A 588 (A 588M), or ASTM A 871 (A 871M) Grade 65, with a minimum yield strength of 50,000 psi (345,000 kPa).

All tower shaft hardware, such as ground lugs, hardware for the handhole door, including the clamp assemblies, hinge and door stop, shall be stainless steel according to Article 1006.31. Ground lugs shall be protected by removable plastic plugs or caps.

Each tower shaft shall be constructed of not more than the following welded or slip fitted sections:

<b>Maximum Light Tower Sections</b>		
Tower Height		Maximum Number of Sections
Meters	Feet	
49	160	4
46	150	4
43	140	4
40	130	4
36	120	3
33	110	3
30	100	3
27	90	3
24	80	2

Sections which are slip fitted shall have slip joints with a minimum overlap of 1.5 times the diameter of the bottom of the upper section at the slip joint. Towers having slip joint construction shall be pre-fitted and match marked at the factory and shall be shipped disassembled for assembly at the job site. Slip joints shall be marked with a scribe to allow verification that 1.5 times diameter insertion is provided. A copper bonding jumper, included with the tower, shall bond slip fit pole sections together with a flat copper mesh and UL Listed ground lugs. The bonding jumper shall not interfere with the operation of the luminaire ring.

**Handhole.**

Each tower shaft shall be constructed with a handhole/access door for access to power connections and lowering mechanism equipment. The handhole shall be large enough to make the following items visible from an extended operating position and accessible for maintenance: cable drum, transition plate, and the drive train oil level indicator. The handhole shall be sized and arranged to permit removal of the lowering mechanism without excessive dismantling of the equipment. The handhole may be a reinforced opening in the pole shaft as detailed on the plans or may be a part of a flared shaft base assembly as approved by the Engineer. The flared base shall not be considered a separate section of the tower shaft.

Minimum opening dimension for the handhole shall be 300 mm x 900 mm (12 in. x 36 in.) and it shall have a lockable door. The handhole shall be located so as to not interfere with the operation of the door clamps, and it shall be positioned on the tower shaft to align on center with one of the anchor bolt (rod) positions and at a minimum height, as detailed on the plans, to facilitate access to mounting nuts with tools required for installation.

The handholes in the pole shafts shall have rounded corners and shall be reinforced to maintain the original strength of the tower shaft. Flared base assemblies shall maintain the strength of the shaft and have no non-round protrusions.

**Handhole Door.** The handhole shall have a door with a full-height stainless steel piano hinge, or with not less than two stainless steel hinges. A bolt through a door and frame eyelet shall not constitute an acceptable hinge. Hinges shall be heavy duty, suitable for the weight of the handhole door. The handhole door shall not be warped in any direction. The door hinge shall be attached with stainless steel nuts and bolts.

**Handhole door gasket.** The door/opening shall be gasketed in a manner which will prevent the entry of water into the tower and the door shall have a tight compressive seal employing a tubular gasket to assure compressibility. The gasket shall be a one-piece design and shall be joined by chemical fusion at the bottom of the opening. The gasket shall be attached mechanically. Adhesives alone are not acceptable.

**Handhole door clamps.** The door shall be held closed with a 12-gauge captive adjustable, spring loaded, stainless steel clamp assembly. The clamps shall have a depth stop feature to insure uniform sealing pressure at all clamp points. A minimum of five clamps shall be used around the non-hinged sides of the door assembly. The door clamp locations and handhole shall be coordinated with the tower so that the clamps can operate over their full range of movement without any interference from other tower components including anchor bolts which may protrude up to 6" above the top surface of the base plate. The door clamps shall be attached with stainless steel nuts and bolts.

**Padlock provision.** A stainless steel padlock hasp and staple shall be provided for locking the door. Door hardware shall be stainless steel. The door shall be equipped with an integral door stop/hold-open mechanism.

**Rain Shield.** A rain shield shall be placed above the handhole to direct water away from the handhole. The shield shall be fabricated of the same material as the pole shaft, shall have rounded corners, and shall be permanently welded to the shaft. The rain shield cannot interfere with operation of the handhole door or door clamps. Details of the configuration and welding shall be submitted for the Engineer's approval.

**Cable Hook.** A cable hook/cradle, readily accessible from the front of the tower, shall be provided to hang the control operator cable assembly when not in use. The hook or cradle shall be made from steel rod no less than 1/2-inch in diameter and shall be galvanized as the pole is. This hook or cradle shall be large enough to hold 25 ft. (7.5m) of power cable and positioned for practical in-field use. The hook shall not have sharp edges or protrusions that could damage the cable and it shall not interfere with the operation of the lowering mechanism.

Each tower shaft shall have a handhole accessible ground pad welded to the shaft for connection of ground conductors. The pad shall be NEMA 2-hole pad and accessible with the lowering device installed.

**Interior Bolt Exposure.** Bolts attaching the various components to the tower, handhole, and handhole door shall be properly sized and coordinated with the matching nuts so that no more than 0.25" of thread is exposed past the nut when properly tightened.

Base Plate.

The base plate shall be factory predrilled (slotted) for the number and configuration of anchor rods as provided in the following table:

<b>Base Plate Configuration</b>				
Tower Height		Min, number anchor rods	Rod Circle	
Meters	Feet		mm	inches
49	160	8	965	38
46	150	8	965	38
43	140	8	914	36
40	130	8	914	36
36	120	8	914	36
33	110	8	762	30
30	100	8	762	30
27	90	8	762	30
24	80	6	762	30

The base plate shall have a round (disk) shape of the specified outer diameter or as otherwise approved by the Engineer. The minimum thickness of the base plate shall be 50 mm (2.0 in.). The base plate shall be circumferentially welded to the tower shaft. A backer ring shall be used for this circumferential weld. All crevices at the backer ring shall be completely sealed to moisture and corrosion. The plate shall be oriented such that one anchor rod is aligned with the vertical center line of the handhole.

Welding.

Manufacturer Welding Requirements.

Circumferential welds. Circumferential welds, including top flange welds, shall be full penetration welds.

Longitudinal welds. Longitudinal welds shall have a minimum of 60 percent penetration, except the longitudinal welds on both the male and female shaft sections shall be full penetration welds within a distance of two diameters of overlap joints.

Minimum preheats for welds shall be 40° C (100° F) for fillets, 65° C (150° F) for seams, and 110° C (225° F) for circumferential welds.

Weld procedure specifications for seams and circumferential welds must be qualified according to Section 4, Part B of AWS D1.1. Charpy V-Notch (CVN) impact specimens shall be tested according to Table III-1 (note 2) of Appendix III for minimum values of 34 J (25 ft lb) at 4° C (40° F). Fillet weld procedures shall be tested according to Table 4.4 of AWS D1.1.

The welds shall be smooth and thoroughly cleaned of flux and spatter and be according to the AWS.

All full penetration welds shall be inspected for soundness by the ultrasonic method and all partial penetration welds shall be inspected by the magnetic particle method. Welding inspection reports shall be submitted to the Engineer for approval. The welding symbols and complete information regarding location, type, size, welding sequence, and WPSs shall be shown on all shop drawings. The Contractor shall submit the manufacturer's welding procedures, including inspection procedures, to the Engineer for approval.

Independent Welding Inspection. In addition to manufacturer's own welding inspection, the Contractor shall have welding inspected by an independent Certified Welding Inspector (CWI). The selected inspector shall be approved by the Engineer before any inspecting is performed. The NDE inspector(s) shall be independent nondestructive testing inspector(s), certified as level II in RT, UT, and/or MT as applicable. The methods for testing full penetration and partial penetration welds by the independent welding inspector(s) shall be the same as specified above in section 7.1

The independent welding inspector shall send the test results directly to the Engineers, as follows: Illinois Department of Transportation, Attn: Engineer of Structural Services, 2300 S. Dirksen Parkway, Bureau of Bridges & Structures, Springfield, Illinois 62764 and to: Illinois Department of Transportation, District 1, Attn: Electrical Design Section Chief, Bureau of Traffic Operations, 201 West Center Court, Schaumburg, Illinois 60196. All welds must pass inspection. Any deficient welds must be brought to the attention of the Engineer and corrective measures must be outlined.

#### Light Tower Finish.

The light tower shall be hot-dip galvanized including the handhole, handhole door, base plate, mounting plate and all other elements welded to the shaft according to AASHTO M 111. Stainless steel components shall remain the natural stainless steel finish.

#### Head Frame.

Each tower shall be equipped with a head frame assembly to support and guide the luminaire ring assembly.

The head frame and luminaire ring shall have a positive mating/alignment interface at which the seating force is applied at each support cable. The interface shall be designed to operate with not less than 1.3 kN (300 lbs.) of total seating force distributed among the interface points. Manufacturer calculations shall be submitted to confirm this requirement. The stop used at the top of the tower shall not deform with the full force applied.

All head frame members and components, including support arms, shall be fabricated of steel of the same type as specified for the tower shafts or stainless steel of appropriate strength. The head frame shall have a head plate, a support, and 2 pulleys for each support cable. All openings in the head frame assembly shall be machined smooth and free from any burrs and sharp edges which could damage the support cables and power cable.

The head frame plate and attached components shall be fabricated of the same type of steel as the tower shaft or of Type 201L or Type 304 stainless steel. It shall then be hot-dipped galvanized according to AASHTO M 111 or painted as specified for the tower shaft or fabricated from stainless steel.

The head frame shall have a power cable pulley arrangement placed between and roughly equidistant from two support arms, and allow a minimum cable bending radius of not less than 6 1/2 in. (163 mm). The head frame shall have a minimum diameter of 36 in. (1 m).

The power cable shall pass through the head frame assembly utilizing a four-way roller guide assembly sized to accommodate the outside diameter of the power cable.

Pulleys shall be constructed to allow associated cables to ride freely within pulley grooves and cable guides shall be incorporated to prevent cables from riding out of pulleys.

Pulleys, attachment hardware, latches, hinges and the like shall be stainless steel. Pulleys shall be made of Unified Numbering System type 300 stainless steel and have permanently lubricated sealed bearings except the power cable pulleys may be cast aluminum or high-strength nylon.

The head frame assembly shall be equipped with an aluminum hood with a minimum thickness of 0.125 in. (3 mm). The hood shall protect the operating head frame components from damage or deterioration from weather but shall permit pole ventilation while preventing the entry of birds. The hood shall have a strong secure mechanical means to open/raise the hood for the future maintenance of the head frame such as a spin screw mount, and shall have a double-secured latching system to assure closure. The Design shall be such as to minimize the risk that the hood will be displaced from gusts of wind. The head frame assembly shall be match-marked to its tower shaft and shall be attached to the shaft by stainless steel hardware.

#### Luminaire Ring.

Each tower shall be provided with a luminaire ring suitable for eight (8) or twelve (12) luminaires of the type, and orientation specified. The ring shall mate/align with the head frame and shall be coordinated relative to seating force.

The ring shall be designed for lowering to a position with the center line of luminaire arms 1.4 m (54 inches) or less above the top of the tower base plate. The exact fully-lowered position shall be adjustable in the field. Wiring shall be fully enclosed in a metal raceway.

The ring shall be equipped with spring loaded bumpers, spring loaded rollers, spring-loaded outriggers or other shock-absorbing mechanism to guide the ring during the raising/lowering operations. The guide mechanism shall be spring loaded and shall be designed to minimize shock to the luminaire during raising and lowering. These devices shall be attached in a secure manner. The mechanism does not have to maintain constant contact with the tower shaft.

Arms for the attachment of luminaires shall be standard 50 mm (2-inch) diameter tenon arms. The arms shall be attached to the ring in a secure manner either by welding or by means of stainless steel bolts, nuts, lock washers and hardware such that a permanent rigid attachment is achieved. Arms shall be coordinated with luminaire size and configuration and shall be arranged so that the overall diameter of the ring, including the luminaire, does not exceed 3.4 m (11 ft.). Tenon arm ends shall be threaded to accept a PVC pipe cap. All tenon arms shall be capped. The tenon arms shall be level when the ring is in the raised position.

The ring raceway shall be arranged with screened weep holes of not less than ½-inch diameter at no less than 90 degree intervals around the ring.

The ring shall be equipped with an enclosed wire raceway and a stainless steel NEMA 4X terminal box for wiring of the luminaires.

Junction Box. The box shall be made of Type 304 stainless steel, not less than 2.03 mm (14 gauge), with all seams continuously welded with stainless steel weld wire and ground smooth. Exterior surfaces shall have a smooth polished finish. The box shall be UL 50 "Junction and Pull Box", "Junction Box", or "Pull Box".

A grounding lug shall be provided for the connection of the equipment grounding conductors as required by NEC Article 250-114.

The box shall have an overlapping stainless steel cover and shall be secured to the box with a continuous stainless steel hinge and a minimum of 4 captive stainless steel clamps utilizing captive stainless steel hex-head bolts or deep slotted stainless steel screws.

Be suitable for surface mounting, complete with external stainless steel mounting lugs or brackets welded to the enclosure.

The box cover shall have a continuous formed, seamless, urethane, oil-resistant gasket. The gasket shall be extruded directly onto the junction box cover. The gasket shall adhere to the cover without the use of adhesives. A neoprene strip gasket, or urethane strip gasket cut out of a larger sheet and glued to the junction box will not be acceptable.

The box shall have a UL Listed stainless steel vent drain mounted in the bottom of the box. This vent drain shall also function as an air pressure equalizer. The vent drain shall maintain the NEMA rating of the junction box when installed.

The box shall be arranged and connected to the top of the ring from the top of the box in a manner that precludes moisture draining from the ring into the box. All fittings penetrating the box shall be watertight hubs with an integral O-ring. The hubs shall be watertight and corrosion resistant NEMA 4X and have an insulated polycarbonate throat. The insulated throat shall be rated up to 105° C. The hubs shall be UL Listed and comply with UL Standard 514B.

The box shall be equipped with a hinged door and a latch or with captive stainless steel closure hardware acceptable to the Engineer and an external special fixed-mount plug with a retained cap as specified elsewhere herein to accept a test power connection when the ring is in the lowered position.

The box shall, on the side, have the main tower cable entry and the entry for the luminaire wires; it shall also contain a terminal strip with identified terminals for connection of the main power cord, luminaires, and the test power receptacle. The terminal strip shall have terminals sized to accommodate the cables to be connected and shall have luminaire connection terminals to accommodate the usage of all luminaire positions.

The ring shall facilitate ease of wiring to the arms by the use of removable gasketed covers, physical arrangement, or other means acceptable to the Engineer. Arms shall be factory or field wired according to NEC Article 410-31.

The arms shall be wired using No. 12 AWG, Type SOOW. The cord shall have three conductor, flexible CPE jacketed construction according to UL 62 and be MSHA approved. The cord shall be rated 600 V and -58 to 221 °F (-50 to 105 °C). Each conductor shall be No.12 AWG stranded annealed copper per ASTM B 174 with EPDM insulation.

Wiring shall be color coded (black, red, white, and green, as applicable) with coloring via outer material color or by painting with a process approved by the Engineer. Wire rating information shall be visible in a contrasting color. Wires shall be installed to all luminaire arms.

Luminaire wires shall extend 600 mm (24 inches) longer than their respective tenon arm and shall be trained back into the arm which shall then be closed with a protective cap for shipment of the jobsite. All wires shall be capped and crimped with sealant and heat-shrink insulating sleeves (wire nuts, tape, crimps, etc. will not be acceptable.). Wiring shall alternate circuits to the luminaire arms so that adjacent arms are not on the same circuit. All ring wires shall be tagged with wire markers at both ends. The tenon arms shall also be tagged corresponding to the wiring contained within.

The luminaire ring shall be factory checked and marked for proper positioning and luminaire orientation. Catalog cuts and shop drawings shall indicate the orientation of the luminaire ring, handhole, and bolt circle in relation to each other on a single drawing.

The ring shall be complete with a counterweight for each unmatched luminaire to maintain ring balance. Counterweights shall be coordinated with the luminaires to be installed.

All luminaire rings shall be arranged to accommodate the complete indicated compliment of luminaires, regardless of the number actually to be installed, to facilitate luminaire positioning and orientation.

The fully enclosed luminaire ring and attached components shall be fabricated of the same type of steel as the tower shaft or of Type 201L or Type 304 stainless steel. If it is not fabricated of stainless steel, it shall then be hot-dip galvanized according to AASHTO M 111 or painted according to Article 1069.08(c)(1). An open ring system shall be fabricated of Type 201L or Type 304 stainless steel.

Lowering and Support Mechanism.

The support shall be of the non-latching design.



The mechanism shall operate to raise the luminaire ring to its fully raised position and to lower the ring to a position with the centerline of the luminaire tenon arms 1.4 m (54 inches) or less above the top of the tower base plate. The exact fully-lowered position shall be adjustable in the field.

The lowering and support mechanism shall include, but not be limited to the support cables, power cable, pulleys, winch, gear reducer, mechanical clutch, electric motor, control and all accessories and appurtenances for a coordinated operating system.

The lowering and support scheme shall be of the 2-cable or 3-cable type as specified.

Three-cable mechanisms shall incorporate 3 support cables joined via an appropriate proven transition design to a single hoist cable wound around a single hoist winch. The transition design shall be such to prevent twisting of the support cables, to assure smooth winding of the cables on the winch and to prevent binding on the inside of the tower shaft.

Two-cable mechanisms shall incorporate 2 support/hoist cables wound around a dual winch assembly. The design shall be such to prevent twisting of the cables and to assure smooth winding of the cables on their respective winches and to prevent binding on the inside of the tower shaft.

The hoisting system shall be securely mounted and the lower assembly, i.e. motor, winch, mechanical clutch, gear reducer, etc., shall be designed to allow ease in removal of the equipment via the tower handhole without dismantling the system. Individual components shall be accessible and removable without the removal of other components. Mounting plates and other mounting templates and provisions shall have standardized dimensions to facilitate removal and interchangeability from unit to unit. Mounting hardware shall have an abundant strength safety factor and shall be positioned for even distribution of load.

The lowering device shall tightly position the luminaire mounting ring against the head assembly frame by applying a holding force evenly distributed among the seating/interface points. The total force required by the system must not be less than 1.3 kN (300 lbs.) greater than the weight of the luminaire mounting ring with all luminaire positions occupied by luminaires. There shall be a positive indication at the handhole that the required force has been applied, visible from the extended operating position away from the handhole and not under the ring. Submittal information shall include load and seating force calculations to demonstrate compliance with specified requirements.

The mechanism shall be equipped with a multipoint safety chain and hook assembly to hold the luminaire ring in place during maintenance. All hardware shall be stainless steel. Chains shall be stainless steel. Two chains are required for each tower with each chain having sufficient strength as to independently withstand the weight of the entire luminaire ring assembly and seating force.

The system shall be designed so that unbroken power cable, suspension and/or hoist cable can be replaced from ground level.

### Support and Hoist Cables.

Cables (wire rope) shall be manufactured from Type 304 or Type 302 stainless steel and shall be stranded assembly coated with a friction-limiting non-corrosive lubricant.

Cables shall be 7x19 wire strand and have no strand joints or strand splices.

Cables shall be manufactured and listed for compliance with military specification MIL-W-83420, Type 1, Composition B.

Cable terminals shall be stainless steel whenever possible, shall be compatible with the cable, and shall be as recommended by the cable manufacturer. The terminals, swaging, etc. shall meet the requirements of military specification MIL-DTL-781. Stainless steel oval sleeves shall be according to military specification MS51844. Care shall be exercised to assure a match of connector sizes to the wire rope size(s), and, to the extent possible, connectors shall have visible size markings.

For 3-cable systems, the support cables shall each be not less than 5 mm (3/16 inch) in diameter and the hoist cable shall not be less than 8 mm (5/16 inch) in diameter.

For 2-cable systems, the support/hoist cables shall each be not less than 6 mm (1/4 inch) in diameter.

As part of the tower shop drawings and product data submitted for approval, support and hoist cable information shall be provided. Submittals without such information will be incomplete and will be rejected. The information shall include, but not limited to:

- Catalog information to confirm sizing, stranding and other specified requirements.
- Evidence of listing as military specification cable as specified.
- Certification of compliance with all specification requirements made by the cable manufacturer.

Documentation of arrangement to provide a sample of the support cable to an independent laboratory as selected by the Engineer for testing to the military specifications listed herein, with results to be sent directly to the Engineer, all included incidental to this item. Copies of recent test reports made on identical cable indicating compliance with military specification requirements shall be submitted. The test reports shall include as a minimum, the following:

- Breaking Strength test.
- Endurance test.
- Stretch test.
- Test load.
- Chemical Composition.

### Winch.

Drum. The winch/gear reducer assembly shall have a drum suitable for the hoist of support/hoist cables, arranged to provide smooth winding of the cable and to prevent slippage. The drum shall be stainless steel or cast/ductile iron and shall have a diameter not less than 18 times the diameter of its respective cable (wire rope). The winch drum shall be designed with cable guides for a smooth cable take-up of level lays and to prevent the cable from riding over the drum flange. The drum shall have the end of the cable attached by means of a swaged connection and one full layer of cable shall be wound on the drum even when the ring is in the fully lowered position. The drum flange axle shall be supported at both ends.

Gear Reducer. Each assembly shall incorporate a gear reducer having a reduction ratio which will prevent free fall of the luminaire ring upon failure or disengagement of the drive unit and which will produce a travel rate of 3 m (10 ft.) to 4.6 m (15 ft.) per minute under normal operation.

The unit shall have a worm gear which is totally enclosed in a lubricating reservoir. The lubricant shall have a viscosity range suitable for proper operation in ambient temperatures from -40° C to 49° C (-40° F. to 120° F.)

The worm shall be manufactured of case hardened ground alloy steel or cast iron.

The gear shall be of bronze alloy or of a proven alternate material and design acceptable to the Engineer with and the gear shall be keyed to the output shaft. The output shaft shall be high quality medium carbon steel ground to close tolerances. The worm and output shaft shall be mounted on anti-friction bearings. All shaft extensions shall be equipped with a lip-type synthetic element and oil seals.

The unit shall have provisions to verify oil levels in all gear boxes, and oil level indication shall be visible from the handhole when the unit is installed.

Clutch. The mechanism shall incorporate a mechanical clutch, installed between the winch/gear reducer and the cable winch assembly. The clutch shall be of mechanical type, in a sealed cast metal housing. The clutch torque shall be factory calibrated and coordinated with the electric motor. The clutch shall act to limit the seating force of the raised ring to 300 lb (1.3 kN). The clutch shall be suitable for the application and torque limitation and shall not deteriorate with use.

Motor.

The electric motor shall be matched to the load and torque characteristics required for a fully loaded luminaire ring and shall not be less than 746 watts (1 horsepower).

The motor shall be capable of producing torque in excess of the clutch maximum torque rating. The motor shall be totally enclosed fan cooled (TEFC), shall be reversible to operate the lowering mechanism in both directions, and shall be suitable for operation on the power supply characteristics shown on the drawings. Submittal information shall include complete motor data, including, but not limited to:

- Manufacturer
- Nameplate Rated Watts (Horsepower)
- Rated Voltage
- Full Load RPM
- Full Load Current
- Locked Rotor Current
- NEMA Design Letter
- Insulation Class
- Torque Data
- Dimensional Data
- Calculations to verify the compatibility of the drive unit components (motor, gear reducer, clutch and winch). Calculations shall verify the 300 lb (1.3 kN) seating force.

#### Lowering Device Control.

The lowering device control shall consist of motor short circuit and motor running overcurrent protection and motor control complete with all appurtenances and interconnecting wiring. The control may incorporate a reversing motor starter or a suitably-rated reversing control station.

The lowering device control may be provided in a separate NEMA 4X stainless steel enclosure or in the enclosure with the tower main Electrical breaker, provided the remote control station is a separate remote device.

The lowering device motor shall have a motor disconnecting means circuit and running overload protection according to N.E.C. requirements. The motor disconnect and short circuit protection shall be achieved by a molded case thermal magnetic bolt-on circuit breaker rated at 600 volts, of an ampere rating suitable for the motor and having a UL-listed interrupting rating of not less than 14,000 rms symmetrical amperes at 480 volts and 10,000 rms symmetrical amperes at 240 volts.

Running overcurrent protection shall be according to N.E.C. requirements. Motor overload protection shall be achieved by an appropriate dual element fuse in a spring-loaded screw-in type small-dimension fuse holder mounted within the enclosure in a suitable box or other arrangement approved by the Engineer.

The motor starter, if incorporated, shall not be smaller than NEMA size 1, shall be rated 600 volts and shall be full voltage, reversing type, with arc-extinguishing characteristics and renewable silver-to-silver contacts. A reversing control switch, if incorporated, shall be rated well in excess of the duty required and in no case less than 2,240 watts (3 horsepower) at 230 volts single phase. The control shall be momentary contact, raise-stop-lower with a neutral stop condition, requiring positive action by the person operating the device to keep the motor energized. The control shall have auxiliary contacts as indicated and as required for the control.

The enclosure shall have an exterior position-indicating trip-free operating handle for the motor circuit breaker. The enclosure(s) shall have exterior nameplates to read "LOWERING DEVICE CONTROL" and "MOTOR CIRCUIT BREAKER" as well as an interior nameplate "MOTOR OVERLOAD FUSE" which shall also be inscribed with the applicable fuse type and ratings. Nameplates shall be engraved, 2-color, attached with screws.

The line side power to the lowering device control shall be obtained via a plug extended connection to the power distribution cord/receptacle.

The control shall be complete with a cable-connected remote control station. The control station shall incorporate heavy duty control devices in a non-metallic impact-resistant NEMA 4X enclosure. The control shall be "dead man" type with "RAISE" and "LOWER" controls, requiring the operator to hold the respective control depressed in position for movement of the ring in either direction and with release of the control to stop the mechanism. The cord shall incorporate a No. 12 ground wire and the number of conductors required for a control, with control conductors not less than No. 14. The cord shall be weatherproof with watertight connections at either end and it shall be long enough to allow the operator to stand 7.5 m (25 ft.) away from the lowered luminaire ring. Provisions for storage of the control station and cord such as a suitable hanger cradle, shall be provided in a manner easily accessible at the handhole and in a location which precludes interference with the internal components of the lowering mechanism.

Cables extended from the enclosure shall be passed through a watertight sealing bushing and the cable shall be supported and arranged to preclude interference with the lowering mechanism. Wiring shall be in compliance with NEC requirements. Motor wires shall not be less than No. 12 and motor wiring shall be extended in UL-listed extra-flexible, weatherproof cord or other cord approved by the Engineer with suitable fittings, bushings and supports. All equipment shall be grounded and bonded via an appropriately sized equipment ground wire.

#### Electric Power Distribution.

Electric power for motorized operation of the lowering mechanism and for the power supply to the lighting shall be taken from the lighting circuitry feeding the tower. The distribution shall provide termination of the supply feeder, extension to a tower main breaker and distribution to lighting and the lowering device. The power cable extension from the branch circuit feeding the light tower shall be sealed with a multi-leg heat shrink break out boot. The power cord extension shall be included as a part of this item.

The tower shall be equipped with a main circuit breaker. The circuit breaker shall be molded case, 2-pole, 40-ampere thermal magnetic, bolt-on type having a UL-listed interrupting rating of not less than 14,000 rms symmetrical amperes at 480 volts. The breaker shall indicate "ON", "OFF" and "TRIPPED" conditions and the handle shall be trip-free.

The main breaker shall be housed in NEMA 4X stainless steel enclosure with an external, position-indicating operating handle with padlock provisions. The enclosure shall have a 2-color engraved nameplate to read "MAIN BREAKER", attached with screws. The box shall have openings and suitable bushings for cable extensions.

The main breaker shall be arranged for line-side connection to incoming feeder conductors entering the base of the tower via an extension of multi-conductor cable. The load side of the main breaker shall be connected to a cord and receptacle which shall be arranged for connection to either the luminaire ring main power, the lowered luminaire ring test power or the lowering device control.

Each connection to the main breaker shall be made with the specified electric power cable, extended from the enclosure through a watertight sealing/support bushing. The cables shall be arranged and secured to preclude any interference with the lowering device operation.

#### Electric Power Cable.

The electric power cable shall consist of a 4-conductor jacketed extra flexible cable, (2 phase conductors, neutral conductor and a ground conductor).

The power cable shall be Type W industrial grade portable power cord and shall be No. 8 AWG or larger. The cord shall have a multi-conductor, extra flexible CPE or CSPE jacketed construction with reinforced fillers to maintain a smooth round surface according to ICEA S-75-381, NEMA WC 58, UL 1650, and be MSHA approved. The cord shall be rated 2000 V and -40 to 194 °F (-40 to 90 °C). Each conductor shall be No. 8 AWG rope lay stranded annealed copper per ASTM B 172 or ASTM B 173.

Each individual conductor's insulation shall be color coded; one black, one red, one white and one green.

The individual conductors shall be assembled in a cable, with non-hydroscopic reinforced rubber fillers to maintain a smooth round outer surface, with a jacket applied overall. The jacket shall be a heavy duty jacket manufactured according to ASTM D 752 and shall be imprinted with the manufacturer, conductor size number of conductors, type of cable, voltage rating.

#### Ground Continuity.

A flexible copper braid connector of #2 copper equivalent shall be attached with studs and exothermic welds at tower shaft sections or the shafts shall be electrically joined by other means approved by the Engineer. Towers shall include all materials to achieve this bond.

#### Power Receptacles and Plugs.

Power receptacles and plugs shall be circuit-breaking devices which shall mate with each other. The plugs and receptacles shall be 4-wire 4-pole, 600 volt, 60 ampere weatherproof devices according to UL Standard 498 and International Electrical Commission Standard 309. The devices shall be listed by the manufacturer as suitable for make and break operation at rated current.

Components and insert assemblies shall be interchangeable to accept either pin or socket inserts to allow either plug or receptacle to be configured in an energized or de-energized condition, i.e. reverse-contact configurations shall be available. Locations of reverse-contact devices shall be as indicated.

Each plug or receptacle connection to a power cord shall be complete with a suitable non-metallic sealing connector body with a wire mesh strain relief. Other plugs and receptacles shall be complete with suitable sealing angle-adaptor panel or box mounting bodies, as applicable and shall be complete with back-boxes if so dictated by the power distribution configuration.

Each plug and each receptacle shall be complete with a retained flap-type or retained screw-on cover.

Plugs and receptacles shall be water-tight, dust-tight, and chemical resistant and be suitable for use when exposed to the weather and shall be applicable for safe use in harsh, wet weather conditions. The Engineer shall be the judge of applicability.

#### Shipment and Installation.

The light tower, luminaire ring, etc., and hardware shall be packaged during shipment to protect all surfaces from being scratched, marred, chipped, or damaged in any way. Prior to installation, the tower and all its components will be inspected by the Engineer and any parts found to be damaged or defective shall be replaced. Any minor damage to a completely painted light tower surface shall be touched up in a professional manner as approved by the paint manufacturer.

The tower shall be set plumb on the foundation and fastened to the anchor rods with double nuts and washers. Flat washers shall be installed below and above the base plate of the pole. Locknuts with nylon or steel inserts shall be installed on top of the top nut. The nuts shall be tightened in compliance with torque specifications recommended by the manufacturer of the lighting unit.

The use of jam nuts will not be allowed.

The space between the finished top of the foundation and the bottom of the base plate of the pole shall be enclosed with an expanded metal screen made of stainless steel. The size of the mesh of the screen shall be 1/4 in. (6 mm) or less and #18 gauge (1.22 mm) thick, or heavier as approved by the Engineer. The screen shall be held in place with a stainless steel band installed around the tower base plate. The band shall be held tight by a ratchet-type device. Grouting shall not be used to enclose the above described space.

The light tower shall be straight and centered on its longitudinal axis, under no-wind conditions, so, when examined with a transit from any direction, the deviation from the normal shall not exceed 1/8 in. in 3 ft (3 mm in 1 m) within any 5 ft (1.5 m) of height, with total deviation not to exceed 3 in. (75 mm) from the vertical axis through the center of the pole base.

When the luminaire position and orientation has been confirmed and approved by the Engineer, the luminaire shall be anchored with a minimum size 1/4-20NC stainless steel set screw installed through tapped holes in the tenon and mounting bracket of the luminaire. Counterweights on unused tenons shall be mounted in a similar manner.

The assembly and installation of light towers shall be supervised by a qualified representative of the tower or lowering device manufacturer. On-site supervision shall be provided on the first day of tower assembly and installation. Support by telephone shall be available thereafter. At the time of the final inspection, the Contractor shall provide to the Engineer the manufacturer's written certification, signed by their supervising representative, that all towers and lowering devices have been properly installed. The entire coordinated assembly shall be warranted by the tower or lowering device manufacturer.

Inspection.

Light tower inspection shall include the complete operational demonstration of each light tower. The contractor shall provide sufficient manpower to perform this demonstration as a part on this item. Inspection check sheets will be provided.

Method of Measurement. Each light tower which is delivered and installed shall be counted as a unit for payment.

Basis of Payment. This work will be paid for at the contract unit price each for LIGHT TOWER of the mounting height, LUMINAIRE MT – 8 or LUMINAIRE MT – 12 as specified.



## **LUMINAIRE, UNDERPASS, LED**

### Description.

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

### General.

The luminaire including the housing, driver and optical assembly shall be assembled in the U.S.A. The luminaire shall be assembled by and manufactured by the same manufacturer. The luminaire shall be mechanically strong and easy to maintain. All electrical and electronic components of the luminaire shall comply with the requirements of Restriction of Hazardous Materials (RoHS) regulations. The luminaire shall be listed for wet locations by an NRTL and shall meet the requirements of UL 1598 and UL 8750

### Submittal Requirements.

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

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

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

- a. TM-21 calculator spreadsheet (XLSX or PDF format) and if available, TM-28 report for the specified luminaire or luminaire family. Both reports shall be for 50,000 hours at an ambient temperature of 77 °F (25 °C).
- b. LM-79 report with National Voluntary Laboratory Accreditation Program (NVLAP) current at the time of testing in PDF format inclusive of the following: isofootcandle diagram with half candela contour and maximum candela point; polar plots through maximum plane and maximum cone; coefficient of utilization graph; candela table; and spectral distribution graph and chromaticity diagram.
- c. LM-80 report for the specified LED package in PDF format and if available, LM-84 report for the specified luminaire or luminaire family in PDF format. Both reports shall be conducted by a laboratory with NVLAP certification current at the time of testing.
- d. AGi32 calculation file matching the submittal package.
- e. In Situ Temperature Measurement Test (ISTMT) report for the specified luminaire or luminaire family in PDF format.
- f. Vibration test report in accordance with ANSI C136.31 in PDF format.
- g. ASTM B117/ASTM D1654 (neutral salt spray) test and sample evaluation report in PDF format.
- h. ASTM G154 (ASTM D523) gloss test report in PDF format.
- i. LED drive current, total luminaire input wattage, and current over the operating voltage range at an ambient temperature of 77 °F (25 °C).
- j. Power factor (pf) and total harmonic distortion (THD) at maximum and minimum supply and at nominal voltage for the dimmed states of 70%, 50%, and 30% full power.
- k. Ingress protection (IP) test reports, conducted according to ANSI C136.25 requirements, for the driver and optical assembly in PDF format.
- l. Installation, maintenance, and cleaning instructions in PDF format, including recommendations on periodic cleaning methods.
- m. Documentation in PDF format that the reporting laboratory is certified to perform the required tests.

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

#### Manufacturer Experience.

The luminaire shall be designed to be incorporated into a lighting system with an expected 20 year lifetime. The luminaire manufacturer shall have a minimum of 33 years' experience manufacturing HID roadway luminaires and shall have a minimum of seven (7) years' experience manufacturing LED roadway luminaires. The manufacturer shall have a minimum of 25,000 total LED roadway luminaires installed on a minimum of 100 separate installations, all within the U.S.A.

#### Housing.

Material. The luminaire shall be a single device not requiring onsite assembly for installation. The power supply for the luminaire shall be integral to the unit. The housing shall be either stainless-steel or cast aluminum.

Aluminum Housing. The housing shall be extruded or cast aluminum; or a combination of both and shall have a copper content of less than 1.0%.

The housing shall be painted grey or silver unless specified otherwise. A epoxy base coat shall applied to the aluminum after the aluminum is properly treated with a conversion coating. The finish coat shall be polyester powder coat with a minimum thickness of 2.0 mil.

The luminaire surfaces exposed to the environment shall exceed a rating of six, according to ASTM D1654, after 1000 hours of ASTM B117 testing. The coating shall exhibit no greater than 30% reduction of gloss, according to ASTM D523, after 500 hours of ASTM G154 Cycle 6 QUV® accelerated weathering testing.

Stainless-Steel Housing. The housing shall be constructed from 16-gauge minimum, 304 stainless steel.

The stainless-steel housing does not need to be painted. The manufacturer may paint the luminaire at no additional cost.

The luminaire shall be optically sealed, mechanically strong and easy to maintain. The luminaire shall be designed for wall mounting to a pier or abutment. It shall be provided with a suitable mounting bracket which allows for +90° adjustment from horizontal in 5° increments.

The luminaire shall be gasketed and sealed and shall be UL listed for wet locations. The luminaire optical assembly shall have a minimum IEC ingress penetration rating of IP66. When furnished with a lens and frame, the lens shall be made of crystal clear, impact and heat resistant flat glass. The lens and frame shall be securely attached to the main housing and be readily removable for servicing the LED optical assembly.

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

The total weight including accessories, shall not exceed 75 lbs.

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

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

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

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

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

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

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

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

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

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

The power connection to the luminaire shall be via liquid tight metallic conduit or an armored flexible cable assembly. The power connection, including any external shielding, must be secured to the luminaire and connected source. The location of the opening shall be coordinated with the installation to minimize the length of flexible conduit required. The length of the cable or flexible conduit shall not exceed four (4) feet.

Mounting Brackets.

The brackets shall be properly sized to accommodate the weight of the luminaire with calculations or other suitable reference documentation submitted to support the material choice. The brackets shall be constructed of 304 stainless steel

The mounting brackets shall be fully coordinated with the luminaire mounting method indicated in plans.

Driver.

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

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

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

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

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

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

### LED Optical Assembly

The optical assembly shall have an IP66 or higher rating in accordance with ANSI C136.25. The circuiting of the LED array shall be designed to minimize the effect of individual LED failures on the operation of other LEDs. All optical components shall be made of glass or a UV stabilized, non-yellowing material.

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

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

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

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

### Photometric Performance.

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

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

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

Photometric Calculations.

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

Complete point-by-point luminance and veiling luminance calculations as well as listings of all indicated averages and ratios as applicable shall be provided in accordance with IESNA RP-8 recommendations. Lighting calculations shall be performed using AGi32 software with all luminance calculations performed to one decimal place (i.e. x.x cd/m<sup>2</sup>). Uniformity ratios shall also be calculated to one decimal place (i.e. x.x:1). Calculation results shall demonstrate that the submitted luminaire meets the lighting metrics specified in the project Luminaire Performance Table(s). Values shall be rounded to the number of significant digits indicated in the luminaire performance table(s).

The AGi32 file used in the submitted calculations shall be provided with the luminaire submittal along with the individual IES photometric files utilized.

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

**IDOT DISTRICT 1 LUMINAIRE PERFORMANCE TABLE 1  
 ROADWAY UNDERPASS LIGHTING  
 1 LANE**

<b>GIVEN CONDITIONS</b>		
<b>ROADWAY DATA</b>	Pavement Width	16 (ft)
	Number of Lanes	1
	I.E.S. Surface Classification	R3
	Q-Zero Value	.07
<b>MOUNTING DATA</b>	Mounting Height	15 (ft)
	Tilt	0-40 (degrees)
	Orientation	Perpendicular to roadway
	Set-Back from Edge Of Pavement	12 (ft)
<b>LUMINAIRE DATA</b>	Lumens	6,300 – 12,500
	Total Light Loss Factor	0.65
<b>LAYOUT DATA</b>	Spacing	40 (ft)
	Configuration	Single Sided
	Luminaire Overhang over EOP	-12 (ft)

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

<b>PERFORMANCE REQUIREMENTS</b>		
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**NOTE:** These performance requirements shall be the minimum acceptable standards of photometric performance for the luminaire, based on the given conditions listed above.

<b>ROADWAY</b>	Average Luminance, $L_{AVE}$	1.6 Cd/m <sup>2</sup> (Max)
		1.2 Cd/m <sup>2</sup> (Min)
<b>LUMINANCE</b>	Uniformity Ratio, $L_{AVE}/L_{MIN}$	3:1 (Max)
	Uniformity Ratio, $L_{MAX}/L_{MIN}$	5:1 (Max)
	Veiling Luminance Ratio, $L_V/L_{AVE}$	0.30:1 (Max)



**IDOT DISTRICT 1 LUMINAIRE PERFORMANCE TABLE 2  
 ROADWAY UNDERPASS LIGHTING  
 2 LANE**

<b>GIVEN CONDITIONS</b>		
<b>ROADWAY DATA</b>	Pavement Width	24 (ft)
	Number of Lanes	2
	I.E.S. Surface Classification	R3
	Q-Zero Value	.07
<b>MOUNTING DATA</b>	Mounting Height	15 (ft)
	Tilt	0-40 (degrees)
	Orientation	Perpendicular to roadway
	Set-Back from Edge Of Pavement	12 (ft)
<b>LUMINAIRE DATA</b>	Lumens	6,300 – 12,500
	Total Light Loss Factor	0.65
<b>LAYOUT DATA</b>	Spacing	35 (ft)
	Configuration	Single Sided
	Luminaire Overhang over EOP	-12 (ft)

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

<b>PERFORMANCE REQUIREMENTS</b>		
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**NOTE:** These performance requirements shall be the minimum acceptable standards of photometric performance for the luminaire, based on the given conditions listed above.

<b>ROADWAY</b>	Average Luminance, $L_{AVE}$	1.6 Cd/m <sup>2</sup> (Max)
		1.2 Cd/m <sup>2</sup> (Min)
<b>LUMINANCE</b>	Uniformity Ratio, $L_{AVE}/L_{MIN}$	3:1 (Max)
	Uniformity Ratio, $L_{MAX}/L_{MIN}$	5:1 (Max)
	Veiling Luminance Ratio, $L_V/L_{AVE}$	0.30:1 (Max)

**IDOT DISTRICT 1 LUMINAIRE PERFORMANCE TABLE 3  
 ROADWAY UNDERPASS LIGHTING  
 3 LANE**

<b>GIVEN CONDITIONS</b>		
<b>ROADWAY DATA</b>	Pavement Width	36 (ft)
	Number of Lanes	3
	I.E.S. Surface Classification	R3
	Q-Zero Value	.07
<b>MOUNTING DATA</b>	Mounting Height	15 (ft)
	Tilt	0-40 (degrees)
	Orientation	Perpendicular to roadway
	Set-Back from Edge Of Pavement	12 (ft)
<b>LUMINAIRE DATA</b>	Lumens	6,300 – 12,500
	Total Light Loss Factor	0.65
<b>LAYOUT DATA</b>	Spacing	50 (ft)
	Configuration	Opposite
	Luminaire Overhang over EOP	-12 (ft)

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

<b>PERFORMANCE REQUIREMENTS</b>		
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**NOTE:** These performance requirements shall be the minimum acceptable standards of photometric performance for the luminaire, based on the given conditions listed above.

<b>ROADWAY</b>	Average Luminance, $L_{AVE}$	1.6 Cd/m <sup>2</sup> (Max)
		1.2 Cd/m <sup>2</sup> (Min)
<b>LUMINANCE</b>	Uniformity Ratio, $L_{AVE}/L_{MIN}$	3:1 (Max)
	Uniformity Ratio, $L_{MAX}/L_{MIN}$	5:1 (Max)
	Veiling Luminance Ratio, $L_V/L_{AVE}$	0.30:1 (Max)

**IDOT DISTRICT 1 LUMINAIRE PERFORMANCE TABLE 4  
 ROADWAY UNDERPASS LIGHTING  
 4 LANE**

<b>GIVEN CONDITIONS</b>		
<b>ROADWAY DATA</b>	Pavement Width	48 (ft)
	Number of Lanes	4
	I.E.S. Surface Classification	R3
	Q-Zero Value	.07
<b>MOUNTING DATA</b>	Mounting Height	15 (ft)
	Tilt	0-40 (degrees)
	Orientation	Perpendicular to roadway
	Set-Back from Edge Of Pavement	12 (ft)
<b>LUMINAIRE DATA</b>	Lumens	6,300 – 12,500
	Total Light Loss Factor	0.65
<b>LAYOUT DATA</b>	Spacing	45 (ft)
	Configuration	Opposite
	Luminaire Overhang over EOP	-12 (ft)

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

<b>PERFORMANCE REQUIREMENTS</b>		
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**NOTE:** These performance requirements shall be the minimum acceptable standards of photometric performance for the luminaire, based on the given conditions listed above.

<b>ROADWAY</b>	Average Luminance, $L_{AVE}$	1.6 Cd/m <sup>2</sup> (Max)
		1.2 Cd/m <sup>2</sup> (Min)
<b>LUMINANCE</b>	Uniformity Ratio, $L_{AVE}/L_{MIN}$	3:1 (Max)
	Uniformity Ratio, $L_{MAX}/L_{MIN}$	5:1 (Max)
	Veiling Luminance Ratio, $L_v/L_{AVE}$	0.30:1 (Max)

**IDOT DISTRICT 1 LUMINAIRE PERFORMANCE TABLE 5  
 ROADWAY UNDERPASS LIGHTING  
 5 LANE**

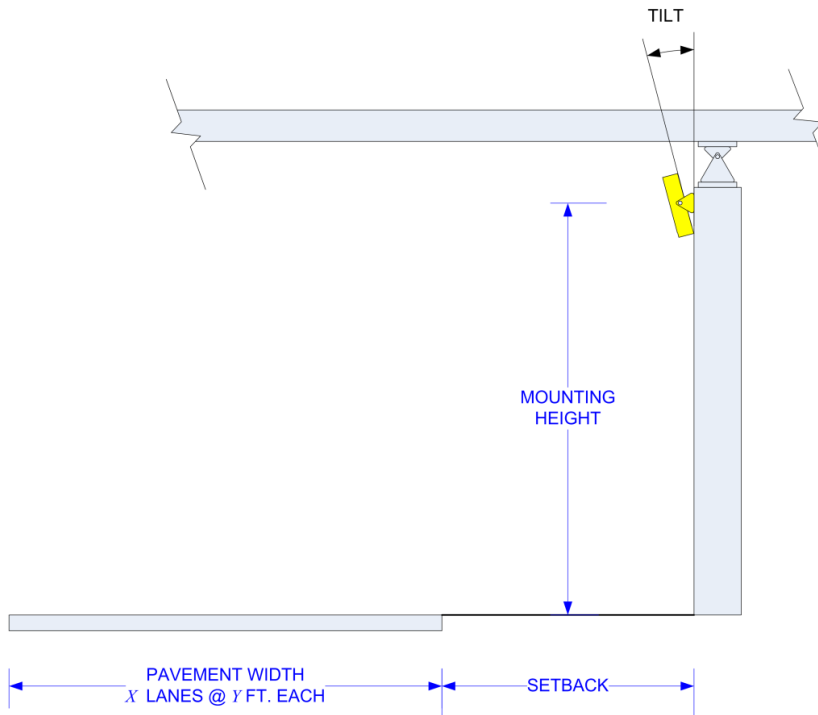
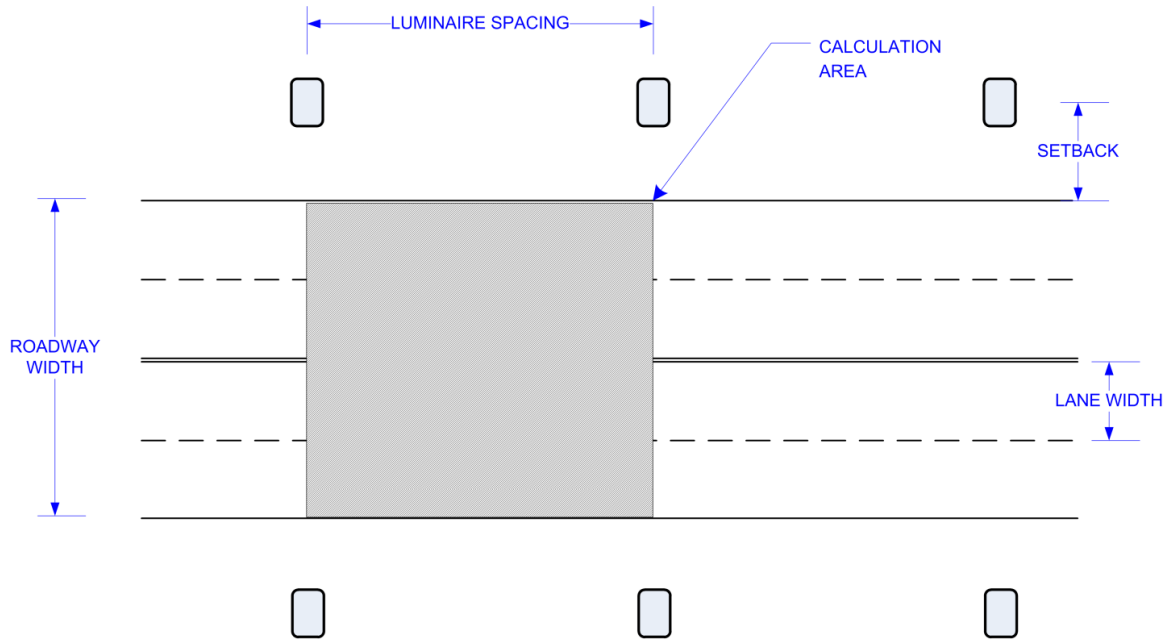
<b>GIVEN CONDITIONS</b>		
<b>ROADWAY DATA</b>	Pavement Width	60 (ft)
	Number of Lanes	5
	I.E.S. Surface Classification	R3
	Q-Zero Value	.07
<b>MOUNTING DATA</b>	Mounting Height	15 (ft)
	Tilt	0-40 (degrees)
	Orientation	Perpendicular to roadway
	Set-Back from Edge Of Pavement	12 (ft)
<b>LUMINAIRE DATA</b>	Lumens	6,300 – 12,500
	Total Light Loss Factor	0.65
<b>LAYOUT DATA</b>	Spacing	40 (ft)
	Configuration	Opposite
	Luminaire Overhang over EOP	-12 (ft)

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

<b>PERFORMANCE REQUIREMENTS</b>		
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**NOTE:** These performance requirements shall be the minimum acceptable standards of photometric performance for the luminaire, based on the given conditions listed above.

<b>ROADWAY</b>	Average Luminance, $L_{AVE}$	1.6 Cd/m <sup>2</sup> (Max)
		1.2 Cd/m <sup>2</sup> (Min)
<b>LUMINANCE</b>	Uniformity Ratio, $L_{AVE}/L_{MIN}$	3:1 (Max)
	Uniformity Ratio, $L_{MAX}/L_{MIN}$	5:1 (Max)
	Veiling Luminance Ratio, $L_V/L_{AVE}$	0.30:1 (Max)



Independent Testing

When a contract has 30 or more luminaires of the same type (distribution type and lumen output/wattage), that luminaire type shall be independently tested, unless otherwise noted. The quantity of luminaires to be tested shall be as specified in the following table.

<b>Contract Quantity</b>	<b>Luminaires to be Tested</b>
1-29	0 (unless otherwise noted)
30-80	2
81-130	3
131-180	4
181-230	5
231-280	6
281-330	7

Testing is not required for temporary lighting luminaires.

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

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

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

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

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

The testing performed shall include photometric and electrical testing.

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

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

Two copies of the summary report and the test results including IES photometric files (including CDROM) shall be certified by the test laboratory and shall be sent by certified mail directly to the Engineer.

To: District Engineer  
Attn: Bureau Chief of Traffic Operations  
Illinois Department of transportation  
201 West center Ct.  
Schaumburg, IL 60196

The package shall state "luminaire test reports" and the contract number clearly.

A copy of this material shall be sent to the Contractor and the Resident Engineer at the same time.

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

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

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

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

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

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

#### Installation.

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

Underpass luminaires shall be either attached to structures (such as piers, etc.) or suspended from structures (such as bridge decks) as indicated or implied by the configuration on the Plans. Mounting, including all hardware and appurtenant items, shall be included as part of this item. Luminaires shall be configured with the luminaire tilt as identified in the submitted documents.

Unless otherwise indicated, suspended underpass luminaires shall be installed one-inch above the lowest underpass beam and shall be mounted using vibration dampening assemblies. All mounting hardware shall be corrosion resistant and shall be stainless steel unless otherwise indicated.

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

Luminaire wiring shall be provided with the luminaire. The wiring shall run from the junction box to the luminaire.

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

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

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



Warranty.

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

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

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

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

Method of Measurement.

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

<b>Designation Type</b>	<b>Minimum Initial Luminous Flux</b>
A	2,200
B	3,150
C	4,400
D	6,300
E	9,450
F	12,500
G	15,500
H	25,200
I	47,250
J	63,300
K	80,000+

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

Basis of Payment.

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

## **REMOVE TEMPORARY WOOD POLE**

Description. This item consists of removing existing temporary wood poles, aerial cable, and all associated apparatus and connections. This removal shall also include removal of all wiring and connections back to the associated lighting controller or adjacent lighting unit to remain not affected by construction. All equipment and material removed as part of this item shall become property of the Contractor and shall be removed from the site.

Pole holes shall be backfilled according to Article 841.02

Method of Measurement. Units measured for payment will be counted on a per-pole basis, regardless of pole material, pole dimensions and installation depth.

Basis of Payment. This work will be paid for at the Contract unit price each for REMOVE TEMPORARY WOOD POLE.

## **LIGHT TOWER, SERVICE PAD**

Description. This work shall consist of the construction of a light tower service pad. The service pad shall be built to the lines and grades and dimension shown on the plans. The work shall include the concrete, protective coat, sub-base, epoxy coated rebar and welded wire fabric required for the installation of the service pad.

This work shall be done according to Section 606 of the Standard Specifications with the following revisions:

Revise Article 606.15 of the Standard Specifications to read:

Basis of Payment. Light tower service pads will be paid for at the contract unit price per each for LIGHT TOWER, SERVICE PAD, which shall be payment in full the material and work described herein and as shown on the plans to provide a complete service pad.

No additional compensation will be allowed for furnishing and compacting 6" of CA-6 sub-base, providing and finishing Class SI concrete, providing reinforcement bars, providing welded wire fabric, backfilling, and restoring slopes for the concrete pad as indicated in the plans or as directed by the Engineer.

## **ROD AND CLEAN EXISTING CONDUIT**

Description. This work will consist of inserting a duct rod or electrical fish rod or tape of sufficient length and rigidity into an electrical conduit opening in one electrical manhole, handhole, or junction box and pushing the said rod through the conduit to emerge at the next or subsequent manhole, handhole or junction box in the conduit system at the location shown on the plans. The duct rod may be inserted and removed by any standard construction method which causes no damage to the conduit system. The size of the conduit may vary from two inch (2") to four inch (4"), but there will be no differentiation in cost for the size of the conduit. Prior to removal, of the duct rod, a duct cleaning attachment such as a properly sized wire brush or cleaning mandrel must be attached to the duct rod, which by removal of the duct rod will be pulled through the conduit to remove sand, grit, or other light obstructions from the duct to provide a clean, clear passage for the installation of cable. Whenever the installation of cables is not performed as an adjunct to or immediately following the cleaning of the duct, a light weight pulling line such as a 1/8" polyethylene line or conduit measuring tape must be placed and will remain in the conduit to facilitate future work. When great difficulty of either inserting the duct rod or removal of the cleaning mandrel is encountered, the duct may require further cleaning by use of a compressed air gun, or a low pressure water hose. In the case of a broken duct line, the conduit must be excavated and repaired. The existence and location of breaks in the duct line may be determined by rodding, but the excavation and repair work required will not be a part of this pay item.

Method of Measurement. This work will be measured per lineal foot for each conduit cleaned. Measurements will be made from point to point horizontally. No vertical rises will count in the measurement.

Basis of Payment. This work will be paid for at the contract unit price per lineal foot for ROD AND CLEAN EXISTING CONDUIT for the installation of new electric cables. Such price will include the furnishing of all necessary tools, equipment, and polyethylene line as required to prepare a conduit for the installation of cable. When the number of cables to be installed requires the use of more than one conduit in the same run, each additional conduit required will be rodded and cleaned as a separate unit and paid for at the contract unit price.

## **REMOVE EXISTING CABLE**

Description. This work will consist of disconnecting and removing of existing cable from a conduit or raceway. Existing cables shall be disposed of or coiled in an existing junction box and protected for re-use as specified herein, as shown on the plans and as directed by the Engineer.

No removal work shall be permitted without approval from the Engineer. All cables removed and disposed of as part of this item shall become property of the Contractor and shall be removed from the site, unless otherwise directed.

Cables to be Disposed. Cables must be pulled out of an existing conduit, removed completely and disposed.

Cables to be Re-Installed. Cables to be reinstalled must be carefully pulled out of an existing conduit, protected from damage and coiled in an existing junction box, handhole or manhole for re-use as shown on the plans.

Method of Measurement. The removed cable will be measured for payment in feet in place, regardless of cable type and size. Measurement will be made in a straight line between changes of direction and to the centers of poles, handholes, junction boxes and manholes. Slack cable and vertical cable will not be measured for payment. Multi-conductor cables within a single outer jacket or within unit duct shall be measured the same as single conductor cables.

Basis of Payment. This work shall be paid for at the contract unit price for REMOVE EXISTING CABLE as specified. The price will be payment in full for completely removing the existing cable or unit duct from a conduit and disposing of the cable or protecting the cable for reuse. If two or more cables in a conduit are to be removed, each cable will be measured for payment separately.

The removal of existing unit duct from an existing conduit or conduit sleeve shall be included in this item and shall not be paid for separately.

The reinstallation of existing cables in existing or new conduits is not included in this item and shall be paid for under a separate pay item.

The removal of existing cables within existing conduits to be removed is not included in this item and shall be paid for under a separate pay item.

**TEMPORARY WOOD POLE, 60 FT., CLASS 4 & TEMPORARY WOOD POLE, 80 FEET,  
CLASS 4**

Description. This item shall consist of furnishing, installing and removing a temporary wood pole, as specified herein and all hardware and accessories required for the intended temporary use of the pole.

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

Item	Article/Section
(a) Light Pole Identification.....	1069.06
(b) Wood Pole.....	1069.04

**CONSTRUCTION REQUIREMENTS**

Installation. Installation shall be as described in Article 830.03(c).

Wood poles may be used poles as approved by the Engineer as described in Article 830.04. The wood pole shall be transferred to IDOT District 1 for maintenance under proposed future contracts.

Method of Measurement. Wood poles shall be counted as, each installed.

Basis of Payment. This item shall be paid at the contract unit price each for TEMPORARY WOOD POLE, of the class and length indicated.

## **DRILL EXISTING JUNCTION BOX**

Description. This item consists of drilling a hole in an existing surface mounted junction box for the installation of a new conduit(s) and drilling a hole in an existing embedded junction box and barrier wall and furnishing and installing new conduit as shown in the plans.

General Requirements. General requirements must be in accordance with Section 801 of the Standard Specifications.

Installation. The size of the hole must be as close as possible to the size of the conduit. Conduit openings must be fitted with the appropriate conduit fittings, nuts and accessories. The type and orientation of the conduit must be as shown on the Plans.

Materials. All materials shall be in accordance to the requirements of section 813 of the Standard Specification.

Installation for embedded junction box. Core drill through the existing barrier wall to reach the junction box. Use a knockout punch to make a hole into the side wall of the junction box. Use the punch size recommended by the manufacturer for the conduit being installed. Do not disturb any existing cables within the junction box.

Run a galvanized steel close nipple through the hole, using a sealing lock nut on either side of the junction box wall.

Connect the nipple to the conduit using metal conduit and fittings as required. Match the size of the conduit. At right angle connections, install mogul LB conduit bodies to facilitate the installation of cable.

Fill in any voids within the barrier wall around the conduit and seal the conduit entry point into the wall to prevent the collection of moisture.

Installation for surface mounted junction boxes. Field cut openings in the junction box shall be uniform and smooth. All burrs and rough edges shall be filed smooth prior to the installation of the conduit(s) into the junction box.

Cleaning the existing junction box (if required) will be included in this item.

Method of Measurement. Each hole that is drilled for a conduit (drilling the hole, furnishing and installing the conduit(s) and fitting(s)) including all necessary labor and material for a complete installation as indicated will be counted as a unit for payment.

Basis of Payment. This work will be paid for at the contract unit price each for DRILL EXISTING JUNCTION BOX, which will be payment in full for performing the work complete as described herein and as directed by the Engineer.

## **REMOVAL OF LIGHT TOWER, NO SALVAGE**

Description. The work shall consist of removal and disposal of existing high mast light tower as described herein, as shown on the plans and as directed by the Engineer.

The removal of the light tower foundation is not included in this item and will be paid for separately.

General. General requirements must be in accordance with Article 842.02 of the Standard Specifications.

Removal of the light towers must be in accordance with Article 842.03 of the Standard Specifications. The light towers, luminaires, and all associated hardware and appurtenances shall become the property of the Contractor and shall be disposed of according to Article 202.03.

Method of Measurement. Each light tower which is removed and disposed of as indicated will be counted for as a unit for payment.

Basis of Payment. Removal of light towers will be paid for at the contract unit price per each for REMOVAL OF LIGHT TOWER, NO SALVAGE.

## **REMOVAL OF TOWER FOUNDATION**

Description. This item consists of removing and disposing of an existing high mast light tower foundation and backfilling the excavated areas as specified herein, as shown on the Plans and as directed by the Engineer.

General Requirements. General requirements must be in accordance with Section 801 of the Standard Specifications, except as herein modified.

Removal. Removal must be in accordance with Article 842.04 of the Standard Specifications.

Method of Measurement. Each foundation that is removed and disposed of properly as indicated will be counted as a unit for payment.

Basis of Payment. This work will be paid for at the Contract unit price each for REMOVAL OF TOWER FOUNDATION, which shall be payment in full for the work described herein.

**TEMPORARY MAST ARM, ALUMINUM, 15FT**

Description. This item shall consist of furnishing and installing a temporary mast arm on the wood pole as shown on the plans and as directed by the Engineer.

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

Item	Article/Section
(a) Mast Arm.....	1069.02(a)

**CONSTRUCTION REQUIREMENTS**

Installation. Installation shall be as described in Article 830.03(c). The Contractor shall provide all the necessary hardware and accessories required to mount the mast arm(s) on the wood pole as indicated on the plans.

The mast arm shall remain the property of the Contractor and shall be removed when directed by the Engineer.

Method Of Measurement. Temporary aluminum mast arms shall be counted as, each installed.

Basis Of Payment. This item shall be paid at the contract unit price each for TEMPORARY MAST ARM, ALUMINUM, of the mast arm type, quantity and length indicated.



## **REMOVE AERIAL CABLE**

Description. This item consists of removing existing aerial cables completely from the lighting units, temporary wood poles and bridge structures including all associated apparatus, anchors, mounting hardware and connections as shown on the plans and as directed by the Engineer.

All equipment and material removed as part of this item shall become property of the Contractor and shall be removed from the site.

Method of Measurement. Removal of existing aerial cable will be measured for payment at the contract unit price per foot, regardless of the quantity and size of the aerial cables. Slack cable and will not be measured for payment.

Basis of Payment. This work will be paid for at the Contract unit price per foot for REMOVE AERIAL CABLE.

## **BOLLARDS**

Description. This work shall consist of furnishing and installing bollards with concrete footings as shown on the Plans and as directed by the Engineer.

Prior to beginning work, the contractor shall stake the bollard locations in the field for the Engineer's review and approval.

General. The bollards shall be constructed of concrete filled schedule 80 steel pipe.

The Portland cement concrete used for the bollard footings and to fill the inside of the pipe shall be in accordance with Article 1020 of the Standard Specifications. Grout installed for the top "cap" of the pipe shall be in accordance with Article 1020 of the Standard Specifications.

The steel reinforcement bars installed for the footings shall be in accordance with Article 1006.10(a) of the Standard Specifications.

The bollard footings shall be the drilled shaft type and shall be constructed according to Section 516. The submittal requirements as stated in Article 516.04 shall not apply.

The bollards shall be painted with one coat of primer and two coats of yellow paint. Cleaning of the painting surfaces shall be in accordance with Article 851.03 of the Standard Specifications.

Method of Measurement. Each bollard installed with a concrete footing will be measured for payment.

Basis of Payment. This work will be paid for at the Contract unit price each for BOLLARDS.

## **CLEANING EXISTING MANHOLE OR HANDHOLE**

Description. This item consists of cleaning an existing hand hole or manhole for the installation of new conduit(s) and cable(s).

General Requirements. General requirements must be in accordance with Section 801 of the Standard Specifications, except as herein modified.

Installation. Existing cable hooks must be relocated, and existing cables must be retrained as required prior to drilling the existing manhole or hand hole. Existing and new debris must be removed and disposed of off-site by the Contractor. Existing and new gas and water must be pumped out as directed by the Engineer. Debris removal, de-gassing and water pumping must be included in this item; separate payment will not be made.

The Contractor must furnish and install cable racks and/or cable hooks for new and existing cables in all manholes and handholes as required to facilitate new cable installation. This Work must be included in this item and separate payment will not be made.

Coordination with ComEd for ComEd handholes or manholes, and coordination with the Bureau of Electricity for city electric handholes or manholes must be performed by the Contractor prior to starting any Work. Coordination must be included in this item; separate or additional payment will not be made.

Drilling the existing manhole or hand hole will not be included in this item and will be paid for under a separate pay item.

Method of Measurement. Each manhole or hand hole that is cleaned (relocating existing cable hooks, installing new cable hooks, retraining cables, removing debris, and pumping out gas and water) as indicated will be counted as a unit for payment. Each manhole or hand hole that is drilled will be measured for payment for cleaning, and will be measured for cleaning only once.

Basis of Payment. This work will be paid for at the contract unit price each for CLEANING EXISTING MANHOLE OR HANDHOLE, which will be payment in full for performing the work described herein.

## **DRILL HOLE THROUGH RETAINING WALL**

Description. This item consists of core drilling a hole in an existing retaining wall for the installation of a new conduit(s).

Installation. The size of the hole must be as close as possible to the size of the conduit. A conduit stub-out of the size required must be installed in the drilled hole. A bushing must be provided at the end of the conduit. The space between the conduit and the retaining wall must be sealed with a waterproof, epoxy mortar. The type and orientation of the conduit must be as shown on the Plans.

Method of Measurement. Each hole that is drilled for a conduit, or hole that is made for a bank of conduits (drilling the hole, furnishing and installing the conduit(s) and bushing(s), including all necessary epoxy mortar as indicated will be counted as a unit for payment.

Basis of Payment. This work will be paid for at the contract unit price each for DRILL HOLE THROUGH RETAINING WALL, which will be payment in full for performing the work described herein.

## **MAINTENANCE OF LIGHTING SYSTEMS**

This special provision applies only to the IDOT lighting systems.

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

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

The Contractor shall be responsible for the proper operation and maintenance of the following existing and proposed lighting systems under this contract:

- Existing IDOT Lighting Controller 'U'; Circuits A, B, C, and D
- Existing IDOT Lighting Controller 'V'; Circuits A, B, C, and D

Before performing any excavation, removal, or installation work (electrical or otherwise) at the site, the Contractor shall initiate a request for a maintenance transfer and preconstruction inspection, as specified elsewhere herein, to be held in the presence of the Engineer and a representative of the party or parties responsible for maintenance of any lighting systems which may be affected by the work. During the maintenance preconstruction inspection, the party responsible for existing maintenance shall perform testing of the existing system in accordance with Article 801.13a. The Contractor shall request a date for the preconstruction inspection no less than fourteen (14) days prior to the desired date of the inspection.

The Engineer will document all test results and note deficiencies. All substandard equipment will be repaired or replaced by the existing maintenance contractor, or the Engineer can direct the Contractor to make the necessary repairs under Section 109.04.

Existing lighting systems, when depicted on the plans, are intended only to indicate the general equipment installation of the systems involved and shall not be construed as an exact representation of the field conditions. It remains the Contractor's responsibility to visit the site to confirm and ascertain the exact condition of the electrical equipment and systems to be maintained. Contract documents shall indicate the circuit limits.

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

Extent of Maintenance.

All of the existing lighting units and lighting circuits currently fed from existing IDOT lighting controllers "U" and "V" shall remain energized during nighttime hours for the duration of the contract. Any temporary power required to keep the lighting systems energized will be provided by the contractor at no additional cost to the contract.

Partial Maintenance. Unless otherwise indicated, if the number of circuits affected by the contract is equal to or less than 40% of the total number of circuits in a given controller and the controller is not part of the contract work, the Contractor needs only to maintain the affected circuits within the project limits. The project limits are defined as those limits indicated in the contract plans. Equipment outside of the project limits, on the affected circuits shall be maintained and paid for under Article 109.04. The affected circuits shall be isolated by means of in-line waterproof fuse holders as specified elsewhere and as approved by the Engineer. The unaffected circuits and the controller will remain under the maintenance of the State.

Full Maintenance. If the number of circuits affected by the contract is greater than 40% of the total number of circuits in a given controller, or if the controller is modified in any way under the contract work, the Contractor shall maintain the entire controller and all associated circuits within the project limits. Equipment outside of the project limits shall be maintained and paid for under Article 109.04.

If the existing equipment is damaged by normal vehicular traffic, not contractor operations, is beyond repair and cannot be re-set, the contractor shall replace the equipment in kind with payment made for such equipment under Article 109.04. If the equipment damaged by any construction operations, not normal vehicular traffic, is beyond repair and cannot be re-set, the contractor shall replace the equipment in kind and the cost of the equipment shall be included in the cost of this pay item and shall not be paid for separately.

Maintenance of Proposed Lighting Systems. Proposed Lighting Systems. Proposed lighting systems shall be defined as any lighting system or part of a lighting system, temporary or permanent, which is to be constructed under this contract regardless of the project limits indicated in the plans.

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

Lighting System Maintenance Operations. The Contractor's responsibility shall include all applicable responsibilities of the Electrical Maintenance Contract, State of Illinois, Department of Transportation, Division of Highways, District One. These responsibilities shall include the maintenance of lighting units (including sign lighting), cable runs and lighting controls. In the case of a pole knockdown or sign light damage, the Contractor shall promptly clear the lighting unit and circuit discontinuity and restore the system to service. The equipment shall then be re-set by the contractor within the time limits specified herein.

If the existing equipment is damaged by normal vehicular traffic, not contractor operations, is beyond repair and cannot be re-set, the contractor shall replace the equipment in kind with payment made for such equipment under Article 109.04. If the equipment damaged by any construction operations, not normal vehicular traffic, is beyond repair and cannot be re-set, the contractor shall replace the equipment in kind and the cost of the equipment shall be included in the cost of this pay item and shall not be paid for separately.

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

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

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

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

Failure to provide this service will result in liquidated damages of \$500 per day per occurrence. In addition, the Department reserves the right to assign any work not completed within this timeframe to 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 \$500 per month per occurrence. Unpaid bills will be deducted from any monies owed to the Contractor. Repeated failures and/or a gross failure of maintenance shall result in the State's Electrical Maintenance Contractor being directed to correct all deficiencies and the resulting costs deducted from any monies owed the contractor.

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

Operation of Lighting. The lighting shall be operational every night, dusk to dawn. Duplicate lighting systems (such as temporary lighting and proposed new lighting) shall not be operated simultaneously. Lighting systems shall not be kept in operation during long daytime periods.

Method of Measurement. The contractor shall demonstrate to the satisfaction of the Engineer that the lighting system is fully operational prior to submitting a pay request. Failure to do so will be grounds for denying the pay request. Months in which the lighting systems are not maintained and not operational will not be paid. Payment shall not be made retroactively for months in which lighting systems were not operational.

Basis of Payment. Maintenance of lighting systems shall be paid for at the contract unit price per calendar month for MAINTENANCE OF LIGHTING SYSTEM.

## **RELOCATE EXISTING TEMPORARY LIGHTING UNIT**

Description. This work will consist of removing and relocating an existing temporary lighting unit including the wood pole, mast arms and luminaires, all hardware, accessories, and connections required for a complete installation to make the temporary lighting unit fully functional at the new location as shown on the plans, as described herein and as directed by the Engineer.

Removal and Reinstallation. The existing temporary lighting unit shall be disconnected and removed. The removed lighting unit shall be installed immediately at the new location. The electric cables shall be connected to power supply cables so that the reinstalled temporary lighting unit becomes operational the same evening without interruption. If the existing electric cables are not of sufficient length to make the new connection, a new continuous span of electric cables, of equal or better quality, shall be installed at no additional cost.

The void caused by the removal of the temporary wood pole shall be backfilled according to Article 841.02.

Work to relocate the existing electric cables supplying power to the temporary lighting units will not be paid for separately and will be included in the cost of this pay item.

For the removal and relocation work, the mast arm and/or luminaire may be removed and reinstalled as a unit, at the option of the Contractor, with approval from the Engineer. No additional compensation will be paid for these operations.

Any damage sustained to the temporary lighting unit during the removal and reinstallation operations shall be repaired, or replaced in kind, to the satisfaction of the Engineer at no additional cost. The Engineer will be the sole judge to determine the extent of the damage and the suitability of repair and/or replacement.

When the temporary lighting unit is not in conflict with the proposed construction, but is in conflict with the Contractor's proposed sequence of operations, or the relocation is for the Contractor's convenience, the relocation of said temporary lighting unit will be at the Contractor's option and expense. The Contractor shall obtain the Engineer's approval before any pole or unit is relocated.

If the Engineer determines a given temporary lighting unit's pole setting has deteriorated to such an extent that the pole poses a safety hazard, the temporary lighting unit shall be reset in or near the same location.



Method of Measurement. Relocation of temporary lighting units will be measured for payment as each.

If the Engineer determines a given temporary lighting unit's pole setting has deteriorated to such an extent that the pole poses a safety hazard, the temporary lighting unit shall be measured for payment as each. Resetting of the pole will not be paid for if the pole setting has been weakened by construction operations.

Basis of Payment. This work will be paid for at the contract unit price for RELOCATE EXISTING TEMPORARY LIGHTING UNIT, which price will be payment in full for the material and work described herein.

**TRAFFIC SURVEILLANCE. – GENERAL (TSC T 400#02)**

Effective: June 1, 1994

Revised: July 21, 2011

The following supplements applicable sections of Section 800 of the Standard Specifications for Road and Bridge Construction.

The intent of this Special Provision is to prescribe the materials and construction methods commonly used in traffic surveillance installations. All material furnished shall be new. The locations and the details of all installations shall be as indicated on the Plans or as directed by the Engineer.

When the road is open to traffic, except as otherwise provided, the Contractor may request a turn on and inspection of all complete traffic surveillance installations system. This request must be made to the Engineer a minimum of seven (7) working days prior to the time of the requested inspection. Upon demonstration that all surveillance is operational and all work is completed in accordance with the contract and to the satisfaction of the Bureau of Traffic Operations Electrical Engineer, The Bureau of Traffic Operations Electrical Engineer will then allow all of the surveillance to be placed in continuous operation. The Agency that is responsible for the maintenance of the traffic surveillance installations will assume the maintenance upon successful completion of this inspection.

Projects which call for the storage and re-use of existing traffic surveillance equipment shall have a 30 day test period prior to project acceptance.

Definition.

Whenever in these Special Provisions the following terms are used, the intent and meaning shall be interpreted as follows:

Induction Loop - A continuous non-spliced wire, three turns, permanently placed and sealed in sawcuts in the roadway and adjacent area, used in conjunction with an induction loop detector sensor unit.

State Highway Communications Center - The main communication control facility of the Illinois Department of Transportation with present offices at 201 W. Center Court, Schaumburg, Illinois 60196-1096.

Prosecution of Surveillance. The work shall be as indicated on the Plans and as required by the Specifications. Unless otherwise indicated, the Contractor shall furnish and install all required materials and equipment, including all associated appurtenances, to produce a complete and operational installation. The appurtenances shall be as indicated, and the costs shall be included in the unit prices bid for the pay items of this contract. The work shall be done in a workmanlike manner.

Connections to Existing. Where new work connects to existing installations, the Contractor shall do all necessary cutting, fitting and foundation drilling to the existing installation and shall remove all existing work, as required, to make satisfactory connections, with the work to be performed under these Provisions, so as to leave the entire work in a finished and workmanlike manner, as approved by the Bureau of Traffic Operations Electrical Engineer. No raceways shall be allowed to enter cabinet through the sides or back walls.

Some contracted work which does not call for a complete rebuilding of a surveillance location but the replacement of detector loops and lead-in cable only in conjunction with work such as pavement overlay, cut and grind, curb and gutter replacement and other similar type work where existing appurtenances have been in place for several years. This at times has created pre-existing conditions (such as blocked/broken lead-in conduits, buried handholes) which the contractor may have to repair/replace to make the location fully functioning. The Contractor will be compensated for such work utilizing contract items after a complete inspection by the Bureau of Traffic Operations Electrical Engineer, Resident Engineer and Electrical Maintenance Contractor's Rep. with a full review on a case by case basis. Upon completing such work the Contractor shall notify the R.E. to contact the Bureau of Traffic Operations Electrical Engineer for checks and test to insure the location is on-line and working correctly.

The Contractor shall furnish all labor and material to the furtherance of this end, whether or not distinctly shown on the plans, in any of the "Standard Specifications" or in the Special Provisions.

Note that the Contractor shall be entitled to only one request for location marking of existing systems by the Electrical Maintenance Contractor and that multiple requests may only be honored at the Contractor's expense.

Standard Guarantee. Manufacturers' warranties or guarantees on all electrical and mechanical equipment consistent with those provided as customary trade practice shall be obtained and transferred to the State.

In-Service Warranties or Guarantees. The Contractor shall provide warranties or guarantees that will provide for satisfactory in-service operation of the mechanical and electrical equipment and related components. These warranties or guarantees shall cover a period of two (2) years following project acceptance. The cost of these warranties and guarantees shall be considered incidental to the Contract.

Equipment Documents. The Contractor shall furnish five (5) diagrams of the internal and external connection of the equipment in each Bureau of Traffic Operations Electrical cabinet. Contractor shall also furnish the Operating and maintenance instructions for all equipment supplied. One copy of the wiring diagrams for each cabinet shall be retained in each field cabinet. A wiring diagram shall be contained in a plastic pouch that shall be permanently mounted to the door of each cabinet. Contractor shall permanently mark the cabinet for each termination and each terminal connection as to loop, tone, closure, phone, and lane function of each termination in the cabinet and provide a completed cable log and location as-built diagram at each location.

Terminal Blocks. Terminal blocks provided in field cabinets shall be the heavy duty barrier type. The terminal block shall be a minimum of 2 inches (50.8 mm) wide and 1-3/16 inch (30.16 mm) deep. Center to center of the terminal screws or studs shall be a minimum of 21/32 inch (16.67 mm) with barriers in between. Terminal blocks shall be rated at 45 amps 600 volts breakdown RMS line to line 11,000 V. and breakdown RMS line to ground 13,800 V. A marking strip shall be provided with each terminal block.

Existing Equipment. All existing equipment, replaced by new equipment shall remain the property of the State and shall be delivered to the Electrical Maintenance Contractor. The cost of removing and delivering the replaced equipment shall be paid for under separate pay item for Cabinet Housing Equipment - Removal.

Telecommunication Cable. When installing the telecommunication cable, the Contractor shall extend his installation and connections of the cable to the next adjacent Surveillance installations or junction box, beyond the limits of his contract section. He shall be responsible for insuring that the cable is continuous and connected from one contract section to the other.

The Contractor shall comply with the agreement between the State of Illinois and IBT/Ameritech as to connections, locations, and terminations of the phone lines (Telephone Company, Engineering, General Service Engineering Division, Outside Plant Engineering Notes 14-36A., March 1971, Administrative Aids and Procedures).

Existing Surveillance Equipment and Appurtenances. Before starting work, the Contractor, in the presence of the Resident Engineer, Bureau of Traffic Operations Electrical Engineer and the State Electrical Maintenance Contractor's rep., shall inspect the existing equipment to be delivered or maintained by the Contractor and shall take an inventory of all defective, broken, and/or missing parts. Those parts found broken, defective, and/or missing shall be repaired or replaced by the State Electrical Maintenance contractor and shall be recorded as such. The Contractor shall be required to maintain all tone transmitters, tone receivers, tone power supplies, tone mounting frames, harnesses, controller and wiring. The Contractor shall be required to maintain all metering and surveillance cabinets, foundation, concrete handhole, vehicle detection equipment, all interconnecting cables and all Surveillance appurtenances including signal heads. Contractor shall number each cabinet as indicated on the plans, with reflective decals as those used on lighting pole standard.

Should damage occur to any surveillance items during the Contractor's contract period, the Contractor shall repair or replace all damaged equipment at his own expense. The Bureau of Traffic Operations Electrical Engineer shall determine what equipment shall be reusable and what shall be replaced. Replaced equipment shall be of equal or better quality and type.

The Contractor, prior to the commencement of his work, shall notify the Bureau of Traffic Operations Electrical Engineer for a pre-construction inspection. If construction begins prior to this meeting, the Contractor assumes maintenance responsibilities of the locations within his contract limits and shall make any repairs or replace any damaged equipment pre-existing or damaged as a result of his own negligence at his own expense. This also relieves the Electrical Maintenance Contractor of providing one free locate of the surveillance installations within the contract limits.

As-Built Plans. Upon completion of the work, the Contractor shall furnish one (1) copy of "as-built" drawings on CD compatible with Micro Station V8-2004 Edition software at the Bureau of Traffic Operations Electrical Design Section and four (4) full size sets of "as-built" plans to the Resident Engineer. The plans shall include definite locations and length of all cables, duct, conduit pushes, induction loop, lead-in, foundations, handhole and P-duct. The cost of the "as-built" plans shall be incidental to the contract. The Engineer will not authorize final inspection of any installations until the said plans are in his possession.

Protection of The Work. Electrical work, equipment and appurtenances shall be protected from damage during construction until final acceptance. Electrical raceway or duct openings, shall be capped or sealed from the entrance of water and dirt. Wiring shall be protected from mechanical injury.

Standards of Installation. Electrical work shall be installed in a neat and workmanlike manner in accordance with the best practices of the trade. Unless otherwise indicated, materials and equipment shall be installed in accordance with the manufacturer's recommendations.

Except as specified elsewhere herein, materials and equipment shall be in conformance with the requirements of Section 800 & 1088 of the Standard Specifications for Road and Bridge Construction.

In addition to the requirements of the Standard Specifications relating to control of materials, the Contractor shall comply with the following requirements.

The Contractor shall supply samples of all wire, cable, and equipment and shall make up and supply samples of each type of cable splice proposed for use in the work for the Engineer's approval.

Before equipment and/or material including cabinet, telemetry, and detectors are delivered to the job site, the Contractor shall obtain and forward to the Engineer a certified, notarized statement from the manufacturer, containing the catalog numbers of the equipment and/or material, guaranteeing that the equipment and/or material, after manufacture, comply in all respects with the requirements of the Specifications and these Special Provisions. Re-manufactured or modified equipment other than by the original manufacturer shall not be allowed. Original manufacturer shall certify that he made modification to the equipment.

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 equipment are paid, and no additional materials and equipment are paid, and no additional compensation will be allowed. Materials and equipment not complying with the above requirements that have been installed on the job will be done at the Contractor's own risk and may be subject to removal and disposal at the Contractor's expense.

Procurement. Materials and equipment shall be the products of established manufacturers, shall be new, and suitable for the service required. The Contractor is obligated to conduct his own search into the timely availability of the specified equipment and to ensure that all materials and equipment are in strict conformance with the contract documents. Materials or equipment items which are similar or identical shall be the product of the same manufacturer. The cost of submittals, certifications, any required samples and similar costs shall not be paid for extra but shall be included into the pay item bid price for the respective material or work.

Exceptions, Deviations and Substitutions. Exceptions to and deviations from the requirements of the Contract Documents shall not be allowed without approval by Engineer and Bureau of Traffic Operations Electrical Engineer. 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 substitutions shall be permitted without the approval of the Engineer, and Bureau of Traffic Operations Electrical Engineer.

Submittals. Within 30 days after contract award, the Contractor shall submit, for approval, complete manufacturer's product data (for standard products and components) and detailed shop drawings (for fabricated equipment). All of the submittal information shall be assembled by the Contractor and submitted to the Engineer at one time. All equipment samples shall be submitted at this time. Partial and sporadic submittals may be returned without review. The Contractor may request, in writing, permission to make a partial submittal. The Engineer will evaluate the circumstances of the request and may accept to review such a partial submittal. However, no additional compensation or extension of time shall be allowed for extra costs or delays incurred due to partial or late submittals.

Testing. Before final acceptance, the electrical equipment, material, induction loops and work provided under this contract shall be tested. Tests will not be made progressively, as parts of the work are completed they shall be all made at one time. Items which fail to test satisfactorily shall be repaired or replaced. Bureau of Traffic Operations Electrical Engineer will witness all testing.

Installation/Inspection Procedures. After all control boxes and equipment to be installed has been physically inspected and approved by Bureau of Traffic Operations Electrical Engineer, the equipment supplier shall then deliver all equipment to the job site. The Contractor shall then install/safeguard all the equipment which has been delivered prior to requesting an inspection. No unapproved equipment shall be on the job site or installed as part of the job. This does not relieve the Contractor from replacement/repairs of equipment found to be damaged or in non-compliance of these provisions.

Certain items such as conduit, wire, duct, anchor bolts, and junction boxes will be inspected and may be tested by the Department's Bureau of Materials and these items shall not be delivered to the job site without inspection approval. Items such as cabinets shall be inspected by the Engineer at the contractor's or manufacturer's shop and these items shall not be delivered to the job site without Bureau of Traffic Operations Electrical Engineer inspection approval. It shall be the Contractor's responsibility to arrange inspection activities with the Engineer thirty (30) days prior to installation. 30 days prior to installation of the tone equipment being supplied and, prior to request for a turn-on, the Bureau of Traffic Operations Electrical Engineer will be contacted for the correct frequencies, controller addresses and "DB" setting for each location to be installed. When the work is complete, all equipment fully operational, the Contractor shall schedule a turn-on inspection with the Engineer. Acceptance will be made as a total system, not as parts. The Contractor shall request the inspection no less than seven (7) working days prior to the desired inspection date.

No inspection shall be made until the delivery of acceptable "as built" drawings, specified certifications, and the required guarantees.

It will be the responsibility of the installing contractor to provide a qualified technician representing the tone equipment supplier to be at the turn-on inspection of each location to provide the technical expertise to bring each location on line.

The Contractor shall furnish the necessary manpower and equipment to make the Inspection. The Engineer may designate the type of equipment required for the inspection tests.

A written record of the loop analyzer readings shall be submitted to the Bureau of Traffic Operations Electrical Engineer prior to the final inspection.

Any part or parts of the installation that are missing, broken, defective, or not functioning properly during the inspection shall be noted and shall be adjusted, repaired, or replaced as directed by the Engineer and another inspection shall be made at another date. Only upon satisfaction of all points shall the installation be acceptable.

After the subject inspections are completed the Bureau of Traffic Operations Electrical Engineer will provide the contractor with a complete punch list of items necessary to be completed prior to final inspection and acceptance for maintenance.

The Contractor shall furnish a written guarantee for all materials, equipment and work performed under the contract for a period of not less than two (2) years from the date of final acceptance.

**OPERATION OF EXISTING TRAFFIC SURVEILLANCE/SPEED/COUNT STATIONS  
(TSC T400#03)**

Effective: June 1, 1994

Revised: November 12, 2008

Existing traffic surveillance installations and/or any electrical facilities at certain locations included in this Section may be altered or reconstructed totally or partially as part of the work on this Section. The Contractor is hereby advised that all traffic surveillance equipment, presently installed at these locations, is the property of the State of Illinois, Department of Transportation, Division of Highways or Springfield Bureau of Traffic.

The Contractor is further advised that the existing traffic surveillance, or the existing speed/data installations, must remain in operation during all construction stages except for the most essential down time. Any shutdown of the installation, for a period to exceed four (4) hours must have the prior approval of the Engineer. Such approval will generally only be granted during the period extending from 10:00 a.m. to 2:00 p.m. on weekdays. Any other traffic shutdown, either for periods in excess of one (1) hour or outside of the 10:00 a.m. to 2:00 p.m. weekday period must have prior approval of the Engineer.

The Contractor, prior to the commencement of his work, shall notify the State's Electrical Maintenance Contractor and the Bureau of Traffic Operations of his intent to perform this work. Failure to notify either the Bureau/EMC when starting work will cause maintenance to be transferred to the Contractor without pre-inspection and will require the Contractor to complete all repairs without compensation. This also relieves the EMC from providing a locate without compensation. Upon request from the Contractor, the State Electrical Maintenance Contractor will locate any buried conduit or other electrical facility which may interfere with the Contractor's operations without charge to him. This shall in no way relieve the Contractor of his responsibility to repair and/or replace electrical facilities damaged by his operations.

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.

Any known or suspected damage to the electrical facility shall be reported immediately to the Engineer. The Contractor will be held fully responsible for the repair and/or replacement of any part of the existing installation, whether permanent or temporary, if, in sole opinion of the Engineer, such damage was caused by the negligence of the Contractor, his agents, or employees. The State, at its own discretion, may call upon the State's Electrical Maintenance Contractor or the concerned bureau to make any such repairs and/or replacements at the total expense of the Contractor for this Section.

### **GROUNDING OF ITS SUBSYSTEMS (TSC T 420#8)**

Effective: March 12, 2009

The grounding of ITS subsystems shall meet the requirements of Section 806 of the Standard Specifications. In addition, amend Article 806.03 of the Standard Specifications to include:

General. All ITS subsystems (ramp metering system, dynamic message sign system, system detector stations, etc.), associated equipment, and appurtenances shall be properly grounded in strict conformance with the NEC and as shown on the Plans.

Testing shall be according to Section 801. 13(a)(5) of the Standard Specifications:

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 as the phase (hot) conductors.

The equipment-grounding conductor shall be green color-coded. The following is in addition to Section 801.04 of the Standard Specifications.

Equipment grounding conductors shall be XLP insulated No. 6, unless otherwise noted on the Plans, and 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.

Equipment grounding connectors shall be bonded, using a listed grounding conductor, to all ramp meters, DMS, and detector cabinets, handholes, and other metallic enclosures throughout the ITS subsystems, except where noted herein. A listed electrical joint compound shall be applied to all conductor terminations, connector threads, and contact points.

All metallic and non-metallic raceways containing ITS circuit runs 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.



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, listed pressure connectors, listed clamps or other approved listed means.

Basis of Payment. Payment shall be included in the various items associated with ITS.

**HANDHOLE (TSC T428#1)**

Effective: June 1, 1994

Revised: May 19, 2009

Description. This item shall consist of constructing a handhole, a heavy-duty handhole, or a double handhole, cast in place, complete with frame and cover and in accordance with the following requirements and conforming in all respects to the lines, grades, and dimensions shown on the plans or as directed by the Engineer. All handholes shall be installed in accordance with the Standard Specifications Sec. 814.

Materials. All handholes shall be constructed of Class SI concrete meeting the requirements of the Standard Specifications for Road and Bridge Construction Section 1020.

Construction Details. Handhole of the type specified shall be constructed in accordance with the details shown on the plans and conform to the following requirements:

**Concrete:** Concrete construction shall be done in accordance with the provisions of Concrete for Structures and Incidental Construction contained in the Standard Specifications for Road and Bridge Construction Sec. 503.

**Placing Castings:** Castings shall be set accurately to the finished elevation so that no subsequent adjustment will be necessary. Castings shall be set flush with a sidewalk or pavement surface. When installed in an earth shoulder away from the pavement edge, the top surface of the casting shall be 1 in. (25.4mm) above the finished surface of the ground.

**Backfilling:** Any backfilling necessary under a pavement, shoulder, sidewalk or within 2 ft. (60 cm) of the pavement edge shall be made with sand or stone screenings.

**Forming:** Forms will be required for the inside face of the handhole wall, and across all trenches leading into the handholes excavation. The ends of conduits leading into the handhole shall fit into a conduit bell which shall fit tightly against the inside form and the concrete shall be carefully placed around it so as to prevent leakage.

**French Drain:** A french drain conforming to the dimensions shown on the plans shall be constructed in the bottom of the handhole excavation.

**Steel Hooks:** Each handhole shall be provided with four galvanized steel hooks of appropriate size, one on each wall of the handhole.

**Frame and Cover:** The outside of the cover shall contain a recessed ring Type "G" for lifting and a legend "IDOT TSC" cast-in.

**Cleaning:** The handhole shall be thoroughly cleaned of any accumulation of silt, debris, or foreign matter of any kind, and shall be free from such accumulations at the time of final inspection.

**Basis of Payment.** This work will be paid for at the contract unit price each for HANDHOLE or HEAVY DUTY HANDHOLE, or HEAVY DUTY HANDHOLE (SPECIAL), as the case may be, for all necessary excavating, backfilling, disposal of surplus material and form work, frame and cover, and furnishing all materials.

## **ETHERNET MANAGE SWITCH**

Effective: January 1, 2020

### **Description.**

This item shall consist of furnishing a managed environmentally hardened Ethernet switch as described herein and as indicated in the Plans.

### **Materials.**

For compatibility with the installed network infrastructure the Ethernet switch shall be a Cisco IE-4000-8GT8GP4G-E switch with PWR-IE170W- PC-AC power supply. Single Mode Fiber Small Form-Factor Plug (SFP) Modules shall be Cisco 1Gbps transceivers of the model for the distances involved.

### **Installation.**

Thirty (30) days prior to the scheduled field installation of each Ethernet switch, Contractor shall deliver the Ethernet switch to the Traffic Systems Center (TSC) for configuration prior to installation by the Contractor. The switch shall be clearly identified as to which location it is to be installed for proper configuration. After the switch is configured, the Contractor shall retrieve the switch from the TSC and install it.

### **Documentation.**

In addition to the initial submittal(s) prior to procurement, the Contractor shall provide installation and operation manuals, documentation of exact equipment model and serial numbers, software/firmware version numbers, in hardcopy and PDF formats on CDROM.

### **Measurement.**

The Ethernet switch shall be counted as each.

### **Basis of Payment.**

This item will be paid for at the contract unit price each for **ETHERNET MANAGE SWITCH**, which shall be payment in full for all material and work as specified herein.

### **ZONE EQUIPMENT**

Effective: October 27, 2016

#### General.

Telemetry equipment shall be furnished and installed in the Traffic Systems Center office and along expressway at locations designated in these Special Provisions and Plans, and in strict accordance with these specifications.

Communication link from field located cabinets to the Traffic Systems Center Office will be via fiber optic cable as shown in the Plans.

All tone transmitters and tone receivers shall be three frequency frequency-shift; that is equipment which the center frequency is normally on at all times and is electrically shifted +30 Hz to a higher frequency (mark) or -30 Hz to a lower frequency (space). Other frequency shifts from +10 to +300 shall be user selectable.

All transmitters, receivers, and power supplies shall be of the modular plug-in type construction. The circuitry of each unit shall be protected by a U-shaped metal chassis, cadmium-plated, with iridite finish.

All tone equipment shall be physically interchangeable with existing Traffic Systems Center tone equipment, that is furnished tone equipment shall be directly compatible with and replaceable by existing tone equipment with no modification to any hardware.

All transmitters, receivers, and power supplies shall be solid state. All transistors shall be silicon, excepting the power transistors in power supplies. All transmitters and receivers I.C.s shall be plug in.

All transmitters and receivers shall be programmable frequency-shift key units. These units shall have a universal card which is field programmable for any channel frequency or shift. The frequencies available shall be in the range of 120 Hz to 3800 Hz in increments of 5 Hz. The shifts available shall be 10, 25, 30, 35, 42.5, 60, 70, 75, 120, 150, 240 and 300 Hz. A new center frequency or shift shall be field programmed by simply changing setting of the program switch.

All transmitters and receivers shall be capable of being operated at any frequency program switches. The center frequency shall be clearly visible through or on the front of each transmitter and receiver. Such indication shall always correspond to the frequency of the elements currently operating in each module. Contractor shall supply 500 complete sets of pre-printed tags for labeling the units indicating the center frequency.

Transmitters and receivers shall work into a communication link with standard impedance of 600 ohms.

Transmitters and receivers shall be individually fused.

### Materials.

#### General

Receivers, transmitters and power supplies shall be capable of operation in field cabinets which provide protection against direct contact with the elements with no special provisions for environment control.

All field located tone equipment shall be mounted in the surveillance cabinets as designated elsewhere in these specifications.

All field located tone equipment shall be capable of operation on a temperature range of -22 degrees F to 140 degrees F (-30° to +60° C) and shall have P.C. boards coated for protection against humidity in the range of 0% to 96%.

All field tone equipment shall be capable of being tipped, while in operation, from the vertical to the horizontal position and back again, without having adverse effect on the continuous operation of the transmitter, receiver or power supply

#### Power supply

The power supply shall operate on input voltage of 117 VAC allowing for 10% variation in line voltage.

The power supply shall provide a regulated 12 VDC output at 1.7 amps.

Each tone equipment mounting frame field located or office located, shall have its own regulated power supply, capable of operating at least ten tone modules in any combination of transmitters and receivers.

The front panel of the power supply shall have an on/off switch and a red led that indicates the status of the output DC voltage.

The power supply shall contain a switch and L.E.D. on the front panel to permit the monitoring of the supply voltage with the existing Traffic Systems Center tone test meter.

The power supply shall be fused.

The power supply shall have a dc voltage control.

#### Transmitter

The tone transmitter shall operate on an input of a regulated 12 VDC.

The tone frequencies shall be programmable in the audio frequency range between 120 and 3800 hertz.

The frequency of one tone transmitter shall have no adverse effect on the operation of the frequency of any other transmitter connected to the same fiber strand

Output level of tone transmitters shall be adjustable over a range of -40 to +13 dBm.

Transmitter harmonic output shall be at least 42 dB down from the fundamental for each harmonic component.

Each unit furnished shall have an external jumper wire on the barrier type terminal block to provide a two frequency space-hold operation.

The transmitter shall be capable of holding any of its assigned frequencies (mark, space) continuously without degradation in life of performance.

Each transmitter shall be capable of test operation of at least 30 pulses per second.

No transmitter plugs shall be required for tone output. A toggle switch thru the faceplate shall put the transmitter "on line" and "off line".

The transmitter shall have L.E.D. indicators for Mark-Red, Space-Yellow and Carrier-Green visible through the face panel.

Test points through front face plate shall be provided to test for DC voltage levels.

#### Receiver

The requirements as to the programmable channel frequency range, channel spacing, holding of shifted frequency, and operating voltage shall be the same as those for 3 Frequency Transmitter.

Input sensitivity of tone receiver shall be adjustable down to -45 dBm. The dynamic range shall be 25 dB.

Adjacent channel attenuation shall be at least 35 dB.

Each receiver shall be capable of test operation of at least 30 pulses per second.

Each receiver shall have one single pole, double throw, mark relay output and one single pole, double throw space output relay.

Each receiver shall also have a carrier detector circuit with one single pole, double throw relay output.

All output relay contacts shall be capable of handling a minimum of 30 VA continuously. Any substitution shall be subject to written approval of the Engineer.

Receiver shall have L.E.D. indicators for Mark-Red, Space-Yellow and Carrier-Green, visible through the face panel.

Receiver shall operate in a space hold, 2 state operation.

An attenuation plug shall be provided to set sensitivity level of receiver.

Each receiver shall come with 2 spare relays as outlined in Sec. (d) (5) of this material specification.

Test points through front face plate shall be provided to test for DC voltage levels.

## Mounting frame

Under this item, for a unit price each, the Contractor shall furnish and install an Inven 1x11-1 mounting rack or equivalent in strict accordance with the requirements specified herein.

Each tone equipment mounting frame field located or office located, shall have with power supply added, 11 slots capable of operating at least ten tone modules in any combination of transmitters and receivers.

Each mounting frame shall provide a separate barrier type terminal block with screw-type terminal for each transmitter, receiver, and power supply.

Each mounting frame shall be constructed of steel with zinc bonderizing and hard baked finish of gold metallic epoxy paint.

Where the mounting frame is not completely filled with tone modules, the unused modules spaces shall be provided with the barrier type terminal blocks, within each mounting frame, shall be wired to the 12 VDC power supply.

Each mounting frame for the field equipment shall be of a size that shall hold the power supply, all transmitters and all receivers required at each field cabinet as specified elsewhere in these special provisions.

In all field cabinet locations where mounting frames are specified the mounting frames shall be bolted to the rear wall of the cabinet by means of a swing bracket as per field mounting frame with cradle assembly drawing #TY-1TSC 400#6.

The bracket cradle shall have three (3) position stops: horizontal, 45 degree and vertical.

The bracket cradles shall be constructed of 1/4" (6.35mm) steel, cadmium plated with an irridite finish, as shown on plan for cradle assembly drawing #TY-1TSC 400#7.

## Basis of Payment

### Power Supply.

This item shall be paid for at the contract unit price each for TONE EQUIPMENT - POWER SUPPLY, installed, operating, and completely in place.

Terminal boards, wiring, and miscellaneous hardware will not be paid for separately, but shall be considered as incidental to the cost of this item.

Transmitter.

This item will be paid for at the contract unit price each for TONE EQUIPMENT - 3 FREQUENCY TRANSMITTER PROGRAMMABLE, installed, operating and completely in place.

Terminal boards, wiring, and miscellaneous hardware will not be paid for separately, but shall be considered as incidental to the cost of this item.

Receiver.

This item will be paid for at the contract unit price each for TONE EQUIPMENT - 3 FREQUENCY RECEIVER PROGRAMMABLE, installed, operating, and completely in place.

Terminal boards, wiring, optical-isolator, relays, cable assemblies and miscellaneous hardware will not be paid for separately, but shall be considered as this item.

Mounting Frame.

This work shall be paid at the contract unit price each for TONE EQUIPMENT – MOUNTING FRAME, which shall be payment in full for all work as described herein and as directed by the Engineer.



## **CABINET, MODEL 334**

### Description

This work shall consist of furnishing and installing a Model 334 cabinet for field equipment including fiber optic communications and ramp meter as shown on the Plans and hereinafter provided.

This item shall consist of furnishing and installing ground mounted cabinets of the type and size needed to house the specified items including all relay control devices, an ethernet switch, surge protection devices, circuit breakers, and shelf to support a portable computer. In addition, this item shall include anchor bolts, cable harnesses, ground rods with grounding wire, ground and neutral bus bars, terminal blocks, mounting hardware, and all miscellaneous items at locations as directed by the Engineer. The concrete foundation shall be paid separately.

### Materials

General. Contractor shall supply all control equipment shown on plans for sending and receiving signals and data between this cabinet and ramp meter installation.

Cabinet, Model 334 shall be a durable, weatherproof enclosure, constructed of 3/16 in. (4.75mm) thick aluminum or 1/8 inch (3.175 mm) thick aluminum lined with bullet resistant fiberglass panels that shall be UL listed and tested for UL752 Level 3 with a nominal thickness of 1/2 inch (12.7mm) maximum, and a nominal weight of 5.0 lbs. per square foot (24.5 kg per square meter) maximum. The cabinet shall have a nominal outside dimension of 67 in. (1.7m) height x 24 inches (600mm) wide X 30 inches (762mm) deep. Cabinet, Model 334 shall consist of the following components: double door each equipped with a Corbin # 2 Brass lock or equal for front and rear cabinet entry, housing, mounting cage, power distribution assembly, service panel, thermostatically controlled fan, and all necessary mounting hardware and wiring, and other equipment, as shown on the Plans and specified in these special provisions.

All bolts, nuts, washers, screws, hinges, and hinge pins that are subject to corrosion shall be stainless steel unless otherwise specified. All equipment under this item shall be in accordance with Section 1074.03 of the Standard Specifications except as modified herein.

### Cabinet Components

The housing and the mounting cage assembly shall conform to those of the Model 334 cabinet provisions of the "Traffic Signal Control Equipment Specifications" (TSCES) issued by the State of California, Department of Transportation, and to all addenda thereto current at the time of project advertising. The housing shall be rainproof with the top of the enclosure crowned to prevent standing water. All exterior seams for the enclosure and doors shall be continuously welded and shall be smooth. The housing shall have no provisions for a police panel or door.

The cabinet shall have single front and rear doors, each equipped with a Corbin # 2 lock. The enclosure door frames shall be double flanged out on all 4 sides and shall have strikers to hold tension on and form a firm seal between the door gasketing and the frame. The front and rear doors shall be provided with catches to hold the door open at both 90 and 180 +/- 10 degrees. Gasketing shall be provided on all door openings and shall be dust-tight. For horizontal support and bolt attachment, cage bottom support mounting angles shall be provided on either side, level with the bottom edge of the door.

The latching handles on the doors shall have provisions for padlocking in the closed position. When the door is closed and latched, the door shall be locked. The locks and handles shall be on the right side of the front door and the left side of the rear door. The lock and lock support shall be rigidly mounted to the door. The locks shall be Corbin #2 and two keys shall be supplied to the Department with each lock. The keys shall be removable in the locked position only.

The front and rear doors shall be provided with louvered vents. A removable and reusable air filter shall be housed behind the door vents. The filter filtration area shall cover the vent opening area, and the filter shell shall be provided that fits over the filter providing mechanical support for the filter. The shell shall be louvered to direct the incoming air downward.

The intake (including filter with shell) and exhaust areas shall pass a minimum of 60 cubic feet (1.7 cubic meters) of air per minute for housing #1 and 26 cubic feet (0.74 cubic meters) of air per minute for housing #2. The thermostatically controlled fan with ball or roller bearings shall be mounted within the housing and vented. The fan shall provide a capacity of at least 150 cubic feet (4.25 cubic meters) of free air delivery per minute of ventilation. The fan shall be thermostatically controlled and activated when the temperature inside the cabinet exceeds 75° F (24° Celsius) and shut off when the temperature is less than 64° F (18° Celsius). In addition, the fan shall be manually adjustable for automatic turn on and off. The fan circuit shall be protected at 125% of the fan motor ampacity.

The housing shall also be equipped with a heating element installed in the bottom front of the cabinet and mounted along the side of the rack. The heating element shall draw 500 watts and have an output of at least 1500 watts (7900 Btu/hr). The heater shall have a built-in quick response thermostat with sealed contacts that has a temperature control range 40 to 100° F (5 to 39 degrees Celsius), and have a built-in thermal cut-off to automatically shut off the heater in the event of overheating.

The cabinet shall have industrial relays which shall meet the following requirements:

1. Rated thermal current of 10 amps
2. Rated insulation voltage of 300
3. DC Coil Voltage Range of 80-110%
4. Contact arrangement shall be convertible from N.O. to N.C.
5. Operating temperature range of -20oC - +40 oC and relative humidity of 50 to 95%, non condensing.
6. Support wire termination of #18 AWG to #14 AWG

The cabinet shall have surge protective devices. Over-voltage protection shall be provided on the power conductors and relay control signals. The specific protection is based on the elements being protected and shall comply with UL 1449, fourth edition and NEC Article 285

The cabinet shall be a Hoffman Enclosures, Electromate Enclosures, or approved equal. The cabinet shall be NEMA-4X compliant. The nominal dimensions of the cabinet shall be as shown on the plans.

All subassemblies shall be mounted in removable 19 in. (482 mm) EIA self-standing rack assemblies. The EIA rack portion of the cage shall consist of 2 pairs of continuous, adjustable equipment mounting angles that comply with Standard EIA RS-310-B. The cage shall be centered within the cabinet and bolted to the cabinet at 4 points.

Each cabinet shall be equipped with 2 shelves. Shelves shall be the full width of the rack and 12 in. (300mm) deep. The shelves shall be designed to support a minimum of 50 lbs. (23 kg).

The power distribution assembly shall be as shown on Plans and shall consist of input files and provides 9 AC outputs and up to 28 isolated inputs. The power distribution assembly shall consist of circuit breakers, and GFI and non-GFI 3-prong type 5-15R grounded utility type outlets as shown on drawings.

Rating of breakers shall be shown on face of breaker or handle. Breaker function shall also be labeled below breakers on front panel. The first equipment receptacle in the circuit shall have ground-fault circuit interruption as defined in the NEC. Circuit interruption shall occur on 6 mA of ground-fault current. All conductors from the power distribution assembly routed to the cabinet wiring shall be connected to the terminal block on the common side, except for the AC power conductor between the service terminal block and main circuit breaker. All internal conductors terminating at the blocks shall be connected to the other side of the blocks.

Two side panels shall be provided and mounted on the cabinet sidewalls. In viewing from the front door, the left side panel shall be designated as the "input/Communications" and the right side panel shall be designated as the "Service Panel". The panel shall be drilled and tapped, as necessary, to mount the terminal blocks and other attachments described herein, as well as to mount the panel to the cabinet wall.

The terminal blocks shall be barrier type rated at 20 A 600 V RMS minimum. The terminal screws shall be nickel-plated brass binder head type with screw inserts of same material. The terminals of the power line service terminal block shall be labeled "AC+, AC-, and AC GND", and shall be covered with a clear insulating material to prevent inadvertent contact. Terminating lugs large enough to accommodate No. 2 conductors shall be furnished for the service terminal block. The terminal block shall be rated for 50 A at 600 V peak, minimum.

The power distribution assembly shall also protect the equipment powered by the assembly from power transients. Over voltage protection shall be provided for the power distribution assembly and shall contain, as a minimum, a surge arrestor, which shall reduce the effect of power line voltage transients and be mounted to the service panel. The arrestor shall have the following minimum features:

Recurrent Peak Voltage:	184 V
Energy Rating (Minimum):	50 J
Power Dissipation, Average:	0.85 W
Peak Current for pulses less than 7 microseconds	1250 A
Stand-by Current for 60 Hz Sinusoidal:	1mA or less

Each cabinet shall be equipped with one fluorescent lighting fixture mounted to the inside top front portion of the cabinet. The fixture shall have an F15-T8 cool white lamp; operated from a normal power factor, UL listed cold weather ballast. A door-activated switch shall be installed to turn the cabinet light on when the front door is opened. The door switch shall be on a separate circuit by itself and used only to turn on the cabinet light.

Each cabinet shall be supplied with a heavy-duty plastic envelope to store plans, wiring diagrams, schematics, etc. This envelope shall have metal grommets so that it hangs from the door hooks. The envelope shall have minimum dimensions of 10 in. (250mm) x 15 in. (381mm).

Foundations shall conform to those shown on the Plans. The foundation is paid for separately.

Identification. The Cabinet, Model 334 shall be identified and labeled with external markings as specified in Article 1069.06 of the Standard Specifications and as shown on the Plans.

## CONSTRUCTION REQUIREMENTS

The Contractor shall deliver the Cabinet Model 334 mounted on a plyboard-shipping pallet that is bolted to the cabinet base. The cabinet shall be enclosed in a slipcover cardboard packaging shell. The housing doors shall be blocked to prevent movement during transportation to the site.

The Contractor shall securely fasten the Cabinet Model 334 on the new concrete foundation at the locations shown on the Plans. The Contractor shall confirm the orientation of the Cabinet Model 334 installation and its front door side with the Engineer prior to installation. Stainless steel bolted connections shall be provided with lock-washers, locking nuts, or other approved means to prevent the connection nuts from backing off. Dissimilar materials shall be isolated from one another by stainless steel fittings.

The Contractor shall make all power connections to the cabinet in accordance with the Plans and as required. The neutral bus shall be isolated from the cabinet and equipment ground. It shall terminate at the neutral lug ultimately attached to the meter pedestal. All conductors used in cabinet wiring shall terminate with properly sized non-insulated (if used, for DC logic only) or clear insulated spring-spade type terminals except when soldered to a through-panel solder lug on the rear side of the terminal block or as specified otherwise. All conductors, except those which can be readily traced, shall be labeled. Labels attached to each end of the conductor shall identify the destination of the other end of the conductor. Cabling shall be routed to prevent conductors from being in contact with metal edges. Cabling shall be arranged so that any removable assembly may be removed without disturbing conductors not associated with that assembly.

All equipment in the cabinet, when required, shall be clearly and permanently labeled using marker strips. The marker strips shall be made of material that can be easily and legibly written on using a pencil or ballpoint pen. Marker strips shall be located immediately below the item that they are to identify and must be clearly visible with the items installed.

Testing. Cabinet Acceptance Test – in addition to the environmental and design approval tests specified in the FHWA Type 170 Traffic Signal control System Hardware Specification, the following water spray test shall be performed for each type of cabinet:

Spray water from a point directly overhead at an angle of 60° from the vertical axis of the cabinet. Repeat for each of eight equally spaced positions around the cabinet for a period of five minutes in each position. The water shall be sprayed using a domestic type sprinkling nozzle at a rate of not less than 10 gal./min (40 liters/min) per square foot (0.1 meters) of surface area. The cabinet shall then be inspected for leakage. Evidence of water leakage shall be cause for rejection.

Operational Standalone Test: The operational standalone test for each Cabinet, Model 334 installed shall consist of the following:

- Visual inspection of the cabinet and its contents for workmanship Verification of the cabinet grounding in accordance with Article 1074.03 (a)(4) of the Standard Specifications
- Measurement of the voltage at the input panel

Documentation. Shop drawings and wiring lists showing the proposed layout of each type of cabinet shall be submitted to the Engineer for approval prior to the start of fabrication. Wiring lists for the internal manufacturer cut sheets for all electrical equipment included in each type of cabinet shall be included in the submission.

Four copies of drawings showing the wiring for each cabinet shall be provided. One copy shall be placed in the clear plastic envelope furnished as part of the cabinet. The other three copies shall be delivered to the Engineer.

For each cabinet, four copies of a configuration of the equipment reporting to that cabinet shall be provided. The sheet shall also list field settable options for the equipment contained in the cabinet. This shall include device addresses and output voltage settings for power supplies. One of these copies shall be placed in the clear plastic envelope furnished as part of the cabinet. The other three copies shall be delivered to the Engineer.

Warranty. The Contractor shall warranty all materials and workmanship including labor for a period of two years after the completion and acceptance of the installation, unless other warranty requirements prevail. The warranty period shall begin when the contractor completes all construction obligations related to this item and when the components for this item have been accepted, which shall be documented as the final completion date in the construction status report. The warranty shall warrant and guarantee repair of the component parts of the Cabinet Model 334 furnished by the Contractor that prove to be defective in workmanship and materials during the first two years of operation as defined and noted above at no additional cost to the Department.

The Engineer will notify the Contractor that a warranted item needs repair. The Contractor shall acknowledge the notification within 24 hours and replace or correct any part or parts of materials and equipment that are found defective within the two-year in-service warranty period. All items needing repair shall be returned to the Department in two weeks from the date of receipt at the Contractor's facility or replaced in-kind by the Contractor, and the Contractor shall be responsible for any return shipping costs. No compensation will be made to the Contractor for such replacements or corrections.

The Contractor shall provide a warranty certificate for this item and its related components to the Department. The Department reserves the right to transfer this service to other parties who may be contracted with in order to provide overall maintenance of this item.

Basis of Payment

This work will be paid for at the contract unit price per each for CABINET, MODEL 334.

## DETECTOR RACK

Description. This specification shall govern the furnishing and installing of a Detector Rack with power supplies, interface panels, cables, and harnesses complete in a Cabinet, Model 334 as shown on the Plans and as directed by the Engineer.

### Materials.

Detector Rack Power Supply. The power supply shall provide regulated DC power for up to 16 input channels. Input voltage shall be 120 VAC, 50/60 Hz. Output voltage (per channel):

Output Voltage VAC	Load Current (mA)
31.3	0
27.2	100
24.3	200
21.8	300

The power supply shall have one output indicator per channel. Indicators shall have high intensity red LEDs which shall indicate output status. Indicators shall illuminate when voltage is greater than or equal to 21.0 VAC $\pm$  1.0 VDC and extinguish when voltage is less than 21.0 VDC  $\pm$  1.0 VDC.

One power switch shall switch input line voltage for all channels. The power supply shall have the following characteristics:

- Dimension: 2.00" W x 4.50" H x 6.875" D
- Weight: approximately 2.5 lbs.

The Connector shall be a 2 x 22 pin edge card connector with .156" spacing. The connector shall be centered on 4.50" dimension with the following pin assignments:

Pins	Assignment
1 & A	DC Common
2 & B	Channel 1
3 & C	Channel 2
4 & D	Spare
5 & E	Spare
Pins	Assignment
6 & F	Spare
7 & H	Spare
8 & J	Spare
9 & K	Spare
10 & L	Chassis Ground
11 & M	120 VAC Neutral
12 & N	120 VAC Line
13 & P	Spare
14 & R	Spare
15 & S	Spare
16 & T	Spare
17 & U	Channel 3
18 & V	Channel 4
19 & W	Spare
20 & X	Spare
21 & Y	Spare
22 & Z	Spare

The power supply shall fit in standard size card rack.

Detector Card Rack. The card rack shall be equal to or exceed an Econolite 16-position card rack with the loop interface panel.

The 16-position card rack shall be able to support eight 2-channel detectors, four 4-channel detectors or any combination needed.

The Contractor shall provide all labor and materials necessary to terminate the loops in the cabinet and extend the detector outputs to other cabinet devices.

The card rack shall be attached to the top shelf in the surveillance/ITS cabinet. No tools shall be required to remove the card rack from the shelf.

The loop interface panel shall be used for the purpose of connecting the field loops to the detector unit.



The interface panels shall be manufactured from FR4 G10 fiberglass, .062" thick, with a minimum of 2 oz. of copper for all traces.

One 16-position interface panel shall be provided for each 16-position card rack.

Each interface panel shall be supplied with a ground terminal bus for termination of the homerun cable shield if elected to be terminated.

Each interface panel shall accommodate 16 independent field loops to be connected.

The loop interface panel shall be attached to the "C" unistrut channel on the side wall of the surveillance cabinet and connected to the card rack via the factory made 20 AWG, twisted pair, harness.

Lightning protection shall be mounted and provided for each field loop on the interface panel. Mounting holes shall be provided for the Edco SRA-6LC loop lightning protection device.

## **CONSTRUCTION REQUIREMENTS**

General. The Contractor shall label all cables and ports using permanent cable tags. These labels shall identify the function of the cables and the ports the cables are connected to.

Installation. The Detector Rack shall be installed and connected inside the surveillance/ITS cabinet at the location shown in the Plans. The Contractor shall install all cables and ancillary equipment.

Surge and over-voltage protection shall be installed on all detector lead-in cables and all power conductors.

All cables shall be neatly dressed and labeled with their function and physical connection.

Testing. An operational standalone test shall be conducted to verify that all functions of the device, both independently and within the cabinet system, are fully operational. A test procedure shall be supplied for approval by the Engineer a minimum of one (1) week prior to the scheduled start of this test..

Method of Measurement. The DETECTOR RACK bid item will be measured for payment by the actual number of DETECTOR RACK assemblies furnished, installed, activated, tested, and accepted, and shall be counted, each.

Basis of Payment. This work shall be paid for at the contract unit price each for DETECTOR RACK, which shall be payment in full for the material and work described herein.

## **CCTV CAMERA STRUCTURE**

Effective: January 1, 2013

Description. This work shall consist of furnishing a CCTV camera structure complete with camera lowering device (*50ft camera pole will not require lowering device*). The structure shall be a galvanized steel structure with a concrete foundation.

### Definitions.

CCTV Camera Structure: The complete camera structure and lowering device as one integral working system.

Shaft: The camera structure shaft.

Lowering Device: The components involved with the mounting, operation, and raising and lowering of the CCTV camera. ***Lowering device is not required for the 50ft camera pole structure.***

Structure Height: The height of the structure shall be measured as indicated on the detail drawings

Materials. Materials shall be as specified elsewhere herein.

Deflection. The design of the structure shaft shall achieve a maximum, fully loaded deflection at the top of the structure, which is not greater than 1-inch

Submittals and Certifications. The structure shall be designed in accordance with 2001 AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals with Appendix C wind pressure for a 90 mph wind zone with a 1.3 gust factor. The pole shall be designed for use with a single arm camera lowering device with a total effective area of 2 square feet and total weight of 95 lbs. The structure shall not exceed 1" deflection in a 30 mph (non-gust) wind.

The camera structure shall be designed and constructed so no structural member or other component is applied in excess of the manufacturer's recommended rating (when applicable) or the published rating, whichever is lower

Shop drawings, product data and certifications shall be submitted. The submitted information shall be complete and shall include information relative to all specified requirements suitable for verification of compliance.

THE SUBMITTALS SHALL BE ARRANGED AND CROSS-REFERENCED TO THE SPECIAL PROVISIONS AND STANDARD SPECIFICATIONS. FAILURE TO CROSS-REFERENCE THE SUBMITTAL INFORMATION WITH THE SPECIAL PROVISIONS WILL RESULT IN THE SUBMITTAL BEING RETURNED WITHOUT REVIEW.

The submittal information shall be dated, current, project specific, identified as to the project, and shall also include the following calculations and certifications as applicable to the material utilized:

- Shaft design calculations, including Registered Engineer Certification.
- Certification of intent to provide domestic steel in accordance with Article 106.01 of the Standard Specifications.
- Welding details and procedures.
- Letter of intent to provide specified weld inspection reports.
- Confirmation of coordination between anchor rod supplier and the structure manufacturer for adequacy of anchor rod assembly.
- Manufacturer's recommended installation procedures.
- Letter of intent to provide manufacturer's representative during installation and to provide specified installation certification.

All certifications shall be notarized.

Shaft. The pole shall be a maximum of three sections for field assembly. The pole shafts shall be a round cross section and meet the requirements of ASTM A595 grade A with a minimum yield strength of 55,000 psi. The bottom section shall have a minimum .3125 wall thickness and a minimum diameter of 23". The three shafts sections shall taper at a rate of .14" per foot and have an overall height of 80'. The pole base plate shall meet the requirements of ASTM A36 and be arranged to accommodate four (4) 1 1/2" x 54" x 6" anchor bolts on a 27" bolt circle. Anchor bolts shall conform to ASTM F1554 gr. 55

The pole assembly shall be equipped with a 6" x 27" reinforced hand hole opening with a 3 gauge cover and shall be attached with four (4) 1/4"-20 hex hd s.s. screws. The bottom of the hand hole shall be located up 14" from the bottom. The hand hole frame shall meet ASTM A529 grade 50 and shall be made from 3/4" x 3 1/2" bar. There shall be a 3/8" diameter rod for wire tie off located at the top of the opening and 1 3/4" from the front of the hand hole frame and also a 1/2" tapped hole located 1 3/4" from the front of the frame at the bottom of the opening as shown on the drawing.

Six (6) 1" i.d. eye rings for power and communication cables are required as shown on the drawing. Two (2) shall be located 38" up from the bottom, two (2) located 6" below the top of the bottom shaft and two (2) 6" below the top of the center shaft.

There shall be a 3 1/2" schedule 40 (4" od) pipe tenon 11 3/4" tall on a 3/8" thick plate welded to the top of the pole. The pipe tenon shall include a 1 3/4" x 5 1/4" slot and two (2) 5/8" holes as shown on the drawing to accommodate the Camera Lowering System arm assembly. A J-hook shall be included inside the top of the tenon assembly and shall include a removable cast aluminum pole top.

### Camera Lowering Device

The 50ft camera pole shall not have a lowering device.

#### General.

The camera lowering system shall be designed to support and lower a standard closed circuit television camera, lens, housing, PTZ mechanism, cabling, connectors and other supporting field components without damage or causing degradation of camera operations. The camera lowering system device and the pole are interdependent; and thus, must be considered a single unit or system. The lowering system shall consist of a pole, suspension contact unit, divided support arm, and a pole adapter for attachment to a pole top tenon, pole top junction box, conduit mount adapter and camera connection box. The divided support arm and receiver brackets shall be designed to self-align the contact unit with the pole center line during installation and insure the contact unit cannot twist under high wind conditions. For maximum arm strength, round support arms are not acceptable. The camera-lowering device shall withstand wind forces of 100mph with a 30 percent gust factor using a 1.65 safety factor. The lowering device manufacturer, upon request, shall furnish independent laboratory testing documents certifying adherence to the stated wind force criteria utilizing, as a minimum effective projected area, the actual EPA or an EPA greater than that of the camera system to be attached. The camera-lowering device to be furnished shall be the product of manufacturers with a minimum of 3 years of experience in the successful manufacturing of camera lowering systems. The lowering device provider shall be able to identify a minimum of 3 previous projects where the purposed system has been installed successfully for over a one-year period of time each.

The lowering device manufacturer shall furnish a factory representative to assist the electrical contractor with the assembly and testing of the first lowering system onto the pole assembly. The manufacturer shall furnish the applicable DOT engineer documentation certifying that the electrical contractor has been instructed on the installation, operation and safety features of the lowering device. The contractor shall be responsible for providing applicable maintenance personnel "on site" operational instructions.

#### Suspension Contact Unit.

The suspension contact unit shall have a load capacity 200 lbs. with a 4 to 1 safety factor. There shall be a locking mechanism between the fixed and moveable components of the lowering device. The movable assembly shall have a minimum of 2 latches. This latching mechanism shall securely hold the device and its mounted equipment. The latching mechanism shall operate by alternately raising and lowering the assembly using the winch and lowering cable. When latched, all weight shall be removed from the lowering cable. The fixed unit shall have a heavy duty cast tracking guide and means to allow latching in the same position each time. The contact unit housing shall be weatherproof with a gasket provided to seal the interior from dust and moisture.

The prefabricated components of the lift unit support system shall be designed to preclude the lifting cable from contacting the power or video cabling. The lowering device manufacturer shall provide a conduit mount adapter for housing the lowering cable. This adapter shall have an interface to allow the connection of a contractor provided 1.25 inch PVC conduit and be located just below the cable stop block at the back of the lowering device. The Contractor shall supply internal conduit in the pole as directed by the Lowering Device provider. The only cable permitted to move within the pole or lowering device during lowering or raising shall be the stainless steel lowering cable. All other cables must remain stable and secure during lowering and raising operations.

The female and male socket contact halves of the connector block shall be made of Hypalon. The female brass socket contacts and the male high conductivity brass pin contacts shall be permanently molded into the polymer body.

The current carrying male contacts shall be 1/8 inches in diameter. There shall be two male contacts that are longer than the rest which will make first and break last providing optimum grounding performance. The number of contacts shall be a minimum of 14 and shall be fully coordinated with the camera specified elsewhere herein.

The current carrying female contacts shall be 1/8 inches I.D. All of the contacts shall be recessed 0.125" from the face of the connector. Cored holes in the socket measuring 0.25" in diameter and 0.125" deep molded into the connector body are centered on each contact on the face of the connector to create rain-tight seals when mated with the male connector.

The wire leads from both the male and female contacts shall be permanently and integrally molded in the Hypalon body. The current carrying and signal wires molded to the connector body shall be constructed of #18/1 AWG Hypalon jacketed wire.

The contacts shall be self-wiping with a shoulder at the base of each male contact so that it will recess into the female block, thereby giving a rain-tight seal when mated. The facility manufacturing the electrical contact connector must comply with Mil Spec Q-9858 and Mil Spec I-45208.

Lowering Tool.

The camera-lowering device shall be operated by use of a portable lowering tool. The tool shall consist of a lightweight metal frame and winch assembly with cable as described herein, a quick release cable connector, an adjustable safety clutch and a variable speed industrial duty electric drill motor. This tool shall be compatible with accessing the support cable through the hand hole of the pole. The lowering tool shall attach to the pole with one single bolt. The tool will support itself and the load assuring lowering operations and provide a means to prevent freewheeling when loaded. The lowering tool shall be delivered to the State upon project completion. The lowering tool shall have a reduction gear to reduce the manual effort required to operate the lifting handle to raise and lower a capacity load. The lowering tool shall be provided with an adapter for operating the lowering device by a portable drill using a clutch mechanism. The lowering tool shall be equipped with a positive breaking mechanism to secure the cable reel during raising and lowering operations and prevent freewheeling. The manufacturer shall provide a variable speed, heavy-duty reversible drill motor and a minimum of two complete lowering tools plus any additional tools required by plan notes. The lowering tool shall be made of durable and corrosion resistant materials, powder coated, galvanized, or otherwise protected from the environment by industry-accepted coatings to withstand exposure to a corrosive environment.

#### Camera Junction Box

The camera junction box shall be of two piece clamshell design with one hinge side and one latch side to facilitate easy opening. The general shape of the box shall be cylindrical to minimize the EPA. The Camera Junction Box shall be cast aluminum with stabilizing weights on the outside of the box to increase room on the interior. The box shall be capable of having up to 40 pounds of stabilizing weights. The bottom of the Camera Junction Box shall be drilled and tapped with a 1-1/2" NPT thread to accept industry standard dome housings and be able to be modified to accept a wide variety of other camera mountings. The junction box shall be gasketed to prevent water intrusion. The bottom of the box shall incorporate a screened and vented hole to allow airflow and reduce internal condensation.

## Materials

All pulleys for the camera lowering device and portable lowering tool shall have sealed, self lubricated bearings, oil tight bronze bearings, or sintered- oil impregnated, bronze bushings. The lowering cable shall be a minimum 1/8-inch diameter stainless steel aircraft cable with a minimum breaking strength of 1740 pounds with (7) strands of 19 wire each.

All electrical and video coaxial connections between the fixed and lowerable portion of the contact block shall be protected from exposure to the weather by a waterproof seal to prevent degradation of the electrical contacts. The electrical connections between the fixed and movable lowering device components shall be designed to conduct high frequency data bits and one (1) volt peak-to-peak video signals as well as the power requirements for operation of dome environmental controls.

The interface and locking components shall be made of stainless steel and or aluminum. All external components of the lowering device shall be made of corrosion resistant materials, powder coated, galvanized, or otherwise protected from the environment by industry-accepted coatings to withstand exposure to a corrosive environment.

The Camera Manufacturer shall provide weights and /or counterweights as necessary to assure that the alignment of pins and connectors are proper for the camera support to be raised into position without binding. The lowering unit will have sufficient weight to disengage the camera and its control components in order that it can be lowered properly

Installation of the lowering device and camera shall be included as a part of this item and shall not be paid for separately.

Method Of Measurement. CCTV camera structures shall be counted, each with all appurtenances installed.

Basis Of Payment. This item shall be paid at the contract unit each for CLOSED CIRCUIT TELEVISION CAMERA STRUCTURE, of the mounting height specified.

## **REINFORCED CONCRETE DUCT BANK REMOVAL**

**Description.** This work shall consist of removing an existing concrete encased reinforced duct bank as shown on the Plans or directed by the Engineer. All related work such as excavation, demolition, removal and disposal of the duct bank, backfill and compacting shall be included in this work.

**Materials.** Removed duct bank shall be backfilled with approved material.

## **CONSTRUCTION REQUIREMENTS**

All work shall be performed as shown on the Plans.

The duct bank shall be removed completely and disposed of outside the right-of-way.

**Measurement and Payment.** The work shall be measured per lineal foot of overall duct bank removed (not per conduit inside duct bank). This work shall be paid for at the contract unit price per foot for REINFORCED CONCRETE DUCT BANK REMOVAL, which shall be payment in full for all work listed herein.



## **ATMS SYSTEM INTEGRATION**

Description. This item includes integrating all loop detector and ramp meter installations shown on the plans into the IDOT Advanced Traffic Management System (ATMS). Data from the loop detector and ramp meter stations will be collected and integrated via the existing iNET interface to the ATMS. This item includes all software (including loading IDOT ramp meter software on controllers), programming, miscellaneous devices, cabinets, racks, and cables necessary to provide the successful integration of the stations in the project to the existing expressway traffic monitoring system. This item shall provide data to the Gateway Traveler Information System (see Gateway Integration special provision).

Work as necessary will be performed at the:

Illinois Department of Transportation  
Bureau of Traffic Operations/Electrical Field Office  
445 W. Harrison Street  
Oak Park, Illinois 60304

Integration. The Contractor shall subcontract with the development and maintenance contractor for the ATMS to perform all ATMS software and hardware modifications. Contact information is:

Parsons  
Project Manager  
650 E Algonquin Rd, Suite 104  
Schaumburg, IL 60173

Phone: (847) 925-0120

The ATMS system shall be upgraded and expanded to add all loop detector and ramp meter installations shown on the plans. The integration must be made to make this expansion a seamless transition, and function in an identical manner as the existing expressway surveillance. Work under this item includes but is not limited to the following:

- Integrate data from the additional loop detector stations thru the existing iNET interface at the existing rate of once every 20 seconds.
- Create new Vehicle Detection Station (VDS) display, data table, description and control panel display, and travel time tables.
- Modify the existing graphic user interface, report generators, data bases, broadcast feeds (both subscriber and internal), and data tables for the dynamic message sign control.
- Display on the Traffic Systems Center ATMS maps, and all user interfaces the new loop detector stations data (as applicable) including volume, occupancy, speed, vehicle classification (length), and operational status.

- Display the operational status of detectors, ramp meters, and DMS on the Traffic Systems Center ATMS maps and all user interfaces.
- Create new segments and groupings used to display travel time and congestion data to the Dynamic Message Signs.
- Provide the Gateway XML data feeds for presentation of the additional data to the Gateway web page and user interfaces (see Gateway Integration special provision).
- Update the Lake Michigan Interstate Gateway Alliance (LMIGA) data feeds for presentation of the additional data to the web page and user interfaces.
- Develop an integration acceptance test plan and conduct said test to verify that all loop detector stations have been properly integrated according to the requirements. This acceptance plan shall conclude with a 30 day burn-in period. During the burn-in period, the subcontractor shall identify and resolve any problems identified with the integration.
- Coordinate with the Roadside Detector manufacturer, ATMS Integration Programmer, and Gateway Integration Programmer.

Method of Measurement. The ATMS System integration shall be measured as lump sum.

Basis of Payment. This item shall be paid for at the contract lump sum price for ATMS SYSTEM INTEGRATION, which price shall be payment in full for the work described for a complete seamless integration of the new loop detector stations into the existing IDOT ATMS System. Acceptance shall be granted after integration and after passing an acceptance test proposed by the Subcontractor, and agreed upon by the Engineer.

## **GATEWAY INTEGRATION**

Effective Date: February 27, 2015

Description. This work shall consist of software modification to the Gateway Traveler Information System (GTIS) Server Interface from the ATMS XML feed (see ATMS System Integration special provision) and any modifications require to broadcast this information to the GTIS web page and media. The cost of this work is incurred by the Department.

In order to distribute the detector data and sign legends to the media, traffic engineers, and the GTIS web page, the ATMS data must be integrated into the GTIS. The integration software shall utilize the five-minute traffic data feeds from the ATMS and translate the data into a format that is compatible with the existing user interface and distribution process. The data shall appear to all users in a format identical to existing detector stations and DMS. No operator intervention shall be required to incorporate the data into the GTIS.

## **CONSTRUCTION REQUIREMENTS**

Gateway Provider Coordination: The Contractor shall contact and coordinate with both the work required and timing of the integration with the Gateway Provider listed below:

John Dillenburg  
University of Illinois at Chicago  
Department of Computer Science  
(312) 996-5598  
[dillenbu@uic.edu](mailto:dillenbu@uic.edu)

This work shall be performed by the Gateway Provider.

All software developed for this process shall become the property of the Illinois Department of Transportation.

Basis of Payment. Any changes performed by the Gateway Provider to integrate the proposed Roadside Detectors and DMS into the existing GTIS will be paid for according to Article 109.05 after final acceptance has been granted as determined by the Engineer.

## **MAINTAINING ITS DURING CONSTRUCTION**

Description. Intelligent Transportation Systems (ITS) references IDOT traffic surveillance infrastructure. These elements include, but are not limited to, the following: induction loops, ramp meters, closed circuit television cameras, dynamic message signs, highway advisory radios, Radar Vehicle Sensing Devices (RVSDs), wireless vehicle detection devices, copper and fiber optic communication cables, power cables, cabinets, and communication equipment.

General Requirements. Effective the date the Contractor's activities (ITS or otherwise) begin at the job site, the Contractor shall be responsible for the proper operation and maintenance of ITS elements that are part of, or that may be affected by, the work until final acceptance by the Engineer or as otherwise determined by the Engineer.

Before performing any excavation, removal, or installation work (ITS or otherwise) at the site, the Contractor shall initiate a request for a maintenance transfer and preconstruction inspection to be held in the presence of the Engineer and a representative of the party or parties responsible for maintenance of any ITS systems that may be affected by the work. This includes co-ordination with adjacent projects that may have an effect on the ITS infrastructure. The request for the maintenance preconstruction inspection shall be made no less than seven (7) calendar days prior to the desired inspection date.

Existing ITS elements, when depicted on the plans, are intended only to indicate the general equipment installation of the systems involved and shall not be construed as an exact representation of the field conditions. It remains the Contractor's responsibility to visit the site to confirm and ascertain the exact condition and location of the ITS components and systems to be maintained and installed.

Existing ITS components shall be defined as any ITS component or device in service at the time of the commencement of construction activities. The contract drawings indicate the general extent of any existing ITS elements, but whether indicated or not, it remains the Contractor's responsibility to ascertain the extent of effort required for compliance with these specifications, and failure to do so will not be justification for extra payment or reduced responsibilities.

Maintaining ITS During Construction - It is the Contractor's responsibility to maintain vehicle detection, which includes speed and volume data, in all lanes within the construction limits for this project, on all roadway segments and ramps that will be open to traffic. Where the existing detection cannot be maintained, the Contractor shall provide a temporary detection system, approved by IDOT, at no additional cost to the contract. The Contractor's responsibility shall include protection or removal and storage of any ITS/Communication cabinets and protecting in place any cables, conduits and ITS devices in or adjacent to the work zone. This work may also include the abandonment of the existing device and communication pathway and the installation of a temporary device such as a RVSD with a wireless communication. This work shall also include the relocation and adjustment of RVSD and wireless detection devices as necessary in coordination with construction staging. It is the Contractor's responsibility to maintain closed circuit television cameras including associated fiber optic communications and power.

The Contractor is responsible for the disconnection, rerouting, and reconnection of all fiber and copper communication cables currently located in existing conduits as indicated in the plans. The disconnection and reconnection must be made at an existing splice point or communication cabinet where a connection is made, or as otherwise indicated in the plans. The existing communication and infrastructure must be properly maintained for the duration of construction activities and the Contractor must coordinate the disconnection and reconnection activities with the Engineer.

All work required to maintain, relocate or provide temporary ITS infrastructure as depicted in the plans or otherwise necessary and as provided for in this special provision shall be paid for under the Maintaining ITS During Construction pay item. No component items germane to this work shall be paid for separately.

Once construction activities are complete, all temporary equipment installed will become the property of the Department and shall remain in place, except where a proposed location has been identified in the plans. All final locations and installations of ITS devices, communication cabinets, junction boxes, conduit, fiber optic, copper cable, wireless equipment and associated infrastructure shall be protected, secured and have the Engineer's approval. Proper documentation, to include latitude and longitude for all equipment locations and communication pathway must be turned over to the Department. The proposed plan for this work must be presented to the Engineer for approval prior to the commencement of the work.

Method of Measurement. The contractor shall demonstrate to the satisfaction of the Engineer that the ITS components, devices and infrastructure have been properly installed, protected and maintained and that the appropriate data is being transmitted to the Traffic Management Center prior to submitting a pay request. In order for final payment to be released the contractor must demonstrate that the equipment is working as intended following inspection by the Engineer. Failure to do so will be grounds for denying the pay request.

Basis of Payment. Maintaining ITS During Construction and Rerouting ITS Communication shall be paid for at the contract unit price per calendar month (Cal Mo) for MAINTAINING ITS DURING CONSTRUCTION, which shall include all work as described herein.

### **CONCRETE FOUNDATION, CABINET MODEL 334**

Description. This work shall consist of constructing a concrete foundation to support ITS equipment cabinets at locations as indicated on the Plans. This work shall include installing any necessary hardware (entering conduits, bolts, anchor rods, grounding, etc.) as shown on the Plans. This work shall also include any topsoil, fertilizing, seeding, and mulching of the disturbed areas in accordance with Sections 211, 250, and 251 of the Standard Specifications.

Materials. Concrete foundations shall be according to materials defined in Article 836.02 of Section 836 of the Standard Specifications. All anchor bolts shall be in accordance with Section 1006.09 of the Standard Specifications except that all anchor bolts shall be hot dipped galvanized the full length of the anchor bolt including the hooks. Anchor bolts shall provide bolt spacing as shown in the Plans and as required by the cabinet manufacturer.

The Concrete foundations shall also be fabricated in accordance with Section 1070 of the Standard Specifications. These concrete foundations shall be fabricated from material new and unused in any previous application. The manufacturer shall provide a Certificate of Compliance that the materials are new and meet the specified requirements in accordance with the Standard Specifications and as shown on the Plans.

### **CONSTRUCTION REQUIREMENTS**

The Engineer will determine the final placement of the Concrete foundations. Concrete foundation dimensions shall be in accordance with those dimensions shown in the Plans on the detail sheet "Cabinet, Model 334 and Foundation Detail". The foundation shall be located as required in order to avoid existing and relocated utilities. The top of the foundation shall be finished level. Shimming of the appurtenance to be attached will not be permitted.

Prior to pouring the foundation, the Contractor shall check the Plans for the specific number, size, and direction of conduit entrances required at the given location. All conduit in the foundation shall be installed rigidly in place before concrete is deposited in the form. Bushings shall be provided at the ends of the conduit. Anchor rods and ground rod shall be set in place before the concrete is deposited by means of a template constructed to space the anchor rods according to the pattern of the bolt holes in the base of the appurtenance to be attached. The appurtenance shall not be erected on the foundation until the bases have cured for at least (7) days. The Concrete shall cure according to Article 1020.13 of the Standard Specifications.

Basis of Payment. This work will be paid for at the contract unit price per each for CONCRETE FOUNDATION, SURVEILLANCE CABINET MODEL 334.

**FIBER OPTIC CABLE, SINGLE MODE**

Effective: March 15, 2013

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

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

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

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

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

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

<b>Optical Characteristics</b>			
<b>Requirement</b>		<b>Units</b>	<b>Value</b>
Cabled Fiber Attenuation	1310 nm	(dB/km)	≤ 0.4
	1550 nm		≤ 0.3
Point discontinuity	1310 nm	(dB)	≤ 0.1
	1550 nm		≤ 0.1
Macrobend Attenuation	Turns	Mandrel OD	
	1	32 ± 2 mm	(dB)
	100	50 ± 2 mm	
	100	50 ± 2 mm	
	100	60 ± 2 mm	
	100	60 ± 2 mm	
100	60 ± 2 mm		
Cable Cutoff Wavelength ( $\lambda_{ccf}$ )		(nm)	< 1260
Zero Dispersion Wavelength ( $\lambda_0$ )		(nm)	1302 ≤ $\lambda_0$ ≤ 1322
Zero Dispersion Slope ( $S_0$ )		(ps/(nm <sup>2</sup> •km))	≤ 0.089
Total Dispersion	1550 nm	(ps/(nm•km))	≤ 3.5
	1285-1330 nm		≤ 17.5
	1625 nm		≤ 21.5
Cabled Polarization Mode Dispersion		(ps/km <sup>2</sup> )	≤ 0.2
IEEE 802.3 GbE - 1300 nm Laser Distance		(m)	up to 5000
Water Peak Attenuation: 1383 ± 3 nm		(dB/km)	≤ 0.4

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

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

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

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

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

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



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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

- Cable Number
- Gross Weight
- Shipped Cable Length in Meters
- Job Order Number
- Product Number
- Customer Order Number
- Date Cable was Tested
- Manufacturer Order Number
- Cable Length Markings
  - a: Top (inside end of cable)
  - b: Bottom (outside end of cable)

The reel (one flange) marking shall include:

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

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

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

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

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

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

Optical Patch Cords and Pigtails. The optical patch cords and pigtails shall comply with the following:

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

Connectors. The optical connectors shall comply with the following:

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

## CONSTRUCTION REQUIREMENTS

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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



Tracer Wire. A tracer wire shall be installed with all fiber optic cable runs. One tracer wire shall be installed along with the fiber optic cable in each raceway. If a raceway has more than one fiber optic cable, only one tracer wire per raceway is required. If there are parallel raceways, a tracer wire is required in each raceway that contains a fiber optic cable. Tracer wire shall be installed in raceway segments which are metallic to provide a continuous tracer wire system.

The tracer wire shall be a direct burial rated, number 12 AWG (minimum) solid (.0808" diameter), steel core soft drawn high strength tracer wire. The wire shall have a minimum 380 pound average tensile break strength. The wire shall have a 30 mil high density yellow polyethylene (HDPE) jacket complying with ASTM-D-1248, and a 30 volt rating.

Connection devices used shall be as approved by the tracer wire manufacturer, except wire nuts of any type are not acceptable and shall not be used.

The cost of the tracer wire shall be included in the cost of the fiber optic cable and not paid for separately.

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

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

#### Construction Documentation Requirements.

##### Installation Practices for Outdoor Fiber Optic Cable Systems

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

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

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

**Testing Requirements.** The Contractor shall submit detailed test procedures for approval by the Engineer. All fibers (terminated and un-terminated) shall be tested bi-directionally at both 1310 nm and 1550 nm with both an Optical Time Domain Reflectometer (OTDR) and a power meter with an optical source. For testing, intermediate breakout fibers may be concatenated and tested end-to-end. Any discrepancies between the measured results and these specifications will be resolved to the satisfaction of the Engineer.

Fibers which are not to be terminated shall be tested with a temporary fusion spliced pigtail fiber. **Mechanical splice or bare fiber adapters are not acceptable.**

The Contractor shall provide the date, time and location of any tests required by this specification to the Engineer at least 5 working (7 calendar) days before performing the test. Included with the notification shall be a record drawing of the installed fiber optic cable system. The drawings shall indicate actual installed routing of the cable, the locations of splices, and locations of cable slack with slack quantities identified.

Upon completion of the cable installation, splicing, and termination, the Contractor shall test all fibers for continuity, events above 0.1 dB, and total attenuation of the cable. The test procedure shall be as follows:

A Certified Technician utilizing an Optical Time Domain Reflectometer (OTDR) and Optical Source/Power Meter shall conduct the installation test. The test equipment used shall have been calibrated within the last two years. Documentation shall be provided. The Technician is directed to conduct the test using the standard operating procedures defined by the manufacturer of the test equipment. All fibers installed shall be tested in both directions.

A fiber ring or fiber box shall be used to connect the OTDR to the fiber optic cable under test at both the launch and receive ends. The tests shall be conducted at 1310 and 1550 nm for all fibers.

All testing shall be witnessed by the IDOT Engineer and a copy of the test results (CD ROM or USB Drive) shall be submitted on the same day of the test. Hardcopies shall be submitted as described herein with copies on CD ROM.

At the completion of the test, the Contractor shall provide copies of the documentation of the test results to the Project Engineer. The test documentation shall be submitted as two bound copies and three CD ROM copies, and shall include the following:

Cable & Fiber Identification:

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

Test Results shall include:

- OTDR Test results
- Total Fiber Trace
- Splice Loss/Gain
- Events > 0.10 dB
- Measured Length (Cable Marking)
- Total Length (OTDR)
- Optical Source/Power Meter Total Attenuation (dB/km)

Sample Power Meter Tabulation:

Power Meter Measurements (dB)									
Location		Fiber No.	Cable Length (km)	A to B		B to A		Bidirectional Average	
A	B			1310 nm	1550 nm	1310 nm	1550 nm	1310 nm	1550 nm
		1							
		2							
<b>Maximum Loss</b>									
<b>Minimum Loss</b>									

The OTDR test results file format must be Bellcore/Telcordia compliant according to GR-196-CORE Issue 2, OTDR Data Standard, GR 196, Revision 1.0, GR 196, Revision 1.1, GR 196, Revision 2.0 (SR-4731) in a ".SOR" file format. A copy of the test equipment manufacturer's software to read the test files, OTDR and power, shall be provided to the Department. These results shall also be provided in tabular form, see sample below:

Sample OTDR Summary					
Cable Designation:	<i>TCF-IK-03</i>	OTDR Location:	<i>Pump Sta. 67</i>	Date:	<i>1/1/00</i>
Fiber Number	Event Type	Event Location	Event Loss (dB)		
			1310 nm	1550 nm	
<i>1</i>	<i>Splice</i>	<i>23500 Ft.</i>	<i>.082</i>	<i>.078</i>	
<i>1</i>	<i>Splice</i>	<i>29000 Ft.</i>	<i>.075</i>	<i>.063</i>	
<i>2</i>	<i>Splice</i>	<i>29000 Ft.</i>	<i>.091</i>	<i>.082</i>	
<i>3</i>	<i>Splice</i>	<i>26000 Ft.</i>	<i>.072</i>	<i>.061</i>	
<i>3</i>	<i>Bend</i>	<i>27000 Ft.</i>	<i>.010</i>	<i>.009</i>	

The following shall be the criteria for the acceptance of the cable:

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

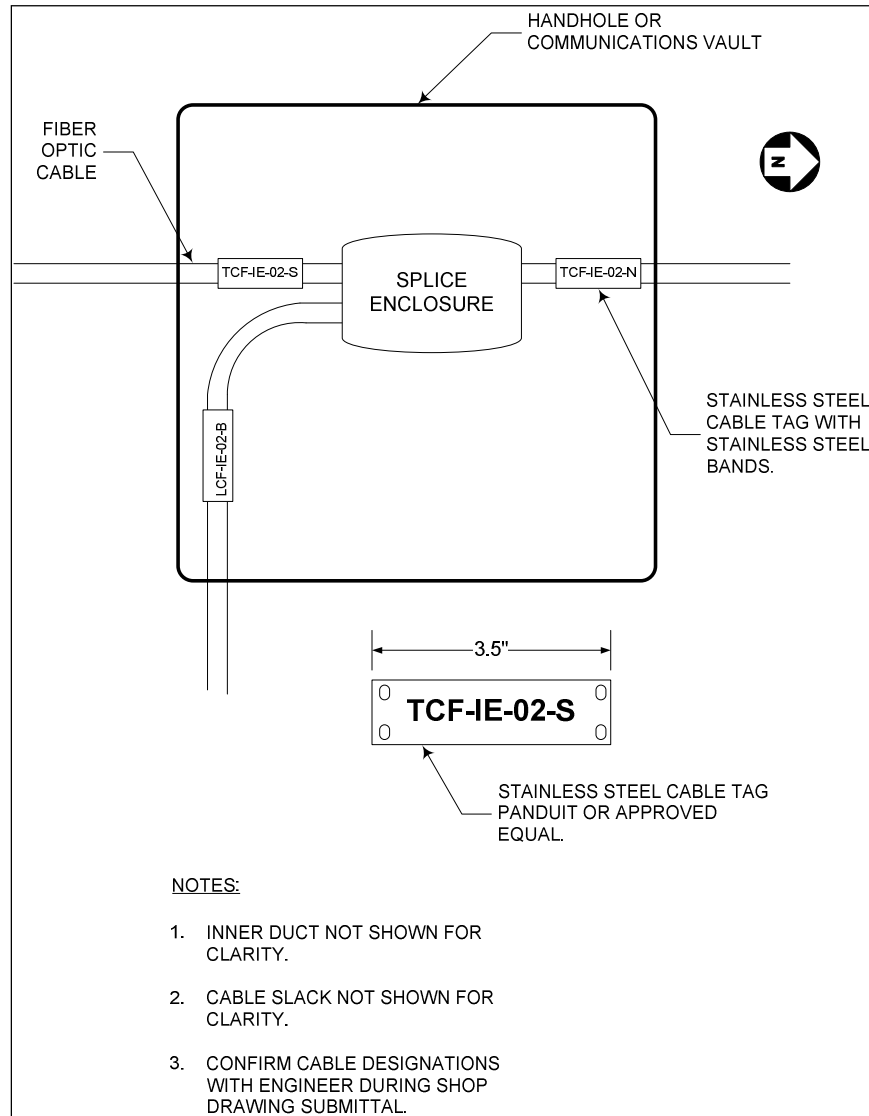
The total loss of the cable (dB), less events, shall not exceed the manufacturer's production specifications as follows: 0.5 dB/km at both 1310 and 1550 nm.

If the total loss exceeds these specifications, the Contractor shall replace or repair the cable run at the no additional cost to the state, both labor and materials. Elevated attenuation due to exceeding the pulling tension, or any other installation operation, during installation shall require the replacement of the cable run at no additional cost to the State, including labor and materials.

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

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

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



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

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

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

## **TERMINATE FIBER IN CABINET**

**Description.** This work shall consist of terminating fibers in cabinets and other IDOT facilities as indicated on the Plans. Termination shall consist of splicing a single strand from a fiber optic cable to an optical pigtail.

**Materials.** Pigtails and jumpers shall be per the Optical Patch Cords and Pigtails section of the "Fiber Optic Splice, Single Mode" special provision. All equipment and ancillary materials needed to make fiber optic fusion splices between fiber strands and pigtails shall be included in this work.

### **CONSTRUCTION REQUIREMENTS**

The Contractor shall splice together a fiber optic strand and pigtail as shown in the Plans. Fiber optic splices shall be per the Splicing Requirement section of the "Fiber Optic Splice, Single Mode" special provision. Upon completing all splicing operations at a location, the Contractor shall test all links per the Testing Requirements section of the "Fiber Optic Splice, Single Mode" special provision. As directed by the Engineer, the Contractor shall, at no additional cost to the Department, replace any splice that does not satisfy the required objectives.

All spliced fibers and pigtails shall be trained in splice trays securely fastened inside of a splice enclosure or termination panel. Uncut fibers and buffer tubes shall be coiled neatly in the splice enclosure or termination panel. The ferrule end of the pigtail shall be connected to a patch panel module as shown in the Plans.

**Basis of Payment.** This work will be paid for at the contract price each for TERMINATE FIBER IN CABINET.

## **INTERCEPT EXISTING CONDUIT**

Description. This item consists of intercepting an existing conduit or raceway for the purpose of installing new electrical equipment or making a connection to a new conduit.

General Requirements. Work under this item shall be performed in accordance with Sections 800, 810, 811, 812 and 1088 of the Standard Specifications.

Construction Requirements. The Contractor shall pull back the existing Fiber Optic cables, Telecommunication cables, or Electrical cables and carefully cut the conduit or raceway so that the cut conduit ends are smooth. For embedded conduits, the contractor shall carefully remove the existing concrete encasement around the conduit to be intercepted and thoroughly clean the conduit for a proper connection to the new conduit or junction box. This item shall include all work necessary to connect new conduit runs to the existing conduit runs. All new conduit and conduit fittings required to intercept the existing conduit and make the necessary connections to create a continuous conduit run into the new junction box or new conduit will not be paid for separately and shall be included in this item. The Contractor shall furnish and install all materials for a complete installation.

Method of Measurement. This work will be measured on a per each basis for each conduit end cut.

Basis of Payment. This work will be paid for at the contract unit price per each for INTERCEPT EXISTING CONDUIT, which will be payment in full for the material and work described herein. No additional payment will be allowed for excavation, backfilling, and restoration of a parkway.

## **FIBER OPTIC TERMINATION PANEL**

Description. This specification shall govern the furnishing and installing of termination panels for fiber optic cable in designated field locations and associated equipment cabinets as shown in the Plans and as detailed in this specification.

### Materials.

The fiber optic termination panel shall comply with the following requirements:

- The 12 fiber optic termination panel shall be rack mountable.
- The fiber patch panel shall terminate pigtail fibers as called out on the Plans.
- The fiber optic termination panel shall allow termination of a fiber patch cord to interconnect outside plant fibers to fiber optic communication equipment.
- The approved type optical connectors on the end of each pigtail shall connect to a coupler securely mounted to a patch panel within the controller cabinet. The maximum optical loss across the connection shall not exceed 0.25 dB.
- The fibers with the optical connectors on the pigtail cable shall be routed through and secured in the fiber optic termination panel as directed by and to the satisfaction of the Engineer.
- The bulkheads or single-mode adapter types shall be single-mode ST compatible, ceramic, unless a substitute is approved by the Engineer.

## **CONSTRUCTION REQUIREMENTS**

General. The Contractor shall label all cables and ports using permanent cable tags. These labels shall identify the function of the cables and the ports the cables are connected to.

Installation. The fiber optic termination panel shall be installed in the surveillance/ITS cabinets or IDOT facilities as specified on the Plans. The panels shall come with cable strain relief hardware and pull out label for administrative documentation. All work shall be neat and in a workmanlike manner. Particular care shall be taken as to not crush or kink the fiber optic cable. If, in the opinion of the Engineer, the cable has been damaged, the entire cable span shall be removed and replaced at the Contractor's expense.

Method of Measurement. The FIBER OPTIC TERMINATION PANEL bid item will be measured for payment by the actual number of FIBER OPTIC TERMINATION PANEL assemblies furnished, installed, activated, tested, and accepted, and shall be counted, each.

Basis of Payment. This work shall be paid for at the contract unit price each for FIBER OPTIC TERMINATION PANEL of the number of fiber optic cable terminations specified, which shall be payment in full for the material and work described herein.



## **THERMAL MAGNETIC CIRCUIT BREAKER**

Description. This work will consist of furnishing and installing a new thermal magnetic circuit breaker in an existing IDOT surveillance cabinet as described herein, as shown on the plans and as directed by the Engineer.

Construction Requirements. Furnishing and installing the thermal magnetic circuit breaker shall meet the requirements according to Division 800 of the Standard Specifications.

Materials. The thermal magnetic circuit breaker shall meet the requirements according to Section 1068.01(3) of the Standard Specifications.

Method of Measurement. Circuit breakers shall be counted as, each installed.

Basis of Payment. This item shall be paid at the contract unit price each for THERMAL MAGNETIC CIRCUIT BREAKER, of the type, voltage and amperage indicated.

## **ELECTRICAL CABLE IN CONDUIT, 4C/NO. 18 SHIELDED LOOP LEAD-IN (TSC T421#14)**

Effective: March 1, 2010

Revised: April 5, 2017

Description. This work shall consist of furnishing materials and labor for installation of shielded loop lead-in cables in conduit as specified herein and indicated by the Engineer, complete with all identification, terminating and testing.

### Materials.

General:

Lead-in is the wire that extends from the core hole of the induction loop to the termination point.

The cable shall be an assembly of pairs of left hand lay twisted insulated conductors, with a core filled with a petroleum base flooding compound, overlapped conductive tape shield and a black high density polyethylene jacket overall. This cable shall meet the requirements of IEEE Standard 383.

The cable shall have an Aluminized Polyester Shield to protect against electromagnetic interference.

The cable interstices shall be filled with a water blocking compound. It shall prevent hosing, siphoning or capillary absorption of water.

The jacket of high density polyethylene shall be rated to 600 volts in accordance with UL 83 Section 36.

All cables shall be UL listed.

The cable shall be rated 90 degrees C dry and 75 degrees C wet and shall be suitable for installation in wet and dry locations, exposed to the weather, and shall be resistant to oils and chemicals.

It shall have an operating temperature range of -20C to +60C (minimum).

The UL listing mark, cable voltage, insulation type and ratings, as well as the cable size shall all be clearly printed on the cable in a color contrasting with the insulation color.

Conductors:

The lead-in cable shall be 4 conductors (2 pair) # 18 stranded (7X.0152") un-coated copper, twisted at least 4 turns per foot and rated to 600 Volts. 1 pair is used for the loop while the other pair is a spare. Under no circumstances shall the spare pair be used to connect a second loop.

Conductors shall meet the requirements of ASTM Designation B-8 as applicable.

The conductors shall be coded as follows: black-red-white-green.

Insulation:

Cable insulation shall incorporate polyvinyl chloride (PVC) or Polypropylene, with a clear nylon covering overall as specified and the insulation shall meet or exceed the requirements of ICEA S-61-402, NEMA Standard Publication No. WC-5, UL Standard 83, as applicable.

Installation. All cables shall be delivered to the site in full reels. Cable on the reels shall be protected from damage during shipment and handling by wood lagging or other means acceptable to the Engineer. Reels shall be tagged or otherwise identified to show the UL listing.

The loop lead-in shall be barrel sleeved, crimped, soldered and protected by heat shrinkable tubing to the loop #14 wire. Lead-ins shall be twisted in such a manner so as to prevent mechanical movement between the individual cables. Lead-ins shall be brought into the cabinet or handhole at the time the induction loop is placed in the pavement. Loops located over 1000 feet from cabinet require four (4) turns of No. 14 wire.

Lead-in cable will be installed where the lead-in length from point of interception to the point of termination exceeds 150 feet.

Where lead-in runs are less than 150 feet, the loop wire will be utilized as lead-in to the point of termination w/o splices, being twisted 5 turns per foot. The additional loop wire will not be paid for separately but shall be included in the Induction Loop Pay Item.

Loop lead-ins placed in handholes shall be coiled, taped, and hung from the side of the handhole to protect against water damage. Any other method of installation will require prior written approval of the Engineer. Each loop lead-in shall be color coded and tagged in each handhole through which it passes. The loop lead-in shall be color coded and tagged at the core hole, in each junction box it passes through and at the termination point in the cabinet.

TRAFFIC SYSTEMS CENTER LOOP SPLICING REQUIREMENT

MAINLINE LOOPS		METERING LOOPS			
Lane 1	Blue	Lane 4	Violet	Loop 1	Green
Lane 2	Brown	Exit	Black	Loop 2	Yellow
Lane 3	Orange	Entrance	White	Loop 3	Red

When 2 or 3 loops are installed on an exit or entrance ramp the loop color code shall conform to the mainline loop color code and shall be marked as entrance or exit ramp loops.

In addition to color codes each loop shall be identified with a written label attached to the loop wire, or lead-in wire. The tags shall be Panduit #MP250W175-C or equivalent. All wires and cables shall be identified in each handhole or cabinet the cable passes through, or terminates in. The labels shall be attached to the cable by use of two cable ties.

Testing. After installation, the cable shall be tested as approved by the Engineer. Cable failing to pass the test shall be replaced with new cable at no additional cost.

Method of Measurement. The cable shall be measured for payment in linear foot in place. Measurements shall be made in straight lines between changes in direction and to the centers of Equipment. All vertical cable and permissible cable slack shall be measured for payment. A total of six (6) feet of slack shall be allowed for the end of a run terminating at a panel and four (4) feet will similarly be allowed when terminating at a wall-mounted panel. Additional vertical distance for the height of conduit risers, etc., as applicable, will be measured for payment for equipment so mounted.

Basis of Payment. This work shall be paid at the Contract unit price per linear foot, furnished and installed for ELECTRICAL CABLE IN CONDUIT, LEAD-IN, NO. 18 4/C, TWISTED SHIELDED

## **TRAFFIC CONTROL LED SIGNAL HEAD & PEDESTAL**

Effective: Aug. 29, 1996

Revised: July 30, 2008

Description. This work shall consist of furnishing and installing one way traffic control LED signal head and pedestal at the locations shown on the plans, in accordance with the following requirements.

Materials. Signal Heads shall be polycarbonate.

### Doors

Doors shall be of the same materials. They shall be suitably hinged and held securely to the casing by stainless steel locking devices. All other door parts such as hinge pins, lens clips, etc., shall be stainless steel also.

### Gaskets

Neoprene gaskets or their equivalent shall be provided between the casing and the door and between the lens and the door to make the signal face weather proof.

### Visors

Each signal lens shall have a visor of polycarbonate material. Visors for vehicular signal faces shall be of the tunnel type. Each visor shall be of standard length and designed to fit tightly against the door. Screws of stainless steel or equal material approved by the Engineer shall be used to attach the visors to the doors.

### Optical Units

Each signal lens shall have an optical unit composed of the following parts:

- (A) A signal lens conforming to the "Specifications for Traffic Signal Lenses," A.S.A. Designation D10.1, latest revision. The nominal sizes for vehicular signal lenses shall be 8 inches (203.2mm).
- (B) An LED lamp designed especially for traffic signal service. This lamp shall be according to Section 880 & 1078 for an 8" Signal Head.
- (C) A weatherproof lamp receptacle made of molded bakelite, designed to hold a traffic signal lamp with the light center at the focal point of the reflector. Each lamp receptacle shall be provided with two #18 (or larger) standard lead wires color coded of adequate length to be connected to the terminal block.

## Post

- (A) Base. The base shall be of cast iron conforming to the Specifications for Gray Iron Castings, A.S.T.M. Designation: A-48, Class 20, latest revision. Each base shall be octagonal in shape, unless a square base is specified. The octagonal bases shall be approximately 14" (355.06 mm) high and 16" (400 mm) across the flat sides at the bottom. The octagonal bases shall be true to pattern, with sharp clean-cut ornamentation and equipped with access doors for cable handling.
- (B) Tubular Steel Post. The post shall be straight sided, having an outside diameter of not less than 4-1/2" (112mm) and a minimum thickness of 0.12" (3mm) and shall be of high-grade, open-hearth lap-welded steel. Neither the post nor the cap shall be galvanized.
- (C) Anchor bolts. The anchor bolts shall be a minimum of 5/8" (16mm) in diameter and a minimum of 16" (400mm) long with an approximate 3" (75mm) bend at one end and threaded approximately 4" (100mm) at the other end. The anchor bolts shall conform to the specifications for Low-Carbon Steel Externally and Internally Threaded Standard Fasteners, A.S.T.M. Designation: A307. The first 5 inches (127mm) at the threaded end of the anchor bolts, also the nuts and washers for use with the anchor bolts shall be galvanized by the hot-dip process or by electro-galvanizing.
- (D) Ground Rod. Ground rod shall be 3/4" (19mm) in diameter and 8 ft (2.4 m) long, with one end pointed to facilitate driving and the other end chamfered to prevent mushrooming. It shall have a steel core with a heavy exterior layer of pure copper bonded to the core. A ground clamp capable of accommodating No. 6 wire shall be furnished with the rod.
- (E) Barrier wall mounted. Where the signal is to be located on top of a barrier or retaining wall, a mounting plate will be provided in place of the iron base. This plate shall be 17" (425 mm) long, and 6" (150 mm) wide. It shall also extend 12" (300 mm) vertically down the wall. The plate will be constructed of 1" (25.4 mm) thick steel with a steel coupling welded in the center of the horizontal plate to accept the 4" (100 mm) steel post.

Installation Details. Each completely assembled traffic signal head shall normally be installed as follows:

A. Signal Head

1. The traffic control LED signal head shall consist of one signal face and each signal face shall consist of two signal sections. Each LED signal head shall be furnished with a terminal compartment and one terminal block.
2. The signal head shall normally be erected vertically on a signal post and the terminal compartment cover facing away from the road.
3. Each signal face shall be pointed in the direction of the approaching traffic it is to control. They shall be aimed as directed by the Engineer.

Each completely assembled traffic control signal post shall normally be installed as follows:

B. Signal Post

1. The metal post shall be screwed into an ornamental base, and the complete unit shall be erected vertically upon and securely bolted to a prepared foundation. Anchor bolts, nuts, and washers shall be furnished with each post.

C. Base Plate

1. The base plate mounted on the barrier wall shall be attached using self-tapping 5/8" x 5" (16 mm x 125 mm) galvanized hex-head anchor bolts. The signal head shall be at the same elevation as the signal on the opposite side of the ramp, normally 5' (1.5 m) above pavement.

Painting.

All exposed metal surfaces shall be shop painted as follows:

1. Posts and bases shall have a minimum of two coats of durable paint, the final coat to be Federal Yellow in color.
2. The traffic signal visors are to be dull black in color.
3. Any steel or iron parts or fittings shall have one coat of approved primer and be finished with two coats of paint Federal Yellow in color.

Basis of Payment. This work shall be paid for at the contract unit price for SIGNAL HEAD, LED, RETROFIT, which price shall be payment in full for furnishing and installing the signal head, post, base, visor, doors, anchor bolts, nuts and washers complete. Any miscellaneous hardware will not be paid for separately, but shall be considered as incidental to the cost of this item.

**PREFORMED INDUCTION LOOP EMBEDDED IN NEW CONCRETE PAVEMENT (TSC  
T418#2)**

Effective: Feb. 11, 1997

Revised: January 1, 2017

Description. This item shall consist of furnishing, installing and testing a Pre-formed Induction Loop, of the dimensions shown in the Plans or of the dimensions from Table 1, at the locations shown. The Pre-Formed Induction Loop shall be installed in accordance with all details shown in the Plans and applicable portions of Section Art.886 of the Standard Specifications for Road and Bridge Construction. All cable installation, lead-ins and testing necessary to complete the installation shall conform with the following requirements.

Materials. The wire used for the Induction loop shall be #14-XLPE-600V, encased in a **3/8" (9.5mm), maximum inner diameter, highly abrasion-resistant Polyurethane alloy cover with a minimum impact pressure of 9000 psi (62,050 kPa). The maximum outer diameter of the cover shall be 5/8" (16 mm). Lead-ins shall be 4C # 18, Twisted Shielded.**

Preformed detector loops shall be factory assembled. The loop assembly shall be one continuous piece. No joints or splices shall be allowed in the loop wire, except where necessary to connect homeruns or interconnects to loops. This will provide maximum wire protection and loop system strength. Tee connections shall be high tensile strength/high temperature Polyurethane. The tee shall be of proper size to attach directly to the loop minimizing glue joints. The tee shall have the same flexible properties as the loop to insure that the whole assembly can conform to pavement movement and shifting without cracking or breaking.

The number of turns in the loop shall be application specific. No wire splices will be allowed in the preformed loop assembly.

The loops shall be filled and sealed with a flexible rubber self-sealing emulsion to insure complete moisture blockage and to prevent false calls due to movement of the wire within the conduit..

Loops and wire shall be custom marked as necessary for the job. The loops shall be individually marked as to the direction of the wire turns.

The Pre-Formed Loop shall pass the Specifications in the Pre-formed Inductive Loop (P-ILD) Handbook V.2.4.

The synthetic yarn reinforced Pre-Formed Loop outside jacket shall be stamped with the size, rating, clockwise or counter-clockwise, loop dimension, # of turns, and wire type every 6 feet, or as directed by the Engineer.

The Pre-formed loops shall have a minimum 15 year Manufacturer guarantee.

Installation Details. The Pre-Formed Induction Loops shall be installed in new concrete pavement at the location shown on the plans or as directed by the Engineer. The loops shall be installed at such a time that the loop can be secured to the reinforcement bars to prevent movement during concrete pour. The induction loop shall have a minimum of 2 inches (50mm) of concrete cover at all points.

The Pre-Formed Loop shall be fed through a 2 in (50mm) galvanized steel conduit to a Heavy Duty Handhole (See TY-1TSC-418#10 and TY-1TS-418#19). The hose shall extend a minimum of 6 feet (1.8 meters) into the HDHH.

For loops in bridge decks, the Loop shall extend a minimum of 6 feet (1.8 meters) beyond the forms for the bridge deck pour. Extra care shall be taken when the forms are stripped to insure that no damage is done to the loop. A nominal 10" X 8" X 4" (254mm X 203.2mm X 101.6mm) stainless steel junction box, minimum, shall be used to house the splice for the induction loop. This stainless steel junction box shall be attached where the Loop passes out of the bridge deck. The stainless steel junction box shall not be considered incidental but shall be paid for separately as 10" X 8" X 4" (254mm X 203.2mm X 101.6mm) stainless steel junction box attached to structure. A minimum of 2 feet of Loop wire and lead-in shall be coiled in the SS Junction Box to permit the splice to be removed, worked on, and replaced.

Where there are continuous count stations in the new concrete pavement, the loops from inside lane to outside lane shall be wrapped and alternate clockwise, counter-clockwise, etc...as per Loop Table #2 shown below:

Mainline Loop Table # 2

<u>Lane 1</u>	<u>Lane 2</u>	<u>Lane 3</u>	<u>Lane 4</u>
Clockwise	Counter-clockwise	Clockwise	Counter-clockwise

The Pre-Formed Induction loops shall follow this method to reduce crosstalk between adjacent loops.

Induction loops on exit and entrance ramps shall be square or rectangular with edges perpendicular or parallel to traffic flow. All mainline loops shall be round loops, 6 feet (1.8 meters) in diameter. Induction loops shall be centered on all ramps and in traffic lanes unless designated otherwise on the plans or by the Engineer. Traffic lanes shall be referred to by number and loop wire shall be color-coded and labeled accordingly. Lane one shall be the lane adjacent to the median, or that lane on the extreme left in the direction of the traffic flow; subsequent lanes are to be coded sequentially towards the outside shoulder. A chart which shows the coding for each installation shall be included in each cabinet.



Each induction loop shall have its own lead-in to the cabinet. The lead-in is paid separately as **Electrical Cable in Conduit 4/C # 18, Twisted Shielded (see Special Provision)**

Induction loops shall not be connected in series with other loops. This wire shall be free from kinks or any insulation abrasions. The loop lead-in shall be barrel sleeved, crimped, soldered and protected by heat shrinkable epoxy filled tubing to the loop #14 wire. The soldered connection shall be made with a soldering iron or soldering gun. No other method will be acceptable, i.e. the use of a torch to solder will not be acceptable. The heat shrink tube shall be shrunk with a heat gun. Any other method will not be acceptable, i.e. the use of a torch will not be acceptable. No burrs shall be left on the wire when done soldering. Cold solder joints will not be acceptable. Refer to TSC typical(s) **TY-1TSC-418 #2 & #3** for proper loop to loop lead-in splice detail.

Lead-ins shall be twisted in such a manner so as to prevent mechanical movement between the individual cables. Lead-ins shall be brought into a cabinet or handhole at the time the induction loop is placed in the pavement. Loops located over 1000 feet (300 m) from cabinet shall require five (5) turns of No. 14 wire.

Loop lead-ins placed in handholes shall be coiled, taped and hung from the side of the handhole to protect against water damage. Any other method of installation will require prior written approval of the Engineer. Each loop lead-in shall be color coded and tagged in each handhole through which it passes. The loop lead-in shall be color coded and tagged at the core hole, in each junction box it passes through, and at the termination point in the cabinet.

Pre-Formed loops on ramps shall use the following table, or as directed by the Engineer.

RAMP LOOP TABLE #1

W (M)	S (M)
13 ft (4.0m)	9 ft (2.8m)
14 ft (4.3m)	10 ft (3.1m)
15 ft (4.6m)	11 ft (3.4m)
16 ft (4.9m)	12 ft (3.7m)
17 ft (5.2m)	13 ft (4.0m)
18 ft (5.5m)	14ft (4.3m)
19 ft (5.8m)	15ft (4.6m)
20 ft (6.1m)	16 ft (4.9m)
21 ft (6.4m)	17 ft (5.2m)
22 ft (6.7m)	18 ft (5.5m)
23 ft (7.0m)	19 ft (5.8m)
24 ft (7.3m)	20 ft (6.1m)
25 ft (7.6m)	21 ft (6.4m)

The new concrete pavement slab in which the loop is installed shall be stamped near the right shoulder to indicate an induction loop.

Traffic Systems Center Loop Splicing Requirement Color Code.

MAINLINE LOOPS				METERING LOOPS	
Lane 1	Blue	Lane 4	Violet	Queue	Green
Lane 2	Brown	Exit	Black	Demand	Yellow
Lane 3	Orange	Entrance	White	Passage	Red

When 2 or 3 loops are installed on an exit or entrance ramp the loop color code shall conform to the mainline loop color code and shall be marked as entrance or exit ramp loops.

In addition to color codes each loop shall be identified with a written label attached to the loop wire, or lead-in wire. The tags shall be **Panduit #MP250W175-C or equivalent.** All wires and cables shall be identified in each handhole or cabinet the cable passes through, or terminates in. The labels shall be attached to the cable by use of two cable ties.

Prosecution of Surveillance Work. Should damage occur to any Traffic Systems Center cabinets, housing telemetry equipment and/or vehicle detection equipment, the Contractor shall install and replace all damaged equipment at his own expense. The Traffic Systems Center staff shall determine what equipment shall be reusable and what shall be replaced. Replaced equipment shall be of equal or better quality and type.

Connections to Existing Installations. Where new work connects to existing installations, the Contractor shall do all necessary cutting, fitting and foundation drilling to the existing installation and shall remove all existing work, as required, to make satisfactory connections, with the work to be performed under these Provisions, so as to leave the entire work in a finished and workmanlike manner, as approved by the Engineer. No raceways shall be allowed to enter cabinet through the sides or back walls.

Protection of Work. Electrical work, equipment and appurtenances shall be protected from damage during construction until final acceptance. Electrical raceway or duct openings shall be capped or sealed from the entrance of water and dirt. Wiring shall be protected from mechanical injury.

Standards of Installation. Electrical work shall be installed in a neat and workmanlike manner in accordance with the best practices of the trade. Unless otherwise indicated, materials and equipment shall be new and installed in accordance with the manufacturer's recommendations.

Except as specified elsewhere herein, materials and equipment shall be in conformance with the requirements of Section 106 of the Standard Specifications.

Testing. Before final acceptance, the induction loops shall be tested. Tests will not be made progressively, as parts of the work are completed. They shall be all made at one time. Items which fail to test satisfactorily shall be repaired or replaced.

An electronic test instrument capable of measuring large values of electrical resistance, ***such as major megger***, shall be used to measure the resistance of the induction loop and its lead-in. The resistance of the loop and its lead-in shall be a minimum of 100 megohms above ground under any conditions of weather or moisture. The resistance tests and all electronic tests shall be performed in the presence of the Engineer any number of times specified by the Engineer. The loop and loop lead-in shall have an inductance between 100 microhenries and 700 microhenries. The continuity test of the loop and loop lead-in shall not have a resistance greater than two (2) ohms. The Contractor shall do all testing in the presence of the Engineer and all readings will be recorded by the Engineer. Testing shall be done with an approved loop tester.

Final Acceptance. When the work is complete, tested and fully operational, the Contractor shall schedule a Final Acceptance Inspection with the Engineer. Final acceptance will be made as a total system, not as parts.

The Contractor shall furnish the necessary manpower and equipment to make the Final Acceptance Inspection. The Engineer will designate the type of equipment required for the inspection tests.

Method of Measurement. The Pre-formed Induction Loop measurement shall be the length of rubber reinforced hose in the pavement which contain loop wire. The actual length of wire used in the rubber reinforced hose shall not be considered in any measurement.

Basis of Payment. This item will be paid at the contract unit price per linear foot (meter) as PREFORMED INDUCTION LOOP. Lead-in cable will be paid at the contract unit price per lineal foot (meter) as 4-CONDUCTOR NO.18 TWISTED SHIELDED. The price will be payment in full for furnishing and installing all materials listed complete and operating in place.

## **REMOVAL OF TRAFFIC SURVEILLANCE EQUIPMENT**

Description. This work shall consist of removing various equipment, as shown in the plans, being careful not to damage those existing conduits, foundations and induction loops which will be reused in the new surveillance system. In case an existing conduit, foundation and induction loop designated to be re-used is damaged, the unsuitable portion will be replaced. The repair work shall not be paid for separately, but will be incidental to this bid item. The equipment shall be disposed of as directed by the Engineer and all debris removed beyond the right-of-way.

General Requirements. No removal work will be permitted without approval from the Engineer. Removal shall start as soon as the temporary ITS or permanent ITS, as applicable, is placed in approved operation. An inspection and approval by the Engineer will take place before any associate proposed permanent or temporary ITS is approved for operation.

Removal of Traffic Surveillance Equipment: Any damage resulting from the removal and/or transportation of the Traffic Surveillance Equipment and associated hardware, shall be repaired or replaced in kind. The Engineer will be the sole judge to determine the extent of damage and the suitability of repair and/or replacement.

Removal and Salvage Details. The equipment shall be removed in accordance with the following applicable sections of the Illinois Department of Transportation Standard Specifications for Road and Bridge Construction:

Concrete Foundation: Section 895

Ramp Meter and Traffic Signal Equipment: Section 895 used for signal heads, pedestals, flashers and post.

Handhole: Section 895

Electric service installation: Section 845

ITS/Surveillance Cabinets : Section 895.05 and 895.08  
Conduits: Existing underground conduits that will not be re-used shall be abandoned.

Wood poles: Wood poles and all associated apparatus and connections shall be removed. The wood pole removed as part of this item shall become property of the Contractor and shall be removed from the site. Pole holes shall be backfilled according to Article 819.02.

RVSD unit: The RVSD unit and associated mounting assembly shall be disconnected, removed from the wood pole, and turned over to IDOT.

RVSD output contact closure module: The RVSD contact closure module shall be removed from the surveillance cabinet and turned over to IDOT.

CCTV Cameras: The Closed Circuit Television Dome Camera Assemblies shall be disconnected, removed, and turned over to IDOT.

Removal of Traffic Surveillance Equipment, No Salvage. When indicated, Traffic Surveillance Equipment and all associated hardware and appurtenances shall become the property of the Contractor and shall be disposed of according to Article 202.03.

Removal of Traffic Surveillance Equipment, Salvage. When indicated, Traffic Surveillance Equipment, and all associated hardware and appurtenances shall remain the property of the Department and shall be delivered to a Department facility within the District, as directed by the Engineer. Traffic Surveillance Equipment shall be removed, boxed in new containers, approved by the Engineer, and delivered to the Department facility. The contractor is responsible for paying for the shipping of Traffic Surveillance Equipment included in this special provision and will not be paid separately for shipping costs.

Basis of Payment. This work shall be paid for at the contract unit price Lump Sum, for REMOVE EXISTING TRAFFIC SURVEILLANCE EQUIPMENT, which shall be payment in full for all labor and material removal necessary to complete the work as described above. The Engineer shall decide what equipment, if any, shall be salvaged and returned to state stock.

### **REMOVE FIBER OPTIC CABLE FROM CONDUIT**

Description. This work shall consist of removing a portion of the existing fiber optic interconnect cable from conduit as shown on the plans.

Materials. None.

Construction. The existing fiber optic cable shall be disconnected from the communications end equipment and fiber enclosures, and removed from the existing conduits. Removal of the fiber optic cable shall prevent damage to end equipment from the cable being tugged. The existing fiber optic cable shall not be disconnected and removed until the temporary equipment and communications are installed in advance and operating to the satisfaction of the Engineer. Cables shall be taken off site for proper disposal.

Basis of Payment. This work will be paid for at the contract unit price per foot for REMOVE FIBER OPTIC CABLE FROM CONDUIT which price shall be payment in full for disconnecting the existing fiber optic cable from the end locations and removing the existing fiber optic cable from the existing conduits.

## **DETECTION INTEGRATION DEVICE**

Description. This specification shall govern the furnishing and installing of a Detection Integration Device and associated cables complete in a surveillance/ITS cabinet as shown on the Plans and as directed by the Engineer.

### Materials.

The Contractor shall provide a Sensys FLEX-DET-M Detection Integration Device or equivalent as approved by the Engineer. The device shall be installed in the surveillance/ITS cabinet as shown in the Plans.

- The Detection Integration Device shall be used to capture data from inductive detector loops, microwave vehicle detection systems, and video detection systems routed to the cabinet and translate detector data for transmittal to the SENSYS System Manager server at the Oak Park TSC over the IDOT fiber optic network.
- The Detection Integration Device shall have an operating temperature range  $-40^{\circ}\text{C}$  to  $+80^{\circ}\text{C}$ .
- The Detection Integration Device shall interface with the Detection Controller.

All required cabling and cabinet wiring needed to and from the Detection Integration Device shall be incidental to this item.

## **CONSTRUCTION REQUIREMENTS**

General. The Contractor shall install, provision, and test the equipment to demonstrate functionality and performance within the cabinet.

One copy of all operations and maintenance manuals for the Detection Integration Device shall be delivered for installed equipment.

The Contractor shall develop and submit for the Engineer's approval, a detailed test plan that verifies that each component is compliant with the specification and that all of the cables are operational and properly configured. This test shall use standard manufacturer operating and diagnostic software. At the test, each component will be inspected to verify that it has been delivered according to the approved shop drawings.

The Contractor shall label all cables and ports using permanent cable tags. These labels shall identify the function of the cables and the ports the cables are connected to.

Installation. Thirty (30) days prior to the scheduled field installation of each detection integration device, the Contractor shall deliver the device to the Traffic Systems Center (TSC) for network configuration prior to installation by the Contractor. The device shall be clearly identified as to which location it is to be installed for proper configuration. The device's MAC address shall be clearly identified. After the device is configured, the Contractor shall retrieve the device from the TSC and install it.

All equipment, cables and connections necessary to complete the installation and make the Detection Integration Device operational shall be included in this item.

The device shall be installed and connected inside the surveillance/ITS cabinet at the location shown in the Plans. The Contractor shall install all cables and ancillary equipment.

All cables shall be neatly dressed and labeled with their function and physical connection.

Testing. An operational standalone test shall be conducted to verify that all functions of the device, both independently and within the cabinet system, are fully operational. A test procedure shall be supplied for approval by the Engineer a minimum of one (1) week prior to the scheduled start of this test.

Method of Measurement. The DETECTION INTEGRATION DEVICE bid item will be measured for payment by the actual number of DETECTION INTEGRATION DEVICE units furnished, installed, activated, tested, and accepted, and shall be counted, each.

Basis of Payment. This work shall be paid for at the contract unit price each for DETECTION INTEGRATION DEVICE, which shall be payment in full for the material and work described herein.

## **DETECTION CONTROLLER**

Description. This specification shall govern the furnishing and installing of a Detection Controller and associated cables complete in a surveillance/ITS cabinet as shown on the Plans and as directed by the Engineer.

### Materials.

The Contractor shall provide a Sensys FLEX-CTRL-M-E Controller or equivalent as approved by the Engineer. The device shall be installed in the surveillance/ITS cabinet as shown in the Plans.

- The Detection Controller shall be used to control components of the Wireless Vehicle Detection System (WVDS) and to transmit and receive data from Wireless Sensor Radio Assemblies and/or Detection Integration Devices to the SENSYS System Manager server at the Oak Park TSC over the IDOT fiber optic network.
- The Detection Controller shall support analytics for traffic data, system performance, and diagnostic reports for the WVDS components.
- The Detection Controller shall have an operating temperature range -40° C to +85° C.
- The Detection Integration Device shall interface with the Ethernet switch.

All required cabling and cabinet wiring needed to and from the Detection Integration Device shall be incidental to this item.



## **CONSTRUCTION REQUIREMENTS**

General. The Contractor shall install, provision, and test the equipment to demonstrate functionality and performance within the cabinet.

One copy of all operations and maintenance manuals for the Detection Controller shall be delivered for installed equipment.

The Contractor shall develop and submit for the Engineer's approval, a detailed test plan that verifies that each component is compliant with the specification and that all of the cables are operational and properly configured. This test shall use standard manufacturer operating and diagnostic software. At the test, each component will be inspected to verify that it has been delivered according to the approved shop drawings.

The Contractor shall label all cables and ports using permanent cable tags. These labels shall identify the function of the cables and the ports the cables are connected to.

Installation. Thirty (30) days prior to the scheduled field installation of each detection controller, the Contractor shall deliver the controller to the Traffic Systems Center (TSC) for network configuration prior to installation by the Contractor. The controller shall be clearly identified as to which location it is to be installed for proper configuration. The controller's MAC address shall be clearly identified. After the controller is configured, the Contractor shall retrieve the controller from the TSC and install it.

All equipment, cables and connections necessary to complete the installation and make the Detection Integration Device operational shall be included in this item.

The device shall be installed and connected inside the surveillance/ITS cabinet at the location shown in the Plans. The Contractor shall install all cables and ancillary equipment.

All cables shall be neatly dressed and labeled with their function and physical connection.

Testing. An operational standalone test shall be conducted to verify that all functions of the controller, both independently and within the cabinet system, are fully operational. A test procedure shall be supplied for approval by the Engineer a minimum of one (1) week prior to the scheduled start of this test.

Method of Measurement. The DETECTION CONTROLLER bid item will be measured for payment by the actual number of DETECTION CONTROLLER units furnished, installed, activated, tested, and accepted, and shall be counted, each.

Basis of Payment. This work shall be paid for at the contract unit price each for DETECTION CONTROLLER, which shall be payment in full for the material and work described herein.

## **RAMP METER CONTROLLER**

Description. This specification shall govern the furnishing and installing of ramp meter control systems in designated field locations and associated equipment cabinets as shown in the Plans and as detailed in this specification.

### Materials.

The ramp meter control system shall consist of the following major items:

- Ramp meter controller unit: The controller shall be used to transmit and receive operational controls and diagnostic data for the ramp meter system.
- Cabinet: The cabinet shall be as described in and paid for under special provision CABINET, MODEL 334.
- Ethernet switch: The Ethernet switch shall be as described and paid for under special provision ETHERNET MANAGE SWITCH.
- Detector Rack: The Detector Rack with power supplies, interface panels, cables, and harnesses shall be as described in and paid for under special provision DETECTOR RACK.
- Detection Controller: A Detection Controller unit shall be as described in and paid for under special provision DETECTION CONTROLLER.
- Load switch: The load switch, when connected to the ramp meter controller, shall be used to control the ramp meter LED signals.
- Solid state flasher: The solid state flasher, when connected to the ramp meter controller, shall be used to control the ramp meter warning flashing beacons.
- Fiber optic termination panel: The Contractor shall provide a Fiber Optic Termination Panel as shown in the Plans at each ramp meter location. The termination panel shall be as described in and paid for under special provision FIBER OPTIC TERMINATION PANEL of the number of ports identified.

Ramp Meter Controller Unit. The ramp meter controller shall comply with the following.

- Operating voltage: 110 VAC
- Temperature range: -37° C to 74° C
- Rack-mountable
- Supports ATC/Linux software (2.6.35 or later)
- Input scan rate of 100x/sec
- Compatible with ATC 5201 v06.25
- Compliant with NTCIP 1201/1207/1209
- 128 MB of DDR2 DRAM memory (minimum)
- 64 MB of FLASH memory (minimum)
- 2 MB of SRAM memory (minimum)
- Two (2) USB 2.0 ports (minimum)
- One (1) SD memory card socket (minimum)
- Seven (7) ATC serial ports (minimum)
- Six (6) Ethernet ports (minimum)

Load switch. The Load Switch shall comply with the following:

- Operating voltage: 80 to 135 VAC
- Maximum load current: 15 amperes
- Control signal voltage: +24 VDC
- Isolation: 2500 VDC and 10 MOhms
- Control signal inputs: Green (Walk), Yellow, and Red (Don't Walk)
- Temperature range: -20° C to 74° C
- Nominal dimension (H x W x D): 4.2 in X 1.75 in X 8.5 in

The load switch shall mate with any standard NEMA loadbay or with the control cabinet output file. The load switch must be fully guaranteed against all failures due to manufacturing defects for at least two years from the time of installation.

Solid State Flasher. The solid state flasher shall comply with the following:

- Operating voltage: 80 to 135 VAC
- Maximum load current: 15 amperes
- Temperature range: -20C to 74C
- Nominal dimensions (H x W x D): 4.2 in X 1.75 in X 8.5 in

The solid state flasher shall flash alternately at the rate of not less than fifty nor more than sixty flashes per minute. A radio interference filter shall be supplied with the solid state flasher. The Contractor shall install a NEMA flasher socket that receives its input from the power distribution assembly and converts it to a dual flashing signal for the upper and lower beacons on the advance warning sign located at the ramp entrance. The solid state flasher shall mate with any standard NEMA flasher socket or with the control cabinet output file. The solid state flasher must be fully guaranteed against all failures due to manufacturing defects for at least two years from the time of installation.

## **CONSTRUCTION REQUIREMENTS**

General. The Contractor shall install, provision, and test all equipment. The Contractor shall prepare a shop drawing, which details the complete control cabinet assembly and all equipment to be supplied under this bid item. The submittal shall consist of the standard catalogue descriptions for each component. The Contractor shall fully document the interconnection of all of the components and the cabling. Detailed drawings shall also be provided indicating the proposed layout of the cabinet.

One copy of all operations and maintenance manuals for each control cabinet assembly's components shall be delivered for each assembly installed.

The Contractor shall demonstrate a prototype assembly using the proposed components. This demonstration shall take place at a Contractor selected and Engineer approved location. These conformance tests shall be completed prior to the delivery of any completed assemblies to the project site. Any deviations from these specifications that are identified during this testing shall be corrected prior to shipment of the assembly to the project site.

The Contractor shall develop and submit for the Engineer's approval, a detailed test plan that verifies that each component is compliant with the specification and that all of the interconnection cables are operational and properly configured. This test shall use standard manufacturer operating and diagnostic software. At the test, each component will be inspected to verify that it has been delivered according to the approved shop drawings.

The Contractor shall label all cables and ports using permanent cable tags. These labels shall identify the function of the cables and the ports the cables are connected to.

Installation. Thirty (30) days prior to the scheduled field installation of each ramp meter controller, the Contractor shall deliver the ramp meter controller to the Traffic Systems Center (TSC) for configuration, loading of IDOT's ramp metering and data collection software, and IP addressing prior to installation by the Contractor. The controller shall be clearly identified as to which location it is to be installed for proper configuration. After the controller is configured, the Contractor shall retrieve the controller from the TSC and install it.

All equipment, terminal blocks, connectors, wires, and connections necessary to complete the installation and make the control system operational shall be included in this item.

The ramp meter controller shall be installed and connected inside the control cabinet at the location shown in the Plans. The Contractor shall install all cables and ancillary equipment.

All cables shall be neatly dressed and labeled with their function and physical connection.

Testing. The Engineer reserves the right to inspect and/or factory test any completed assemblies, prior to the delivery of the material to the project site. The purpose of this test is to verify that aspects of the controller are fully compliant with the specifications. Any deviations from these specifications that are identified during such testing shall be corrected prior to shipment of the assembly to the project site.

The operational standalone test shall also verify that all functions of the system are fully operational. A test procedure shall be supplied for approval by the Engineer a minimum of one (1) week prior to the scheduled start of this test.

Method of Measurement. The RAMP METER CONTROLLER bid item will be measured for payment by the actual number of RAMP METER CONTROLLER assemblies furnished, installed, activated, tested, and accepted, and shall be counted, each.

Basis of Payment. This work shall be paid for at the contract unit price each for RAMP METER CONTROLLER, which shall be payment in full for the material and work described herein.

## **FLASHING BEACON ASSEMBLY**

### Description

This item shall consist of furnishing and installing two (2) one-section, bracket-mounted flashing beacon LED signal heads on a carbon steel pole as indicated on the Plans, or as directed by the Engineer, in accordance with the following requirements.

### Materials and Equipment

This work shall conform to the requirements of applicable portions of Section 875,880, Article 1077.01 and Section 1078 for 8" heads of Standard Specifications for Road and Bridge Construction and Traffic Control Signal Head & Pedestal in these specifications.

### Installation

This flashing beacon shall be installed on a carbon steel pole as shown on the plans.

The steel support pole shall be saddle-mounted to the parapet wall as shown in the Plans and as directed by the Engineer.

Method of Measurement

The flashing beacon assembly bid item will be measured for payment by the actual number of flashing beacon assemblies furnished, installed, activated, tested, and accepted, and shall be counted, each. This includes two (2) one-section flashing signal heads and steel support pole.

Basis of Payment

This work will be paid for at the contract unit price each for FLASHING BEACON ASSEMBLY, which price shall be payment in full for furnishing and installing FLASHING BEACON ASSEMBLY complete and operating in place. Conduit and fittings on the steel pole shall be incidental to the cost of the item and will not be paid for separately.

**CABLE IN CONDUIT, TRIPLEX, 2-1/C NO. 6 AND 1-1/C NO. 8 GROUND**

Description. This Work consists of furnishing and installing electric cable that is triplexed. The cable must be rated at 600 volts and must consist of two number 6 conductors and one number 8 conductor. The cable will be installed in conduit underground.

Material.

Material Specification

Cable.....1534

Material Acceptance. The Contractor must provide a Manufacturer's written certification that the materials comply with these specifications.

Construction Method. All cables must be installed with care to prevent damage to the cable. Any defects found in the cable must be reported to the Resident Engineer. Damaged cable must be replaced.

The cable must be pulled into the conduit with a minimum of dragging on the ground or pavement. This must be accomplished by means of reels mounted on jacks or other suitable devices located for unreeling cable directly into duct. Lubricants must be used to facilitate installation if deemed necessary by the Contractor. Bends in the cable must conform to the recommended minimum radius as outlined in the National Electric Code.

Cable passing through manholes must be trained and racked around the sides of the manhole into a permanent position. If racks are non-existent or in poor condition, the Contractor must install racks. The material be approved by the Resident Engineer. Any material and labor involved in training and racking the cable will be considered incidental to the cost of this pay item.

Where cable runs continue from manhole to manhole without tapping within a light pole, they must be continuous without splices unless authorized by the Resident Engineer.

The cable installation must be color coded so that each lead of all circuits may be easily identified and lighting units connected to the proper leg as indicated on the Plans. The equipment grounding conductor (no. 8) must be color coded green. All wire or cable in the distribution panels and control cabinets must be properly trained and have sufficient slack provided for any rearrangement of equipment or future additions.

There must be at least two feet of slack in a street light pole base or street light controller base. A handhole must have at least five feet of slack and a manhole at least ten feet of slack.

Method of Measurement. The length of CABLE IN CONDUIT, TRIPLEX, 2-1/C NO. 6, 1-1/C NO. 8 GROUND. cable furnished and installed will be measured as the length in feet of conduit plus three feet for cable entering and leaving a light pole or street light control cabinet, plus any slack in manholes or handholes.

Basis of Payment. This Work will be paid for at the Contract Unit Price per foot for CABLE IN CONDUIT, TRIPLEX, 2-1/C NO. 6, 1-1/C NO. 8 GROUND. The price will be payment in full for furnishing, installing, and testing the cable, and will include all material, labor, and incidentals necessary to complete the Work as per the contract Plans.

### **REMOVE CONCRETE FOUNDATION (ELECTRICAL)**

This work shall be done in accordance with Article 842.04 of the Standards Specifications, except as herein modified.

Description. The Work must consist of removing a concrete foundation for a street light pole, a completely, or to a level two feet below the grade, disposing of the debris off-sight in an approved manner, backfilling the excavation with screenings or other approved backfill material, and reconstructing the surface area. If the foundation is in a parkway, the parkway must be properly restored with dirt to the existing level. If the foundation is in sidewalk, the sidewalk must be restored under a different pay item and will not be considered as part of this Work.

#### Materials.

Item	Article/Section
(a) Backfill.....	1003.04

Method of Measurement. This measurement REMOVE CONCRETE FOUNDATION (ELECTRICAL) will be based upon each structure removed. All backfill will be considered as part of the foundation breakdown.

Basis of Payment. This work will be paid for at the Contract unit price each for REMOVE CONCRETE FOUNDATION (ELECTRICAL), as specified, which price will be payment in full for all labor and materials necessary to complete the work as described above.

## **LUMINAIRE, LED, SPECIAL**

Description. This item will consist of installing a street lighting luminaire, complete with internal driver, and LED SSL luminaire of the proper wattage and input voltage, on a street light mast arm attached to a street light pole, and connecting the unit to an aerial wire distribution system at the location shown on the plans, or as directed by the Engineer.

Installation. The luminaire must be securely installed on the mast arm. The vertical axis of the luminaire must be in a vertical plane, and the longitudinal axis must be leveled as specified in shop drawings supplied by the manufacturer to produce the desired distribution pattern with the LEDs secured in the required position for that distribution.

For an aerial distribution system, the primary wiring to the driver must consist of 3 1/C #12 AWG wires, with 150 degree C. irradiated polyolefin insulation, connected to the terminal board "line" terminals. They must extend through the mast arm and exit from the mast arm through the grommet in the hole provided for this purpose, and extend further forming a drip loop and connect with aerial circuit wires. Connection to the aerial circuit wires must be made with a split bolt type pressure connector for a No. 6 solid copper wire and the connection so formed must be wrapped with two layers of an approved electrical tape. The ground wire must be terminated to the pole by drilling into the top of the pole and making the connection through the use of a Burndy grounding connector, or as specified by Commissioner.

A cartridge type fuse, type KTK, rated at 10 amperes must be installed in each of the fuse holders. The primary wiring to the driver must consist of 3 1/C No. 12 AWG wires with 150 degree C. irradiated polyolefin, insulation connected to the terminal board "line" terminals. They must extend through the mast arm raceway and down the inside of the pole to the pole base where they must be spliced to the underground feeder cables. Sufficient wire must be supplied to extend the wires outside of the pole through the access handhole to permit splicing work to be performed outside the pole.

All splice methods must be approved by the Engineer before implemented. All splices, tapes and grounding connections must be inspected by the Commissioner's authorized representative before wires are permanently trained in the light pole.

Current, insulation resistance, and voltage readings must be taken and tabulated by the Contractor for each circuit. These readings are to be witnessed by the Commissioner's authorized representative. Any indication of grounds, open, or crossed conductors must be thoroughly investigated and remedied before acceptance of the installation. Line voltage must be taken at any in-line fused location, within the pole designated by the Commissioner's authorized representative. Locations and voltage must be tabulated as directed. Three (3) copies of the tabulated voltage insulation resistance, and current readings must be submitted to the Commissioner's authorized representative. Maximum voltage drop must not exceed 10% of nominal source voltage. The insulation resistance must not be less than 2 Megohms, when tested to ground with 500 volts AC.



The Contractor must submit the manufacturer's certified test reports on all materials used on this project. Any material deemed defective must be removed and disposed of by the Contractor at his sole cost.

After the lighting installation has been completed and satisfactory current and voltage reading recorded, a field test must be made to insure that all lighting and control equipment are in proper operating condition. This field test must be witnessed by the Engineer. The Contractor will furnish special test devices, tools and miscellaneous items that will be required for the testing of cables and control equipment, all as herein specified.

Method of Measurement. This work will be measured per each unit installed, complete. All wiring to the underground feeder cable, including splices, will be included in this measurement.

Basis of Payment. This work will be paid for at the contract unit price each for LUMINAIRE, LED, SPECIAL of the proper wattage, voltage, and distribution type, which will be payment in full for installing, connecting and testing the unit complete in place.

### **MAST ARM, STEEL, 8 FOOT**

Description. This item will consist of furnishing and installing a steel pipe mast arm of a specified length to support a street light luminaire, or other electrical equipment as required, as is shown on Drawing Number 620.

Material. The material of the mast arm must conform to the requirements of Material Specification 1450. The 8 foot mast arm must conform to Standard Drawing 620.

Installation. The 8 foot mast arms will be installed with two bolts to the mast arm attachment on the pole. The pole must have a mast arm attachment as shown in Standard Drawing 659 in order to properly mount the arm. The truss arms require 2 such mounts. Bolts will be supplied with the arm per Material Specification 1450.

Method of Measurement. This work will be measured per each unit installed.

Basis of Payment. This work must be paid for at the contract unit price each for a MAST ARM, STEEL, 8 FOOT of the length specified, which will be payment in full for furnishing and installing the mast arm complete in place.

## **MANHOLE, SPECIAL**

Description. This item will consist of furnishing and installing an electrical manhole of the dimensions indicated with a 30" frame and lid.

Material. The concrete manhole must meet the applicable requirements of Material Specification 1528. The frame and lid must meet the requirements of Material Specification 1458. A 30" frame and lid must meet the requirements of Standard Drawings 874 and 10927. Bricks must meet the requirements of Article 1041 of the Standard Specifications. All other materials used must meet the appropriate material requirements of the Standard Specifications.

Method of Construction. The manhole will be a precast concrete structure, or, if conditions merit, a cast in place concrete structure, complete with cast iron frame and lid. A 3'X4'X4' manhole with a 30" frame and lid must conform to Drawing 729. The number and size of conduit openings will be as shown on the construction plans.

Each manhole will be installed in paved sidewalk, earth parkway, or in pavement at the location specified on the construction plans or at a location as directed by the Resident Engineer.

The area where the manhole is to be placed must be properly excavated. All disposable material will be properly disposed of per Section 202.03 of the Standard Specifications. Each manhole must be set or constructed to conform with the appropriate City of Chicago drawings, except that the number and size of conduit openings will be in accordance with the construction plans. The frame casting must be accurately set on a full bed of mortar to the finished elevation so that no subsequent adjustment will be necessary. Mortar and brick, or mortar and concrete rings, may be used to adjust to the proper grade. Adjustment rings, bricks, and frames must be set in a full mortar bed. Use of partial bricks will not be allowed. Bricks must be laid in full header courses only. In no instance will the neck of the manhole exceed two (2) feet in height. Mortar will be mixed in a proportion of one (1) part cement to three (3) parts sand by volume of dry materials. After entering laterals have been installed in place in the manhole, the openings in the wall must be plugged in an approved manner flush with the inner surface. If backfill is required, screenings must be used and properly compacted. Parkway must be restored to the proper grade. Pavement must be restored to the correct grade. Patching of the pavement must be done with high early strength concrete meeting the requirements of Articles 1001 and 1020 of the Standard Specifications. Sidewalks must be restored to the proper grade using a 5 inch thickness of concrete. The inside of the manhole must be clean of all debris.

Method of Measurement. This work will be measured per each unit installed.

Basis of Payment. The unit price for installing manholes will include necessary excavation, backfilling and restoration of parkway and pavement in accordance with the foregoing specifications. No additional payment will be allowed for restoring parkway or the restoration of sidewalk or pavement. Removal of sidewalk or pavement will be covered by separate pay items. New conduit, if necessary, will also be paid for separately. The unit cost will be for complete installation for each unit for MANHOLE, SPECIAL.

## **INTERCEPT EXISTING CONDUIT**

Description. This item will consist of intercepting an existing city conduit or conduits for the purpose of installing a new foundation, a new manhole or handhole, or making a connection to a new conduit.

Construction. Work under this item will be performed in accordance with Article 800 of the Standard Specifications, Division of Electrical Operations Standards and the City of Chicago Electrical Code, except as herein modified.

The contractor must carefully cut the conduit so that the cut conduit ends will be flush with the inside walls of the new manhole or handhole. Where existing cables are in service in the conduit(s) being intercepted, conduit(s) must be carefully split so that all working cables are not interrupted. If conduit(s) are concrete encased, such concrete must be removed as required. Any concrete encasement damaged during installation must be restored as needed.

Method of Measurement. This work will be measured on a per each basis for each conduit end cut.

Basis of Payment. This work will be paid for at the contract unit price per each for INTERCEPT EXISTING CONDUIT, which price will include all necessary excavation, backfilling, and restoration of a parkway. No additional compensation will be made for removal or placement of concrete. This item will include all work necessary to bring the conduit into the manhole, handhole, or foundation, or to make the necessary connection to a new conduit. The contractor will furnish all materials for a complete installation.

## **LIGHT POLE, SPECIAL**

Description. This item will consist of furnishing, installing, and setting plumb a steel anchor base pole to which equipment may be attached for the extension of the City street light systems.

Material. The material of the pole must meet the requirements of Material Specification 1447.

Installation. The pole must be installed on the concrete foundation designed for the particular pole usage as indicated on the plans or as directed by the Engineer. Double nut construction must be used as shown on Drawing 837. Double nut construction provides the proper ventilation, as well as providing a way to plumb the pole. Any exposed portions of anchor rods extending above the nuts which interfere with the installation of the bolt covers must be cut off to provide the necessary clearance. The excess must not be burned off. The pole must be set secure, properly orientated, and plumb using the nuts and washers provided with the anchor bolts. The bolt covers, handhole cover, and pole cap must be securely attached.

The contractor will utilize non-abrasive slinging materials and will otherwise exercise due care in erecting the pole and mast arm to minimize any possible damage to the finish. When necessary, the contractor will utilize, at his own expense, factory approved touch-up materials and methods to restore the finish to like new appearance and durability.

Method of Measurement. This item will be measured per each unit installed, complete with anchor bolt covers, pole cap, and handhole cover.

Basis of Payment. This work will be paid for at the Contract unit price each for LIGHT POLE, SPECIAL, which will be payment in full for furnishing and installing the pole complete in place. Light standard foundations, mast arms, and luminaires will not be included in this pay item but will be paid for separately.

## **LIGHT POLE FOUNDATION, SPECIAL**

Description. This item will include furnishing and installing a steel light pole foundation, as shown on the plans or as directed by the Engineer, of the size indicated. Proper size anchor bolts and hardware will be furnished for each foundation.

Material. The steel foundation must meet the applicable requirements of Section 1070.01 of the Standard Specifications unless specified differently here and in City Material Specification 1526. Each anchor rod must have a hex head. In addition, each anchor rod must include a washer and nut for tightening. Each anchor bolt and associated hardware must be hot dipped galvanized and must meet the applicable requirements of Material Specification 1467. The foundation for arterial street light poles must have a 7 foot shaft and must accommodate a 10 inch to 15 inch bolt circle for 4 anchor bolts. The base plate must be 15.5 inches square. The bolts must be 1 1/4 inches in diameter with a 6 inch thread length. The bolts must meet the applicable requirements of Standard Drawing 811. Each steel foundation must meet the applicable requirements of Standard Drawing 936.

Installation. The installation must follow the requirements of Article 836.03 (d) of the Standard Specifications for metal foundations. The foundation must be plumb with the base plate level with the existing grade. If installed in a sidewalk, the helix must be set lower than the sidewalk and topped with concrete level to the top of the sidewalk. An expansion joint must also be installed. Any improperly installed or damaged foundations will be replaced at no additional cost.

Basis of Payment. This work will be paid for at the Contract unit price each for LIGHT POLE FOUNDATION, SPECIAL.

## **MAINTENANCE OF LIGHTING SYSTEM (CDOT)**

Description. This work consists of furnishing all labor, equipment, and incidental materials for maintaining existing City of Chicago street lighting system until the proposed new equipment is installed, energized, tested, and accepted for operation by the Commissioner.

The work must include any necessary temporary devices to maintain existing illumination. The location and protection of devices necessary to comply with these requirements must be subject to the approval of the Commissioner. The Commissioner will be the sole judge of satisfying existing illumination levels.

Any temporary wire or cable which may be required to be installed overhead between existing poles or temporary devices must be furnished, installed, terminated, and maintained in service until the proposed lighting equipment is installed, tested and accepted for operation by the Commissioner.

Material. Materials must be according to the following Division of Electrical Operations (DEO) Specifications and Articles of Standard Specifications Section 1000 – Materials:

Item	Requirement
(a) Cable Splicing and Termination	Article 1066.06
(b) Fuse holders and Fuses	Article 1065.01
(c) Pole Wire	Article 1066.09
(d) Lamps	Article 1067.06
(e) Aerial Cable Assembly	Article 1066.04
(f) Thermal Magnetic Circuit Breaker	DEO Specification 1428
(g) Metal Light Poles	Article 1069.01
(h) Luminaires	Section 1067

Material Acceptance. The Contractor must provide a Manufacturer's written certification that the materials comply with these specifications.

General Requirements. General requirements must be in accordance with Section 801 of the Standard Specifications, and in accordance with Division of Electrical Operations Standards and the City of Chicago Electrical Code, except as herein modified.

The Contractor must maintain temporary, permanent, and proposed lighting systems, as well as receptacles and other ancillary devices connected to the applicable street lighting controllers. Effective the day the Contractor starts work (including non-electrical work), the Contractor must maintain the existing lighting equipment located within the project limits as it then exists. The contractor must also maintain any street lighting equipment outside of the project limits but connected to a controller situated within the project limits. The contractor must also maintain any street lighting equipment inside of the project limits but connected to a controller situated outside the project limits.

The Scope of Work must include the assumption of responsibility for the continuing operation of existing, temporary, or other lighting systems affected by the work as may be specified elsewhere herein. Existing lighting systems, when depicted on the Plans, are intended only to indicate the general nature of the systems involved and must not be construed as an exact representation of the field conditions. It remains the Contractor's responsibility to visit the site to confirm and ascertain the exact nature of systems to be maintained.

The Contractor must take over maintenance of all the equipment supplied with electric power from all street lighting controllers regardless of location which control lighting units located on Lake Street and Ogden Avenue, associated streets, crosswalks, and underpasses within or outside of the project limits.

Installation Requirements for Temporary Lighting Units. The Contractor must furnish and install a temporary lighting unit to replace any existing lighting unit that is removed prior to the new lighting system being operational.

Temporary lighting unit must include pole, mast arm, 400 watt luminaire, and temporary wiring connections. The Contractor must furnish and install temporary lighting units and all associated electrical equipment to ensure compliance with the applicable codes, standards, and Specifications.

The Contractor must coordinate temporary lighting with the sequence of construction and maintenance of traffic for this Project.

The wiring on the pole must consist of aerial electric cables and waterproof splices at each light pole.

All equipment furnished must be functional and new in appearance, and must be maintained. The Contractor must own all the temporary lighting equipment furnished and installed.

The Contractor must disconnect and remove temporary lighting and all associated electrical equipment upon energizing and acceptance of the permanent lighting system.

Temporary Wiring. The Contractor must furnish and install aerial electric cable, including messenger wire, in accordance with Section 818 of the Standard Specifications. The conductor size must be Number 6 AWG minimum. The messenger wire must be steel and of adequate size to support the cables from structure to structure under normal and adverse weather conditions.

The electric cables must be secured to the steel messenger wire with binding strips continuous throughout each span of cable and must be of adequate strength to support the size of electric cables required for this Project.

Temporary Poles. Temporary lighting poles may be used metal poles in accordance with Article 1069.01 of the Standard Specifications. Metal poles must be similar in type, size and finish.

Temporary lighting poles may be used steel poles that comply with Division of Electrical Operations (DEO) Specification Number 1447 if already owned by the Contractor and in Stock.

The Contractor must provide and remove temporary foundations for the metal poles that will be adequate to support the poles during normal and adverse weather conditions and as directed by the Commissioner.

Temporary Luminaire. Each luminaire must be ceramic metal halide. Each luminaire must be mast arm or bracket arm mounted on the top of the pole. Each luminaire must be provided with a leveling surface and a leveling device and must be capable of being tilted by plus or minus 30 degrees and rotated to any degree with respect to the supporting bracket. Each luminaire must have a pipe arm barrier to limit the amount of inflection.

Installation. Location of cables and fixtures for temporary lighting must be adjusted and supported to accommodate field conditions encountered, including any potential interferences with other construction or equipment to be installed.

The Contractor must determine the exact route and location of each temporary lighting fixture and associated wiring, prior to installation.

Temporary lighting must be installed to permit removal (without damage to other parts) of parts requiring periodic replacement or maintenance.

Temporary wiring/lighting must be removed immediately upon acceptance of permanent lighting.

Penalty for Non-Compliance. The Contractor will be subject of \$500.00 per incident, per day, to be deducted from next pay estimate due Contractor, for each occurrence when the Commissioner determines that Contractor or his Subcontractor is not in full compliance with this Section of the Specification.

Penalty for Failure to Respond. The Contractor is required to respond within ½ hour to any request from the Commissioner for repair or replacement of any broken, defective and/or missing parts as specified under this section, "Response" is interpreted to mean on the job, preparing to make repairs. Failure by Contractor to so respond must be grounds for a penalty of \$500.00 for each and every occurrence, to be deducted from next pay estimate due Contractor.



Preconstruction Inspection. Before performing any excavation, removal, or installation work (electrical or otherwise) at the site, the Contractor must initiate a request for preconstruction inspection, to be held in the presence of the Commissioner and a representative of the party or parties responsible for maintenance of any of any lighting and/or traffic control systems which may be affected by the work. The request for the maintenance preconstruction must be made no less than seven (7) calendar days prior to the desired inspection date. The maintenance preconstruction inspection must:

1. Establish details of any formal transfers of maintenance responsibility required for the construction period.
2. Establish approximate locations of known lighting and/or traffic control systems, which may be affected by the work.
3. Establish the condition of lighting and/or traffic control systems which may be affected by the Work.

Reimbursement. If the Contractor utilizes any lighting equipment owned by the City or uses existing Com Ed service, the Contractor must compensate the City for such usage.

Method of Measurement. MAINTENANCE OF LIGHTING SYSTEM (CDOT) will not be measured for payment, but will be paid on a per month basis.

Basis of Payment. This Work will be paid for the contract per month price for MAINTENANCE OF LIGHTING SYSTEM (CDOT) which will be payment in full for maintaining existing street lighting system until the proposed new equipment is installed, energized, tested, and accepted for operation by the Commissioner, furnishing, installing, and removing all temporary lighting units, aerial cable and ancillary equipment required to maintain the existing lighting system as described herein.

**STORM WATER POLLUTION PREVENTION PLAN**



Illinois Department of Transportation

Storm Water Pollution Prevention Plan

Route	Marked Route	Section Number
I-90/94	Adams Street / Jackson Boulevard	2014-015R&B-R
Project Number	County	Contract Number
C-91-274-14	Cook	60X94

This plan has been prepared to comply with the provisions of the National Pollutant Discharge Elimination System (NPDES) Permit No. ILR10 (Permit ILR10), issued by the Illinois Environmental Protection Agency (IEPA) for storm water discharges from construction site activities.

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Signature	Date	
	12-6-19	
Print Name	Title	Agency
Anthony Quigley, P.E.	Regional Engineer, Region One	IDOT

**Note:** Guidance on preparing each section of BDE 2342 can be found in Chapter 41 of the IDOT Bureau of Design and Environment (BDE) Manual. Chapter 41 and this form also reference the IDOT Drainage Manual which should be readily available.

**I. Site Description:**

**A. Provide a description of the project location; include latitude and longitude, section, town, and range.**

The project is located along Adams Street from east of Halsted Street to west of Des Plaines Street (41 52' 45.2" N, 87 38' 44.93" W) within Township 39 N, Range 14 E, Section 16. The gross and net length of the Adams Street project is 554 Feet (0.105 Miles). The project is also located along Jackson Boulevard from east of Halsted Street to west of Des Plaines Street (41 52' 40.64" N, 87 38' 45.01" W) within Township 39 N, Range 14 E, Section 16. The gross and net length of the Jackson Boulevard project is 510 Feet (0.097 Miles)

The design, installation, and maintenance of BMPs at these locations are within an area where annual erosivity (R value) is less than or equal to 160. Erosivity is less than 5 in all two-week periods between October 12 and April 15, which would qualify for a construction rainfall erosivity waiver under the US Construction General Permit requirements. At these locations, erosivity is highest in spring to autumn, April 16 - October 11.

**B. Provide a description of the construction activity which is the subject of this plan. Include the number of construction stages, drainage improvements, in-stream work, installation, maintenance, removal of erosion measures, and permanent stabilization:**

The work consists of the construction of the Adams Street Bridge (SN 016-1701) and Jackson Boulevard Bridge (SN 016-1702) over Interstate 90/94 and construction of the proposed retaining wall #28 along the northbound entrance ramp, construction of proposed retaining walls #8 (SN 016-1727), #24 (SN 016-Z016), #36 (SN 016-1825), #37 (SN 016-1826), and Wall #51 (SN 016-Z048) and removal or modifications of existing retaining walls #16, #17, and #18 (SN 016-W989).

Work includes bridge construction, retaining wall construction, roadway reconstruction, erosion control and protection, utility relocation of existing storm sewers, non-special waste excavation, special waste excavation, earth excavation and embankment, removal of existing improvements, miscellaneous storm sewers, pavements, pavement marking and signage, roadway lighting, ITS, traffic control and protection, urban enhancements and all incidental and collateral work necessary to complete the improvements as shown on the Plans and as described

herein.

The project will be constructed in 6 stages. Drainage improvements will include the installation of new storm sewer laterals along Adams Street, Jackson Boulevard, the Adams and Jackson southbound I-90/94 exit ramps, and the Adams northbound I-90/94 entrance ramp. The new storm sewer will connect to existing City systems on Adams Street and Jackson Boulevard, and to mainline sewers constructed in Contracts 60X79, 62A76, and 62A77.

The project does not include any in-stream work. The project includes installation, maintenance, and removal of temporary erosion and sediment control measures including erosion control blanket, protection of trees, temporary erosion control seeding, temporary mulching, surface roughening, mulch method 2, dust suppression, perimeter erosion barrier, retaining walls, sediment traps, storm drain inlet protection, stabilized construction entrances, temporary sump pits, and stabilized flow lines. Permanent stabilization is included in the contract and consists of a mixture of seeding and sodding. The permanent stabilization shall be installed as soon as an area will no longer be needed for construction access or traffic.

C. Provide the estimated duration of this project:

27 months

D. The total area of the construction site is estimated to be 5.79 acres.

The total area of the site estimated to be disturbed by excavation, grading or other activities is 4.47 acres.

E. The following are weighted averages of the runoff coefficient for this project before and after construction activities are completed; see Section 4-102 of the IDOT Drainage Manual:

C=0.65(Existing), C=0.72(Proposed)

F. List all soils found within project boundaries; include map unit name, slope information, and erosivity:

NRCS Soil Survey classification classifies the site soil as urban land.

For the proposed Adams Street Bridge (SN 016-1701), the general lithologic succession encountered beneath the topsoil/pavement, in descending order, includes: 1) man-made ground (fill); 2) very soft to medium stiff silty clay to silty clay; 3) stiff to hard silty clay to silty clay to loam; 4) medium dense to very dense sand to gravelly sand with interbedded silt to silty loam; and 5) strong dolostone bedrock-- Found in the Structural Geotechnical Report (SGR).

For the proposed Jackson Boulevard (SN 016-1702), the general lithologic succession encountered beneath the topsoil/pavement, in descending order, includes: 1) man-made ground (fill); 2) very soft to medium stiff silty clay to silty clay; 3) stiff to hard silty clay to silty clay to loam; 4) medium dense to very dense sand to gravelly sand with interbedded silt to silty loam; and 5) strong dolostone bedrock-- Found in the Structural Geotechnical Report (SGR).

For the proposed Retaining Wall #8 (SN 016-1727), the general lithologic succession encountered beneath the topsoil/pavement, in descending order, includes: 1) man-made ground (fill); 2) medium stiff to very stiff silty clay to silty clay loam; 3) very soft to medium stiff clay to silty clay; 4) stiff to hard silty clay to silty clay loam; 5) medium dense to very dense silty loam and sand; 6) weathered to sound dolostone-- Found in the Structural Geotechnical Report (SGR).

For the proposed Retaining Wall #24 (SN 016-Z016), the general lithologic succession encountered beneath the topsoil/pavement, in descending order, includes: 1) man-made ground (fill); 2) medium stiff to very stiff silty clay to silty clay loam; 3) very soft to medium stiff clay to silty clay; 4) stiff to hard silty clay to silty clay loam; 5) medium dense to very dense silty loam and sand; 6) weathered to sound dolostone-- Found in the Structural Geotechnical Report (SGR).

For the proposed Retaining Wall #36 (SN 016-1825), the general lithologic succession encountered beneath the topsoil/pavement, in descending order, includes: 1) man-made ground (fill); 2) medium stiff to very stiff silty clay to silty clay loam; 3) very soft to medium stiff clay to silty clay; 4) stiff to hard silty clay to silty clay loam; 5) medium dense to very dense sand to gravelly sand; and 6) weathered to sound dolostone.-- Found in the Structural Geotechnical Report (SGR).

For the proposed Retaining Wall #37 (SN 016-1826), the general lithologic succession encountered beneath the topsoil/pavement, in descending order, includes: 1) man-made ground (fill); 2) medium stiff to very stiff silty clay to silty clay loam; 3) very soft to medium stiff clay to silty clay; 4) stiff to hard silty clay to silty clay loam; 5) medium dense to very dense silt to silty loam and sand; and 6) weathered to sound dolostone.-- Found in the Structural Geotechnical Report (SGR).

For the proposed Retaining Wall #51 (SN 016-Z048), the general lithologic succession encountered beneath the topsoil/pavement, in descending order, includes: 1) man-made ground (fill); 2) medium stiff to very stiff silty clay to silty clay loam; 3) very soft to medium stiff clay to silty clay; 4) stiff to hard silty clay to silty clay loam; 5) medium dense to very dense silt to silty loam and sand; and 6) weathered to sound dolostone.-- Found in the Structural Geotechnical Report (SGR).

G. If wetlands were delineated for this project, provide an extent of wetland acreage at the site; see Phase I report:

No wetlands were identified on site.

H. Provide a description of potentially erosive areas associated with this project:

See first section of I. for Description

I. The following is a description of soil disturbing activities by stages, their locations, and their erosive factors (e.g., steepness of slopes, length of slopes, etc.):

See Below for H. Description.

Potentially erosive areas are located adjacent to side slope embankments near the Adams and Jackson bridge abutments, exit and entrance ramp approaches. The side slope embankments near the existing and proposed retaining wall 8, 24, 36, 37, 51 and the removals or modifications of the existing walls 16, 17 and 18.

Description for I:

Stage 0B: Soil disturbing activities will consist of excavation for the following:

As identified on the Structural Plans Adams St. Bridge over I-90/94 (SN 016-1701). Adams St. Bridge demolition and entrance ramp. As identified on the Structural Plans Jackson Blvd. Bridge over I-90/94 (SN 016-1702). Existing abutment and wingwall removals. Proposed east and west abutments. As identified on Structural Plans Retaining Wall 8 (SN 016-1727). As identified on the Structural Plans Retaining Wall 37 (SN 016-1826). As identified on the Structural Plans Retaining Wall 16 and 17 removals.

Stage 1A & 1B: Soil disturbing activities will consist of the excavation for the following:

As identified on the Structural Plans Adams St Bridge over I-90/94 (SN 016-1701). Adams St. Bridge existing abutment and wingwall removals. Adams St. Bridge Abutments and Pier 1 constructions. As identified on the Structural Plans Jackson Blvd. Bridge over I-90/94 (SN 016-1702). Existing abutment and wing wall removals. and proposed east and west abutments. As identified on the Structural Plans Retaining Wall 8 SN 016-1727). As identified on the Structural Plans Retaining Wall 37 (SN 016-1826). As identified on the Structural Plans Retaining Wall 16 and 17 removals. As identified on the Structural Plans Retaining Wall 36 (SN 016-1825). As identified on the Structural Plans Existing Wall 18 (SN016-W989). As identified on the Structural Plans Retaining Wall 24 (SN016-Z016).

Stage 2: Soil disturbing activities will consist of the excavation for the following:

Continuing items from Stage 1A & 1B. And as identified on the Structural Plans retaining wall 51 (SN016-Z048).

Stage 3 & 4A: Soil disturbing activities will consist of the excavation for the following:  
As identified on the Structural Plans Adams St. Bridge over I-90/94 (SN 016-1701). Pier 1, Pier 2, Pier 3 abutments and portions of MSE walls for entrance ramp abutments. As identified on the Structural Plans Jackson Blvd. Bridge over I-90/94 (SN 016-1702). Pier 2, portions of MSE walls.

Stage 4B: Soil disturbing activities will consist of the excavation for the following:  
As identified on the Structural Plans Adams St. Bridge over I-90/94 (SN 016-1701). Bridge Deck. As identified on the Structural Plans Jackson Blvd. Bridge over I-90/94 (SN 016-1702). Pier 1, 2, and MSE walls.

Stage 5: Soil disturbing activities will consist of the excavation for the following:  
Adams Street pavement construction. As identified on Structural Plans Jackson Blvd. Bridge over I-90/94 (SN 016-1702).

Stage 6: Soil disturbing activities will consist of excavation for the following:  
Jackson Blvd. pavement construction. Adams street pavement construction.

J. See the erosion control plans and/or drainage plans for this contract for information regarding drainage patterns, approximate slopes anticipated before and after major grading activities, locations where vehicles enter or exit the site and controls to prevent offsite sediment tracking (to be added after contractor identifies locations), areas of soil disturbance, the location of major structural and non-structural controls identified in the plan, the location of areas where stabilization practices are expected to occur, surface waters (including wetlands), and locations where storm water is discharged to surface water including wetlands.

K. Identify who owns the drainage system (municipality or agency) this project will drain into:  
IDOT / City of Chicago

L. The following is a list of General NPDES ILR40 permittees within whose reporting jurisdiction this project is located:  
City of Chicago / Cook County / IDOT / Metropolitan Water Reclamation District of Greater Chicago (MWRD)

M. The following is a list of receiving water(s) and the ultimate receiving water(s) for this site. In addition, include receiving waters that are listed as Biologically Significant Streams by the Illinois Department of Natural Resources (IDNR). The location of the receiving waters can be found on the erosion and sediment control plans:

Runoff along Jackson Boulevard outside of the limits of the bridge flows to the existing 60" combined sewer siphon which passes under Interstate 90/94 just North of Van Buren Street and drains to the South Branch of the Chicago River. Runoff along Adams Street outside of the limits of the bridge flows to the existing 3-pipe combined sewer siphon (108", 54", 84") which passes under Interstate 90/94 just North of Monroe Street and drains to the South Branch of the Chicago River.

Interstate 90/94 between I-290 and Monroe Street drains to the existing 7'-2 3/8" x 8'-0" main drain sewer and outlets to Pump Station #5 which discharges into the South Branch Chicago River via a 48" diameter pipe at the southwest corner of Van Buren Street and Des Plaines Street. The pipe outlets into an existing 60" diameter brick sewer near Clinton Street before outletting into the South Branch of the Chicago River. Pump Station #26 will receive portions of overflow from Pump Station #5. Pump Station #26 outfalls at the South Union Avenue interceptor sewer.

I-90/94 from Monroe St. to Lake St. drains to the existing 6'-4 3/4" x 8'-0" main drain sewer and outlets to Pump Station #22. Pump Station #22 discharges into a 10'-6"W x 11'-8"H MWRD combined sewer system at the southwest corner Fulton Street and N. Union Avenue.

The South Branch Chicago River will be the ultimate receiving water this site and it is not identified by the IDNR as a "biologically significant stream". The South Branch Chicago River (segment IL\_HC-01) is listed on the 2014 IEPA 303(d) list as impaired for the designated use of fish consumption due to the PCBs and the indigenous aquatic life use as being impaired by dissolved oxygen, total dissolved solids, and phosphorous (Total). No TMDLs are currently being developed for these impairments.

N. Describe areas of the site that are to be protected or remain undisturbed. These areas may include steep slopes (i.e., 1:3 or steeper), highly erodible soils, streams, stream buffers, specimen trees, natural vegetation, nature preserves, etc. Include any commitments or requirements to protect adjacent wetlands.

For any storm water discharges from construction activities within 50-feet of Waters of the U.S. (except for activities for water-dependent structures authorized by a Section 404 permit, describe: a) How a 50-foot undisturbed natural buffer will be provided between the construction activity and the Waters of the U.S. or b) How additional erosion and sediment controls will be provided within that area.

Existing trees that will not be impacted during construction will need to be protected as shown on the plans.

O. Per the Phase I document, the following sensitive environmental resources are associated with this project and may have the potential to be impacted by the proposed development. Further guidance on these resources is available in Section 41-4 of the BDE Manual.

303(d) Listed receiving waters for suspended solids, turbidity, or siltation.

The name(s) of the listed water body, and identification of all pollutants causing impairment:

Provide a description of how erosion and sediment control practices will prevent a discharge of sediment resulting from a storm event equal to or greater than a twenty-five (25) year, twenty-four (24) hour rainfall event:

Provide a description of the location(s) of direct discharge from the project site to the 303(d) water body:

Provide a description of the location(s) of any dewatering discharges to the MS4 and/or water body:

Applicable Federal, Tribal, State, or Local Programs

Floodplain

Historic Preservation

Receiving waters with Total Maximum Daily Load (TMDL) for sediment, total suspended solids, turbidity or siltation

TMDL (fill out this section if checked above)

The name(s) of the listed water body:

Provide a description of the erosion and sediment control strategy that will be incorporated into the site design that is consistent with the assumptions and requirements of the TMDL:

If a specific numeric waste load allocation has been established that would apply to the project's discharges, provide a description of the necessary steps to meet that allocation:

Threatened and Endangered Species/Illinois Natural Areas (INA)/Nature Preserves

Other

<input type="checkbox"/> Wetland

P. The following pollutants of concern will be associated with this construction project:

- |   |  |
|---|--|
| <input checked="" type="checkbox"/> Antifreeze / Coolants<br><input checked="" type="checkbox"/> Concrete<br><input checked="" type="checkbox"/> Concrete Curing Compounds<br><input checked="" type="checkbox"/> Concrete Truck Waste<br><input checked="" type="checkbox"/> Fertilizers / Pesticides<br><input checked="" type="checkbox"/> Paints<br><input checked="" type="checkbox"/> Petroleum (gas, diesel, oil, kerosene, hydraulic oil / fluids)<br><input checked="" type="checkbox"/> Soil Sediment | <input checked="" type="checkbox"/> Solid Waste Debris<br><input checked="" type="checkbox"/> Solvents<br><input checked="" type="checkbox"/> Waste water from cleaning construction equipments<br><input checked="" type="checkbox"/> Other (Specify) <u>Asbestos</u><br><input type="checkbox"/> Other (Specify) _____<br><input type="checkbox"/> Other (Specify) _____<br><input type="checkbox"/> Other (Specify) _____<br><input type="checkbox"/> Other (Specify) _____ |
|---|--|

**II. Controls:**

This section of the plan addresses the controls that will be implemented for each of the major construction activities described in Section I.C above and for all use areas, borrow sites, and waste sites. For each measure discussed, the Contractor will be responsible for its implementation as indicated. The Contractor shall provide to the Resident Engineer a plan for the implementation of the measures indicated. The Contractor, and subcontractors, will notify the Resident Engineer of any proposed changes, maintenance, or modifications to keep construction activities compliant with the Permit ILR10. Each such Contractor has signed the required certification on forms which are attached to, and are a part of, this plan:

A. **Erosion and Sediment Controls:** At a minimum, controls must be coordinated, installed and maintained to:

1. Minimize the amount of soil exposed during construction activity;
2. Minimize the disturbance of steep slopes;
3. Maintain natural buffers around surface waters, direct storm water to vegetated areas to increase sediment removal and maximize storm water infiltration, unless infeasible;
4. Minimize soil compaction and, unless infeasible, preserve topsoil.

B. **Stabilization Practices:** Provided below is a description of interim and permanent stabilization practices, including site- specific scheduling of the implementation of the practices. Site plans will ensure that existing vegetation is preserved where attainable and disturbed portions of the site will be stabilized. Stabilization practices may include but are not limited to: temporary seeding, permanent seeding, mulching, geotextiles, sodding, vegetative buffer strips, protection of trees, preservation of mature vegetation, and other appropriate measures. Except as provided below in II.B.1 and II.B.2, stabilization measures shall be initiated **immediately** where construction activities have temporarily or permanently ceased, but in no case more than **one (1) day** after the construction activity in that portion of the site has temporarily or permanently ceases on all disturbed portions of the site where construction will not occur for a period of fourteen (14) or more calendar days.

1. Where the initiation of stabilization measures is precluded by snow cover, stabilization measures shall be initiated as soon as practicable.
2. On areas where construction activity has temporarily ceased and will resume after fourteen (14) days, a temporary stabilization method can be used.

The following stabilization practices will be used for this project:

- |  |   |
|--|---|
| <input checked="" type="checkbox"/> Erosion Control Blanket / Mulching<br><input checked="" type="checkbox"/> Geotextiles<br><input checked="" type="checkbox"/> Permanent Seeding<br><input type="checkbox"/> Preservation of Mature Seeding<br><input checked="" type="checkbox"/> Protection of Trees<br><input checked="" type="checkbox"/> Sodding<br><input checked="" type="checkbox"/> Temporary Erosion Control Seeding | <input type="checkbox"/> Temporary Turf (Seeding, Class 7)<br><input checked="" type="checkbox"/> Temporary Mulching<br><input type="checkbox"/> Vegetated Buffer Strips<br><input checked="" type="checkbox"/> Other (Specify) <u>Surface Roughening</u><br><input checked="" type="checkbox"/> Other (Specify) <u>Mulch, Method 2</u><br><input type="checkbox"/> Other (Specify) _____<br><input type="checkbox"/> Other (Specify) _____ |
|--|---|

Describe how the stabilization practices listed above will be utilized during construction:

Refer to the Erosion and Sedimentation Control plan sheets for the contract for the specific stabilization practices

called out for temporary conditions during construction. Temporary and permanent stabilization shall be completed during the current stage prior to switching traffic to the next stage. Where possible, stabilization of the initial Stage should be completed before work is moved to subsequent stages. Stabilization controls runoff volume and velocity, peak runoff rates and volumes of discharges to minimize exposed soil, disturbed slopes, sediment discharges from the construction and provide for natural buffers and minimization of soil compaction. Existing vegetated areas where disturbance can be avoided will not require stabilization. Where possible, stabilization of the initial Stage should be completed before work is moved to subsequent stages.

**Protection of Trees** - Areas of trees, shrubs and other woody vegetation designated to remain undisturbed during any stage of construction shall be protected. Clearly delineate protected areas prior to clearing/grubbing or other soil disturbing activities.

**Temporary Erosion Control Seeding:** This item will be applied to all bare areas every seven days to minimize the amount of exposed surface area. Earth stockpiles shall be temporarily seeded if they are to remain unused for more than 14 days. Within the construction limits, areas which may be susceptible to erosion as determined by the Engineer shall remain undisturbed until full scale construction is underway to prevent unnecessary soil erosion. Bare and sparsely vegetated ground in highly erodible areas as determined by the Engineer shall be temporarily seeded at the beginning of construction where no construction activities are expected within seven days, regardless of when permanent stabilization is anticipated.

**Temporary Mulching:** Mulch is applied to temporary erosion control seeding to allow for the seeding to take hold in the ground and grow. Without the mulching, the seeding will be displaced by wind and rain and therefore would not grow. Mulch will be paid separately from temporary seeding and shall conform to Section 251 of the Standard Specifications. Mulch Method 2 and surface roughening shall be applied to slopes for temporary stabilization prior to seasons when Temporary seed will not germinate, for example in mid-July or in winter.

**Surface Roughening:** All slopes steeper than 3:1 (horizontal to vertical) shall be surface roughened by either stair-step grading, grooving, or tracking. Areas with slopes flatter than 3:1 shall have the soil surface lightly roughened and loosed to a depth of 2 to 4 inches prior to seeding. Surface roughening is included in the cost of Mulch, Method 2 or Mulch, Method 4.

Describe how the stabilization practices listed above will be utilized after construction activities have been completed:

Refer to the Permanent Erosion and Sedimentation Control plan sheets for the contract for the specific stabilization practices used for permanent conditions after construction activities. All areas disturbed by construction will be stabilized with permanent seeding and erosion control blanket or sodding. Stabilization controls runoff volume and velocity, peak runoff rates and volumes of discharge to minimize exposed soil, disturbed slopes, and provides natural buffers and minimization of soil compaction. Existing vegetated areas where disturbance can be avoided will not require stabilization.

**Permanent Seeding:** Seeding, Class 2A will be installed per IDOT specifications to areas where there will be no more disturbance. The seeding will keep the soil from eroding due to natural conditions (wind, rain, etc.)

**Erosion Control Blanket:** Erosion Control Blankets will be installed over all areas to be permanently seeded to protect slopes from erosion and allow seeds to germinate and allow the seeding to take hold in the ground and grow. Without protection, the seeding will be displaced by wind and rain. Mulch may not be used in place of erosion control blanket to protect the disturbed areas and prevent further erosion.

**Sodding:** Sod is a stabilization of fine graded disturbed areas using a continuous cover of grass sod. It shall be applied at disturbed areas where it requires immediate cover for erosion protection or sediment control, residential or commercial areas where quick establishment or aesthetics are factors, locations where surface water concentrates, areas adjacent to drop inlets or in swales, or all other areas where seeding is not appropriate but an immediate vegetative cover is required. Irrigate sod according to Article 252.08.



C. **Structural Practices:** Provided below is a description of structural practices that will be implemented, to the degree attainable, to divert flows from exposed soils, store flows or otherwise limit runoff and the discharge of pollutants from exposed areas of the site. Such practices may include but are not limited to: perimeter erosion barrier, earth dikes, drainage swales, sediment traps, ditch checks, subsurface drains, pipe slope drains, level spreaders, storm drain inlet protection, rock outlet protection, reinforced soil retaining systems, gabions, and temporary or permanent sediment basins. The installation of these devices may be subject to Section 404 of the Clean Water Act.

- |  |   |
|--|---|
| <input type="checkbox"/> Aggregate Ditch<br><input type="checkbox"/> Concrete Revetment Mats<br><input checked="" type="checkbox"/> Dust Suppression<br><input type="checkbox"/> Dewatering Filtering<br><input type="checkbox"/> Gabions<br><input type="checkbox"/> In-Stream or Wetland Work<br><input type="checkbox"/> Level Spreaders<br><input type="checkbox"/> Paved Ditch<br><input type="checkbox"/> Permanent Check Dams<br><input checked="" type="checkbox"/> Perimeter Erosion Barrier<br><input type="checkbox"/> Permanent Sediment Basin<br><input checked="" type="checkbox"/> Retaining Walls<br><input type="checkbox"/> Riprap<br><input type="checkbox"/> Rock Outlet Protection<br><input checked="" type="checkbox"/> Sediment Trap<br><input checked="" type="checkbox"/> Storm Drain Inlet Protection | <input checked="" type="checkbox"/> Stabilized Construction Exits<br><input type="checkbox"/> Stabilized Trench Flow<br><input type="checkbox"/> Slope Mattress<br><input type="checkbox"/> Slope Walls<br><input type="checkbox"/> Temporary Ditch Check<br><input type="checkbox"/> Temporary Pipe Slope Drain<br><input type="checkbox"/> Temporary Sediment Basin<br><input type="checkbox"/> Temporary Stream Crossing<br><input type="checkbox"/> Turf Reinforcement Mats<br><input checked="" type="checkbox"/> Other (Specify) <u>Stabilized Flow Line</u><br><input checked="" type="checkbox"/> Other (Specify) <u>Temporary Sump Pit</u><br><input type="checkbox"/> Other (Specify) _____<br><input type="checkbox"/> Other (Specify) _____<br><input type="checkbox"/> Other (Specify) _____<br><input type="checkbox"/> Other (Specify) _____<br><input type="checkbox"/> Other (Specify) _____ |
|--|---|

Describe how the structural practices listed above will be utilized during construction:

\* Refer to the Erosion and Sedimentation Control plan sheets for the contract for the specific stabilization practices called out for temporary and permanent conditions.

\* Dust Suppression - Dust suppression per the standard specifications and according to the project special provision for Construction Air Quality - Dust Control shall be followed.

\* Perimeter Erosion Barrier: As soon as reasonable access is available to all locations where water drains away from the project, perimeter erosion barrier shall be installed as called out in this plan and directed by the Engineer. Silt fences shall be placed along the contour at the limits in an effort to contain silt and runoff from leaving the site. Silt fence shall not be installed in areas of concentrated flow such as across ditches. The barrier will be constructed at the beginning of construction. Damage to silt fence by traffic or snow plowing should be immediately fixed by the contractor. Silt fence should only be used as Perimeter Erosion Barrier in areas where the work area is higher than the perimeter. The use of silt fence at the top of the slope/elevations higher than the work area should always be avoided. If necessary, temporary fence should be utilized in these locations (where the top of slope/elevation is higher than the work area) in lieu of silt fence.

\* Temporary Sediment Trap: The contractor shall design and construct a sediment trap or temporary sump pit to outlet temporary drainage systems. Prior to draining the runoff from the temporary drainage systems, the sediment trap shall be constructed with stabilized slopes. Maximum embankment height is 5 feet with a maximum excavation depth of 6 feet. Protection required if within clear zone. The design, installation, inspection, maintenance, materials, and removal will not be paid for separately but shall be considered included in the cost of the contract.

\* Storm Drain Inlet Protection: Sediment filters will be placed in all open lid inlets, catch basins and manholes during construction and will be cleaned on a regular basis. Avoid using the INLET AND PIPE PROTECTION shown on the Highway Standard 280001. Straw bales and silt fence shall not be used as inlet and pipe protection. Inlet and pipe protection shall be comprised of Inlet Filters, Temporary Ditch Checks, Temporary Seeding and Temporary Erosion Control Blanket, as applicable, at all inlets, catch basins, and manholes for the duration of construction. Inlet filters shall be cleaned on a regular basis.

\* Stabilized Construction Exits: Stabilized Construction Exits or Entrances will be provided by the Contractor. The entrance shall be maintained in a condition which shall prevent tracking or flowing of sediment onto Public Right-Of-Way. Periodic inspection and needed maintenance shall be provided after heavy use and each rainfall

event. All work associated with installation and maintenance of Stabilized Construction Entrances are incidental to the contract.

\* Temporary Sump Pit: The Contractor shall provide a temporary sump pit if unfiltered runoff needs to be pumped from the work area. A perforated vertical standpipe shall be placed in the center of the pit to collect filtered water. The standpipe will be a perforated 12 to 24 inch diameter corrugated metal or PVC pipe. Water is then pumped from the center of the pipe to a suitable discharge area. The pit will be filled with coarse aggregate meeting the requirements of IDOT standards for gradations of CA-2, CA-3 or CA-4. If water from the sump pit will be pumped directly to a storm drainage system, filter fabric will be wrapped around the standpipe to ensure clean water discharge. The contractor shall determine the number of sump pip exact locations. The installation, inspection, maintenance, materials, and removal will not be paid for separately but shall be considered included in the cost of the contract.

\* Stabilized Flow Line: The Contractor should provide to the Resident Engineer a plan to ensure that a stabilized flow line will be provided during storm sewer construction. The use of a stabilized flow line between installed storm sewer and open disturbance will reduce the potential for the offsite discharge of sediment bearing waters, particularly when rain is forecasted so that flow will not erode. Lack of an approved plan or failure to comply will result in an ESC Deficiency Deduction.

\* All work associated with installation and maintenance of Stabilized Construction Entrances, and Concrete Washouts is incidental to the contract.

\* All erosion control products furnished shall be specifically recommended by the manufacturer for the use specified in the erosion control plan prior to the approval and use of the product. The Contractor shall submit to the Engineer a notarized certification by the producer stating the intended use of the product and that the physical properties required for this application are met or exceeded. The contractor shall provide manufacturer installation procedures to facilitate the Engineer in construction inspection.

Describe how the structural practices listed above will be utilized after construction activities have been completed:

Once construction is completed and the vegetation has been established, the perimeter erosion barrier will be removed and areas disturbed by the removal will be stabilized with permanent stabilization methods as shown on the plans.

Retaining walls are being constructed to retain embankments along Ramp EN as well as the future Northbound I-90/94 C-D Road.

#### D. Treatment Chemicals

Will polymer flocculants or treatment chemicals be utilized on this project:  Yes  No

If yes above, identify where and how polymer flocculants or treatment chemicals will be utilized on this project.

**E. Permanent (i.e., Post-Construction) Storm Water Management Controls:** Provided below is a description of measures that will be installed during the construction process to control volume and pollutants in storm water discharges that will occur after construction operations have been completed. The installation of these devices may be subject to Section 404 of the Clean Water Act.

1. Such practices may include but are not limited to: storm water detention structures (including wet ponds), storm water retention structures, flow attenuation by use of open vegetated swales and natural depressions, infiltration of runoff on site, and sequential systems (which combine several practices).

The practices selected for implementation were determined based on the technical guidance in Chapter 41 (Construction Site Storm Water Pollution Control) of the IDOT BDE Manual. If practices other than those discussed in Chapter 41 are selected for implementation or if practices are applied to situations different from those covered in Chapter 41, the technical basis for such decisions will be explained below.

2. Velocity dissipation devices will be placed at discharge locations and along the length of any outfall channel as necessary to provide a non-erosive velocity flow from the structure to a water course so that the natural physical and biological characteristics and functions are maintained and protected (e.g., maintenance of hydrologic conditions such as the hydroperiod and hydrodynamics present prior to the initiation of construction activities).

Description of permanent storm water management controls:

The Phase I Location Drainage Study indicates no modifications are planned for Pump Station #5 nor Pump Station #26. The tailwater conditions representing the South Branch of the Chicago River (outfall for Pump Station #5) and the South Union Avenue interceptor sewer (outfall for Pump Station #26) will not be modified from existing conditions.

The drainage area for Pump Station #5 is along I-290 from the western extent at Central Avenue to the eastern extent at Des Plaines Street within the Jane Byrne Interchange. For Pump Station #26, the drainage area is along I-90/94 from the northern extent at the Jane Byrne Interchange (Harrison Street) to the southern extent at Roosevelt Road. A proposed storage tank will be constructed south of the Jane Byrne Interchange in a future contract, improving water quality in runoff from the 5-year and greater storms discharged to Pump Station #26.

Phosphorous fertilizer has been eliminated from the project to reduce project impacts on the receiving waters

**F. Approved State or Local Laws:** The management practices, controls and provisions contained in this plan will be in accordance with IDOT specifications, which are at least as protective as the requirements contained in the IEPA's Illinois Urban Manual. Procedures and requirements specified in applicable sediment and erosion site plans or storm water management plans approved by local officials shall be described or incorporated by reference in the space provided below. Requirements specified in sediment and erosion site plans, site permits, storm water management site plans or site permits approved by local officials that are applicable to protecting surface water resources are, upon submittal of an NOI, to be authorized to discharge under the Permit ILR10 incorporated by reference and are enforceable under this permit even if they are not specifically included in the plan.  
Description of procedures and requirements specified in applicable sediment and erosion site plans or storm water management plans approved by local officials:

All management practices, controls and other provisions provided in this plan are in accordance with "IDOT Standard Specifications for Road and Bridge Construction" and "Illinois Urban Manual".

**G. Contractor Required Submittals:** Prior to conducting any professional services at the site covered by this plan, the Contractor and each subcontractor responsible for compliance with the permit shall submit to the Resident Engineer a Contractor Certification Statement, BDE 2342A.

1. The Contractor shall provide a construction schedule containing an adequate level of detail to show major activities with implementation of pollution prevention BMPs, including the following items:

- Approximate duration of the project, including each stage of the project
- Rainy season, dry season, and winter shutdown dates
- Temporary stabilization measures to be employed by contract phases
- Mobilization time-frame
- Mass clearing and grubbing/roadside clearing dates
- Deployment of Erosion Control Practices
- Deployment of Sediment Control Practices (including stabilized cons
  
- Deployment of Construction Site Management Practices (including concrete washout facilities, chemical storage, refueling locations, etc.)
- Paving, saw-cutting, and any other pavement related operations
- Major planned stockpiling operation
- Time frame for other significant long-term operations or activities that may plan non-storm water discharges as dewatering, grinding, etc
- Permanent stabilization activities for each area of the project

2. During the pre-construction meeting, the Contractor and each subcontractor shall provide, as an attachment to their signed Contractor Certification Statement, a discussion of how they will comply with the requirements of the permit in regard to the following items and provide a graphical representation showing location and type of BMPs to be used when applicable:

- Temporary Ditch Checks - Identify what type and the source of Temporary Ditch Checks that will be installed as part of the project. The installation details will then be included with the SWPPP.
- Vehicle Entrances and Exits - Identify type and location of stabilized construction entrances and exits to be used and how they will be maintained.
- Material Delivery, Storage and Use - Discuss where and how materials including chemicals, concrete curing compounds, petroleum products, etc. will be stored for this project.
- Stockpile Management - Identify the location of both on-site and off-site stockpiles. Discuss what BMPs will be used to prevent pollution of storm water from stockpiles.
- Waste Disposal - Discuss methods of waste disposal that will be used for this project.

- Spill Prevention and Control - Discuss steps that will be taken in the event of a material spill (chemicals, concrete curing compounds, petroleum, etc.)
- Concrete Residuals and Washout Wastes - Discuss the location and type of concrete washout facilities to be used on this project and how they will be signed and maintained.
- Litter Management - Discuss how litter will be maintained for this project (education of employees, number of dumpsters, frequency of dumpster pick-up, etc.).
- Vehicle and Equipment Fueling - Identify equipment fueling locations for this project and what BMPs will be used to ensure containment and spill prevention.
- Vehicle and Equipment Cleaning and Maintenance - Identify where equipment cleaning and maintenance locations for this project and what BMPs will be used to ensure containment and spill prevention.
- Dewatering Activities - Identify the controls which will be used during dewatering operations to ensure sediments will not leave the construction site.
- Polymer Flocculants and Treatment Chemicals - Identify the use and dosage of treatment chemicals and provide the Resident Engineer with Material Safety Data Sheets. Describe procedures on how the chemicals will be used and identify who will be responsible for the use and application of these chemicals. The selected individual must be trained on the established procedures.
- Additional measures indicated in the plan.

### III. Maintenance:

When requested by the Contractor, the Resident Engineer will provide general maintenance guides (e.g., IDOT Erosion and Sediment Control Field Guide) to the Contractor for the practices associated with this project. Describe how all items will be checked for structural integrity, sediment accumulation and functionality. Any damage or undermining shall be repaired immediately. Provide specifics on how repairs will be made. The following additional procedures will be used to maintain, in good and effective operating conditions, the vegetation, erosion and sediment control measures and other protective measures identified in this plan. It will be the Contractor's responsibility to attain maintenance guidelines for any manufactured BMPs which are to be installed and maintained per manufacture's specifications.

The Contractor will be responsible for the inspection, maintenance, and repair of all sedimentation and erosion control measures. If the Engineer notices or is notified of an erosion or sedimentation deficiency, the Engineer will notify the Contractor to correct it. All maintenance of erosion control systems will be the responsibility of the contractor until construction is complete and accepted by IDOT after final inspection. All Offsite Borrow, Waste, and Use areas are part of the construction site and are to be inspected according to the language in this section and Section IV.

Inspection of all ESC measures shall be made at least once every seven days and within 24 hours of the end of each 0.5 inches or greater rainfall (including snowfall). Additionally during winter months, all measures should be checked after each significant snowmelt. Any necessary repairs or cleanup to maintain the effectiveness of said measures shall be made immediately. The project shall additionally be inspected by the Construction Field Engineer on a bi-weekly basis to determine that the erosion control efforts are in place and effective and if other erosion control work is necessary.

All ESC measures shall be maintained in accordance with the IDOT Erosion and Sediment Control Field Guide for Construction Inspection and IDOT's Best Management Practices – Maintenance Guide:<http://www.idot.illinois.gov/transportation-system/environment/erosion-and-sediment-control>

In addition, the following links may also be useful for maintenance:

Illinois Urban Manual (IUM): [http://www.aiswcd.org/wp-content/uploads/2013/11/IUM\\_FM\\_2013\\_WEBSITE\\_hyperlinks.pdf](http://www.aiswcd.org/wp-content/uploads/2013/11/IUM_FM_2013_WEBSITE_hyperlinks.pdf)

Best Management Practices (BMP): <http://www.idot.illinois.gov/transportation-system/environment/erosion-and-sediment-control>

Construction equipment shall be stored and fueled only at designated locations. All necessary measures shall be taken to contain any fuel or pollution runoff in compliance with environmental law and EPA Water Quality Regulations. Leaking equipment or supplies shall be immediately repaired or removed from the site. On a weekly basis, the Engineer shall inspect the project to determine whether erosion control efforts are in place and effective and if additional control measures are necessary. Sediment collected during construction by the various temporary erosion control systems shall be disposed on the site on a regular basis as directed by the Engineer and stabilized accordingly.

**Protection of trees:** Any protective measures which are knocked down shall be repaired immediately. Damaged trees shall be replaced with similar species. Trim any cuts, skins, scrapes or bruises to the bark of the vegetation and utilize local nursery accepted procedures to seal damaged bark. Prune all tree branches broken, severed, or damaged during construction. Smoothly cut, perpendicular to the root, all cut, broken, or severed during construction, roots 1 inch or greater in diameter. Cover roots exposed during excavation with moist earth and/or backfill immediately to prevent roots from drying.

**Temporary Erosion Control Seeding:** All areas seeded with temporary seeding are to be inspected every 7 calendar days and after a storm even of 0.5 inches or greater (including snowfall). A visual inspection of this item is necessary to determine whether or not it has germinated. If the seed has failed to germinate, another application of seed may be necessary. If seed has been washed away or found to be concentrated in ditch bottoms, temporary mulch may have to be used to hold seed in place. Inspect other BMPs around the location of the temporary seeding to ensure the successful function of temporary erosion control seeding. Rills greater than 4 inches in depth shall be restored as quickly as possible on slopes steeper than 1V:4H to prevent sheet flow from becoming concentrated flow patterns.

**Temporary Mulching:** This item shall be inspected every 7 calendar days and after a storm event of 0.5 inch or greater (including snowfall). Additional mulch shall be placed if straw is blown or washed away, erosion control blanket curls or slides down a slope, or hydraulic mulch is washed away.

**Surface Roughening:** The slope shall be inspected after every runoff producing rain and repairs made as needed. Fill any eroded areas to slightly above the original grade, re-roughen the surface, then re-seed and mulch as soon as possible.

**Perimeter Erosion Barrier:** This item shall be inspected every 7 calendar days and after a storm event of 0.5 inch or greater (including snowfall). Repair when tears, gaps, leaning or undermining occur and restore erosion barrier taut. Repair or replace any missing or broken stakes immediately. Sediment shall be removed if the integrity of the fencing is in jeopardy. Remove once permanent stabilization is established.

**Erosion Control Blanket:** Repair damage due to water running beneath the blanket and restore and reseed when displacement occurs. Reseeding may be necessary. Replace and re-staple all displaced erosion control blankets immediately.

**Storm Drain Inlet Protection:** This item shall be inspected every 7 calendar days and after a storm event of 0.5 inch or greater (including snowfall). Remove sediment from inlet filter basket when basket is 25% full or 50% of the fabric pores are covered with silt. Remove ponded water on road surfaces immediately. Clean filter if standing water is present longer than one hour after a rain event. Remove trash accumulated around or on top of filter. When filter is removed for cleaning, replace filter if any tear is present.

**Stabilized Construction Exits:** This item shall be inspected every 7 calendar days and after a storm event of 0.5 inch or greater (including snowfall). Replenish stone or replace exit if vehicles continue to track sediment onto the roadway from the construction site. Sweep sediment on roadway from construction activities immediately. Use street sweeping in conjunction with this BMP to remove sediment not removed by the stabilized construction exit.

**Material Delivery and Storage:** Document the various types of materials delivered and their storage locations in the SWPPP. Update the SWPPP when significant changes occur to material storage or handling locations and when they have been removed. Cleanup spills immediately. Remove empty containers.

**Stabilized Flow Line:** Follow approved maintenance plans provided by the Contractor to avoid the flow from eroding at the upstream and downstream ends of the storm sewer when it is under construction.

**Sediment Trap:** Removed sediment and silt from the trap when it becomes 50% full. Other BMP measures, such

as sand filters, shall be implemented to filter pollutants if sediment discharges or other pollutants are identified at the discharge point. Once the sediment has been removed, the trap shall be restored to its original dimensions. The sediment that has been removed must be placed in the designated disposal area. The depth of spillway shall be periodically checked to ensure it is a minimum of 1.5 feet below the low point of the embankment to slightly above design grade. Any aggregate or riprap displaced from the spillway while the sediment is being removed shall be replaced immediately. After all areas around the sediment trap have been permanently stabilized, regrade the area to drain and stabilize the area.

Temporary Sump Pit: The pit and filter fabric shall be replaced when it is 75% full of sediment.

All offsite Borrow, Waste and Use areas are part of the construction site and are to be inspected according to the language in this section.

#### IV. Inspections:

Qualified personnel shall inspect disturbed areas of the construction site including Borrow, Waste, and Use Areas, which have not yet been finally stabilized, structural control measures, and locations where vehicles and equipment enter and exit the site using IDOT Storm Water Pollution Prevention Plan Erosion Control Inspection Report, BC 2259. Such inspections shall be conducted at least once every seven (7) calendar days and within twenty-four (24) hours of the end of a storm or by the end of the following business or work day that is 0.5 inch or greater or equivalent snowfall.

Inspections may be reduced to once per month when construction activities have ceased due to frozen conditions. Weekly inspections will recommence when construction activities are conducted, or if there is 0.5" or greater rain event, or a discharge due to snowmelt occurs.

If any violation of the provisions of this plan is identified during the conduct of the construction work covered by this plan, the Resident Engineer shall notify the appropriate IEPA Field Operations Section office by email at: [epa.swnoncomp@illinois.gov](mailto:epa.swnoncomp@illinois.gov), telephone or fax within twenty-four (24) hours of the incident. The Resident Engineer shall then complete and submit an "Incidence of Non-Compliance" (ION) report for the identified violation within five (5) days of the incident. The Resident Engineer shall use forms provided by IEPA and shall include specific information on the cause of noncompliance, actions which were taken to prevent any further causes of noncompliance, and a statement detailing any environmental impact which may have resulted from the noncompliance. All reports of non-compliance shall be signed by a responsible authority in accordance with Part VI. G of the Permit ILR10.

The Incidence of Non-Compliance shall be mailed to the following address:  
Illinois Environmental Protection Agency  
Division of Water Pollution Control  
Attn: Compliance Assurance Section  
1021 North Grand East  
Post Office Box 19276  
Springfield, Illinois 62794-9276

#### V. Failure to Comply:

Failure to comply with any provisions of this Storm Water Pollution Prevention Plan will result in the implementation of a National Pollutant Discharge Elimination System/Erosion and Sediment Control Deficiency Deduction against the Contractor and/or penalties under the Permit ILR10 which could be passed on to the Contractor.

**CITY OF CHICAGO, DEPARTMENT OF TRANSPORTATION, ELECTRICAL TECHNICAL SPECIFICATIONS**

**ELECTRICAL SPECIFICATION 1450  
DIVISION OF ENGINEERING  
DEPARTMENT OF TRANSPORTATION  
CITY OF CHICAGO  
REVISED APRIL 20, 2007**

**MAST ARMS: 4-, 8-, 12-, AND 15-FOOT: STEEL**

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**SUBJECT**

1. This specification covers the requirements for 4-, 8-, 12-, and 15-foot steel mast arms for supporting street light luminaires.

**GENERAL**

2. (a) Specifications. The mast arms shall conform in detail to the requirements herein stated, and to the requirements of the following organizations cited herein, of which the most recently published revision will govern:
  - American National Standards Institute (ANSI)
  - American Society for Testing and Materials (ASTM)
  - American Welding Society (AWS)
  - Society for Protective Coatings (SSPC)
- (b) Acceptance. Mast arms not conforming to this specification will not be accepted.
- (c) Drawings. The drawings mentioned herein are drawings of the Department of Transportation. They are integral parts of this specification cooperating to state necessary requirements.
- (d) Bidders Drawings. Bidders shall submit with their bids detailed scale drawings of the mast arms and attachments showing actual dimensions, details, and welds. Shop drawings must be original engineering drawings created by the manufacturer. The drawings must give every dimension necessary to show how the parts will fit each other and be properly held in assembly. These drawings shall be submitted in electronic format, preferably Microstation 95, if so requested by the City.

- (e) Sample. One complete mast arm of each size and of the manufacture intended to be furnished must be submitted within fifteen (15) business days upon request of the Chief Procurement Officer.
- (f) Warranty. The manufacturer shall warrant the performance and construction of the mast arms to meet the requirements of this specification and must warrant all parts, components, and appurtenances against defects due to design, workmanship, or material developing within a period of five years after the mast arms have been delivered. This will be interpreted particularly to mean structural or mechanical failure of any element or weld, or failure of any portion of the painting system. The warranty must be furnished in writing guaranteeing material replacement including shipment, free of charge to the City. The Commissioner will be the sole judge in determining which replacements are to be made and the Commissioner's decision will be final.

## **DESIGN**

- (a) 4-Foot Mast Arm. Each 4-foot mast arm must be fabricated from a continuous, single piece, two (2) inch "extra strong" steel pipe conforming to the requirements of ASTM A53, Table X2. It must conform in detail with the mast arm shown on Drawing Number 661.
- (b) 8-Foot Mast Arm. Each 8-foot mast arm must be fabricated from a continuous, single piece, two (2) inch "extra strong" steel pipe conforming to the requirements of ASTM A53, Table X2. It must conform in detail with the mast arm shown on Drawing Number 620.
- (c) 12-Foot Mast Arm. Each 12-foot mast arm must be fabricated from two (2) continuous, single piece, two (2) inch "standard" steel pipes conforming to the requirements of ASTM A53, Table X2. It must conform in detail with the mast arm shown on Drawing Number 839.
- (d) 15-Foot Mast Arm. Each 15-foot mast arm must be fabricated from two (2) continuous, single piece, two (2) inch "standard" steel pipes conforming to the requirements of ASTM A53, Table X2. It must conform in detail with the mast arm shown on Drawing Number 840.
- (e) Mast Arm Attachment. The mast arm attachment to be welded to all mast arms will be a steel forging per ASTM A668, Class D, or cast steel conforming to the requirements for Grade 65-35 cast steel of ASTM A27, or can be fabricated from corrosion resistant steel plate such as "Cor-Ten" or approved equal. It shall be so designed that it may be fitted over the mast arm supports on the pole and be held by the mast arm supports in proper position without other support. The attachment must conform to the details shown on Standard Drawing 724. Provision must be made for fastening the attachment to each mast arm support by two special screws and washers as noted in Section 6.



- (f) Entryway for Wires. A drilled opening lined with a neoprene grommet having inserted therein a neoprene plug must be provided on the underside of the upper member of all arms approximately three (3) inches from the point of attachment. The clear opening must not be less than five-eighths (5/8) inch in diameter. Its design must be submitted for approval by the Commissioner or his authorized representative.
- (g) Mast Arm Members. All mast arm members shall conform with the type of steel required for the arm specified. The members must be continuous lengths of pipe cut to the proper size to fabricate the mast arm lengths requested. No butt welded, swaged and welded or other pieced together configurations of pipe lengths will be accepted. The outer and inner surfaces of the pipes shall be smooth and even without protrusions, nicks, holes or other imperfections.

## **PAINTING**

- 4. (a) Oil and Grease Removal. All metal surfaces shall be washed with an alkaline detergent to remove any oils or grease.
- (b) Metal Cleaning. All exterior metal surfaces shall be cleaned by blasting with a combination of shot and grit to remove all dirt, mill scale, rust, corrosion, oxides and foreign matter and provide a "near white" surface in accordance with SSPC-SP10. Included in this process shall be one to two inches of the interior section of the mast arm.
- (c) Chemical Pretreatment. The cleaned metal surfaces shall be treated with a hot, pressurized iron phosphate wash and shall be dried by convection heat.
- (d) Exterior Coat. A Thermosetting, polyester powder coat must be applied electrostatically to all cleaned and treated surfaces to a uniform eight (8) mil thickness in a one coat application. This powder coat must be cured in a convection oven at a minimum temperature of 400°F to form a high molecular weight fusion bonded finish.
- (e) Alternate Methods. Alternate powder coat methods may be reviewed and tested on a case by case basis. However, no coating method will be accepted unless the Commissioner judges such alternate to be equal to the coating herein specified.
- (f) Interior Coat. The interior metal surfaces must be powder coated with a thermoplastic hydrocarbon resin containing corrosion inhibitors. The resin shall be formulated for application over untreated metal surfaces. The resin must be applied at a temperature of approximately 200°F to a minimum thickness of three (3) mils. The interior thermoplastic coat must overlap the interior, thermosetting base coat by approximately one (1) inch. Alternate interior coatings may be used subject to prior approval of the Commissioner.

- (g) Durability. Both the exterior and interior coats must be capable of passing 1,000 hours of salt spray exposure as per ASTM B117 in a 5% NaCl solution at 95°F and 95% relative humidity without blistering.
- (h) Coating Measurement. Measurement of coating thickness must be done in accordance with SSPC-PA 2-73T, "Measurement of Dry Paint Thickness with Magnetic Gauges," except that the lowest "Single spot measurement" in an area of two square inches must be not less than 7.0 mils.
- (i) Color. Color must be gloss black, unless otherwise specified in the order. A color chip sample must be submitted for approval prior to fabrication.

### **WELDING**

- 5. (a) Standards. Every weld shall be made in conformity with the proper interpretation of the standard welding symbols of the American Welding Society as indicated on the drawings; however, each bidder must submit with his proposal a drawing showing the sizes and types of welds, must state the type of electrode, and must describe the welding methods he proposes to employ in fabricating the mast arm.
- (b) Testing. The welds shall be inspected for penetration and soundness by the magnetic particle inspection method or by radiography. If the magnetic inspection process is used, the dry method with direct current must be employed.

### **SCREWS**

- 6. Two (2) special 1/2" - 13 NC x 1-1/2" long stainless steel cap screws, and two (2) stainless steel flat washers, must be provided for each mast arm attachment.

**MAST ARM TESTS**

7. (a) General. Tests must be made upon three (3) of the first fifty (50) arms in any order. An additional one (1) arm must be tested for each additional fifty (50) arms in the order.
- (b) 4-Foot Mast Arm. The 4-foot mast arm, when securely attached to a suitable and proper supporting structure, must withstand a side pull of not less than three hundred (300) pounds applied at a point three feet six inches (3'-6") from the connection to the supporting structure without failure of welds.
- (c) 8-Foot Mast Arms. The 8-foot mast arm, when securely attached to a suitable and proper supporting structure, must withstand a side pull of not less than three hundred (300) pounds applied at a point seven (7) feet from the connection to the supporting structure without failure of the welds.
- (d) 12-Foot and 15-Foot Mast Arms. The 12-foot mast arm and the 15-foot mast arm, when securely attached to a suitable and proper supporting structure, must withstand a side pull of 300 pounds applied at a point seven (7) feet from the connection to the supporting structure without failure of the welds.
- (e) Rejection. If any of the mast arms in any lot fail to meet the test, an additional three (3) arms in the same lot must be tested. If any of these mast arms fail to meet the test requirements the entire lot will be subject to rejection, except that the manufacturer may subject each mast arm in the lot to the test, and those which meet the requirements will be accepted.
- (f) All test results must be certified by the manufacturer. Documentation must be available for the City to approve.

## **PACKAGING**

8. (a) General. The arms shall be shipped in bundles. Each arm must be individually wrapped so that the arm can be bundled for shipping and unbundled for delivery without damage to the arm or its finish. Materials such as lumber (2"x4" min.), non-marring banding, and other appropriate bundling materials must be used to make a rigid, long lasting, bundle capable of being handled , shipped and stored without shifting or breaking of the contents. Any bundles, in which either the mast arms or packaging is received broken, damaged or with contents shifted, will not be accepted and it will be the responsibility of the supplier to return the bundle at no cost to the City. Each bundle must be capable of being lifted by a fork lift truck or crane and the bundles must be shipped in a flat bed truck to facilitate unloading. Each arm wrapping must be clearly labeled indicating the arm size, i.e. "8' STEEL LUMINAIRE MAST ARM".
- (b) The hardware must be shipped with each bundle. The package must be labeled and placed in a prominent position to facilitate accessibility, and must be attached to, or within, the bundle in such a manner as to assure safe delivery.

# **ELECTRICAL SPECIFICATION 1526**

**DIVISION OF ENGINEERING  
DEPARTMENT OF TRANSPORTATION  
CITY OF CHICAGO  
REVISED JUNE 12, 2014**

## **HELIX FOUNDATIONS**

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### **SUBJECT**

1. This specification covers the requirements for steel helix foundations. These foundations may be used to support street light poles for both residential and arterial streets. They may also be used to support aluminum traffic signal posts. They may not be used for any combination poles that support both street lighting and traffic signals, or any traffic signal poles that support monotube arms.

**GENERAL**

2. (a) Specifications. The foundations must conform in detail to the requirements herein stated and to the specifications and methods of test of the American Society for Testing and Materials cited by ASTM Designation Number of which the most recently published revision will govern.
- (b) Acceptance. Foundations not conforming to this specification will not be accepted.
- (c) Drawings. The drawings mentioned herein are drawings of the Department of Transportation. They are integral parts of this specification cooperating to state necessary requirements.
- (d) Bidders Drawings. The apparent low bidder must submit detailed scale drawings of the foundations showing actual dimensions, details, and welds, if so requested. Shop drawings must be original engineering drawings created by the manufacturer. The drawings must give every dimension necessary to show how the foundation will function and how the pole or post will be mounted. These drawings must be submitted in electronic format, preferably Microstation 95, if so requested by the City.
- (e) Sample. One complete foundation of each size and of the manufacture intended to be furnished must be submitted within fifteen (15) business days upon request of the Chief Procurement Officer.
- (f) Warranty. The manufacturer must warrant the performance and construction of the foundations to meet the requirements of this specification and must warrant all parts, components, and appurtenances against defects due to design, workmanship, or material developing within a period of three years after the foundations have been delivered. This will be interpreted particularly to mean structural or mechanical failure of any element or weld, or failure of any portion of the galvanizing system. The warranty must be furnished in writing guaranteeing material replacement including shipment, free of charge to the City. The Commissioner will be the sole judge in determining which replacements are to be made and the Commissioner's decision will be final.

## **DESIGN**

3. (a) **Material.** Steel must meet or exceed the requirements of ASTM A36. The shaft may be ASTM A53 Grade B, ASTM A252 Grade 2 or ASTM A36.
- (b) **Dimensions.** Each foundation must be dimensioned as shown on Standard Drawing 936. There are three types of foundations; a five foot foundation with a 13 inch bolt circle for three anchor bolts, a five foot foundation with a ten inch bolt circle for four anchor bolts, and a seven foot foundation with a ten to fifteen inch bolt circle for four anchor bolts.
- (c) **Construction.** Each foundation must have a shaft .250 inches thick with an outside diameter of 8-5/8 inches. The base plate must be 1 inch thick. The shaft must extend 1 inch into the base plate and be circumferentially welded top and bottom. The base plate must be even and flat on top with no sharp edges. The top of the base plate must be clearly and permanently marked to indicate the cableway orientation. The helix screw plate must be fabricated from a 3/8 inch thick 14 inch diameter circle of steel formed to a 3 inch pitch. The pilot point must extend 9 inches below the screw plate. The leading end of the pilot must be rounded, diamond shape, or chisel shaped. The pilot point must be welded concentric with the axis of the foundation. The cableways must be 3 inches wide by 18 inches long and be located as indicated on Standard Drawing 936. There must be no sharp edges on the cableway openings.

After fabrication, the complete foundation must be hot dipped galvanized in accordance with the provisions of ASTM A123, Grade B. This requires a zinc coating equal to 2 ounces per square foot. Touch up of small areas using a cold zinc rich coating or a cold galvanized coating is not permitted.

## **WELDING**

4. (a) **Standards.** Every weld must be made in conformity with the American Welding Society. Each bidder must submit with his proposal a drawing showing the sizes and types of welds, must state the type of electrode, and must describe the welding methods he proposes to employ in fabricating the foundations.
- (b) **Testing.** The welds must be inspected for penetration and soundness by the magnetic particle inspection method or by radiography. If the magnetic inspection process is used, the dry method with direct current must be employed.

## **TESTING**

5. (a) The foundations must be capable of withstanding 10000 foot-pounds of torque applied about the main axis.
- (b) The manufacturer must certify the type of steel used to form the foundations.
- (c) The manufacturer must certify that the welds have been properly tested.

## **PACKAGING**

6. (a) General. The foundations must be packaged so as not to incur any damage during shipping and unloading. Materials such as lumber (2"x4" min.), non-marring banding, and other appropriate bundling materials must be used to make a rigid, long lasting, bundle capable of being handled , shipped and stored without shifting or breaking of the contents. Each bundle must be capable of being lifted by a fork lift truck and the bundles must be shipped in a flat bed truck to facilitate unloading.
- (b) All foundations will be delivered to the Division of Electrical Operations storage yard at 1539 South Ashland Avenue in Chicago, or to another location within the City as indicated on the order.

**ELECTRICAL SPECIFICATION 1528  
DIVISION OF ENGINEERING  
DEPARTMENT OF TRANSPORTATION  
CITY OF CHICAGO  
REVISED JUNE 6, 2014**

## **PRECAST CONCRETE STRUCTURES**

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## **SUBJECT**

1. This specification covers the requirements for precast concrete structures to be used for City of Chicago electrical facilities. The structures will include manholes, handholes, and street light pole foundations.

**GENERAL**

2. (a) Specifications. The precast structures must conform in detail to the requirements herein stated and to the specifications and methods of test of the American Society for Testing and Materials cited by ASTM Designation Number of which the most recently published revision will govern.
- (b) Acceptance. Precast structures not conforming to this specification will not be accepted. The Commissioner of Transportation or his representative will be the sole judge in determining if the precast structures meet this specification. The Commissioner's decision will be final.
- (c) Drawings. The drawings mentioned herein are drawings of the Department of Transportation. They are integral parts of this specification cooperating to state necessary requirements.
- (d) Bidders Drawings. The apparent low bidder must submit detailed scale drawings of the precast structures showing actual dimensions and details, if so requested. Shop drawings must be original engineering drawings created by the manufacturer. The drawings must give every dimension necessary and show how the structure is assembled.
- (e) Sample. One complete precast structure of each item must be submitted within fifteen (15) business days upon request of the Chief Procurement Officer.
- (f) Warranty. The manufacturer must warrant the performance and construction of the precast structures to meet the requirements of this specification and must warrant all parts, components, and appurtenances against defects due to design, workmanship, or material developing within a period of one (1) year after the precast structures have been delivered. This will be interpreted particularly to mean structural failure of any element. The warranty must be furnished in writing guaranteeing material replacement including shipment, free of charge to the City. The Commissioner will be the sole judge in determining which replacements are to be made. The Commissioner's decision will be final.



## DESIGN

(a) Material. Concrete must be Portland cement concrete, Class SI or PC, meeting current IDOT specifications. Pulling irons in manholes must meet or exceed the requirements of ASTM A36 steel. Pulling irons must be hot dipped galvanized. Steel reinforcing bars must meet or exceed the requirements of ASTM A615, Grade 60. Cable supports in manholes, including stanchions and racks, must be manufactured for that specific purpose. Stanchions must be non-metallic and must be capable of accommodating several different sizes of cable hooks at various elevations. A minimum of eight cable hooks, 4 inches in length, must be provided with each manhole, and should include any hardware necessary to affix the hooks to the racks. Cable hooks for handholes must be manufactured for that specific purpose. Cable hooks for handholes must be a minimum of 3 inches in length and 3 inches in depth. Anchor rods in foundations must meet the latest Electrical Material Specification 1467. Conduit elbows in foundations must meet the latest Electrical Material Specification 1462.

(b) Foundations must include conduit elbows, anchor rods, washers, and nuts. The 7 foot foundation must include a 6 foot re-bar cage. Handholes must include cable hooks. Manholes must include cable racks, pulling irons, and cable hooks. Each manhole and each handhole must have lifting anchors cast in the concrete to facilitate shipment and installation. If the manhole or handhole is in more than one piece, instructions for assembly must be provided. Also, a sufficient amount of bonding agent must be provided. The bonding agent must be approved material. Frames and covers, sump grates, clay tile, and ground rods are not included under this specification.

- (c) Dimensions of Manholes and Handholes. Each manhole or handhole must be dimensioned as shown on the appropriate standard drawing. The 30 inch diameter handhole is Standard Drawing 867. The 36 inch diameter handhole for 24 inch frame and cover is Standard Drawing 866. The 36 inch diameter for 30 inch for frame and cover is Standard Drawing 871. The 3 foot by 4 foot by 4 foot manhole for a 24 inch diameter frame and cover is Standard Drawing 730. The 3 foot by 4 foot by 4 foot manhole for 30 inch frame and cover is Standard Drawing 729. The 4 foot by 6 foot by 6 foot manhole for 24 inch frame and cover is Standard Drawing 732. The four foot by 6 foot by 6 foot manhole for 30 inch frame and cover is Standard Drawing 733. The 5 foot 4 inch by 7 foot 4 inch manhole roof is Standard Drawing 733.
- (d) Dimensions of Grade Rings. Grade rings shall be in four different dimensions. The 39 inch outside diameter ring shall have a 24 inch diameter opening and shall come in both 2 inch and 4 inch thicknesses. The 45 inch outside diameter ring shall have a 30 inch diameter opening and shall also come in both 2 inch and 4 inch thicknesses.
- (e) Dimensions of foundations. The residential street light foundation shall be dimensioned as shown on standard drawing 565. The 7 foot arterial street light foundation shall be as shown on standard drawing 818.

## **DELIVERY**

4. All manholes, handholes, and foundations will be delivered to the Division of Electrical Operations storage yard at 1539 South Ashland Avenue in Chicago, or to another location within the City as indicated on the order. Any manhole, handhole, or foundation deemed to be defective by the Commissioner or his representative must be removed and replaced at no cost to the City. The Commissioner's decision will be final.

**ELECTRICAL SPECIFICATION 1584  
DIVISION OF ENGINEERING  
DEPARTMENT OF TRANSPORTATION  
CITY OF CHICAGO  
REVISED MAY 14, 2015**

**LUMINAIRE: LED, COBRA-HEAD, ARTERIAL, STANDARD RIGHT-OF-WAY IES CUTOFF  
TYPE II/III DISTRIBUTION**

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## **SUBJECT**

1. This specification states the requirements for an LED street lighting luminaire complete with driver. The luminaire shall be for standard arterial streets where the right-of-way is 66 feet in width and the street can be up to 48 feet in width. The luminaire shall have an IES Type II/III medium cutoff distribution. The luminaire shall be mounted at 35 feet above grade. The overall shape of the luminaire shall be the cobra-head as presently used by the City for arterial streets.

**GENERAL**

2. (a) Information. If so requested, the apparent low bidder shall submit the following information relative to the luminaire he proposes to furnish within fifteen (15) days of such request:
1. Outline drawing.
  2. Complete description and weight.
  3. Luminaire efficiency.
  4. Projected area in square feet.
  5. Manufacturer's name and catalogue designation of the luminaire.
  6. Manufacturer's part list.
  7. IES formatted photometric curve in electronic format.
  8. Certified test reports.
- (b) Sample. One completely assembled luminaire of the manufacture intended to be furnished, must be submitted upon request of the Chief Procurement Officer within fifteen (15) business days of such request.
- (c) Assembly. Each luminaire must be delivered completely assembled, wired, and ready for installation. It must consist of an aluminum die-cast housing, LED arrays, terminal block, driver-door panel, electronic driver, gaskets, surge arrestor, fuses, slip fitter, photo-control receptacle and all necessary hardware.
- (d) Warranty. The manufacturer shall warrant the performance and construction of these luminaires to meet the requirements of this specification, and must warrant all parts, components and appurtenances against defects due to design, workmanship or material developing within a period of ten (10) years from the date of acceptance by the City. A reduction of lighting output of more than 30% within the ten years will constitute luminaire failure. Any luminaire or part thereof, not performing as required, or developing defects within this period must be replaced by a new luminaire, delivered to the City by the manufacturer, without expense to the City. The Commissioner will be the sole judge in determining which replacements are to be made and his decision will be final.
- (e) The manufacturer shall have a history of manufacturing roadway and outside area lighting for a minimum of five years. The manufacturer must demonstrate to the City that the manufacturer has the capacity to supply the quantities required for the contract in a timely manner.
- (f) Organizations. The following organizations' specifications are mentioned herein.
- ANSI – American National Standards Institute  
ASTM – American Society for Testing and Materials  
IEC – International Electrotechnical Commission  
IES – Illuminating Engineering Society  
UL – Underwriters Laboratories

## **CONSTRUCTION**

3. (a) Weight and Area. The net weight of this luminaire must not be more than 29 pounds and should be able to be handled by one man. The effective projected area (EPA) must not exceed 0.7 square feet.
- (b) Housing. The housing shall be a precision aluminum die-casting composed of aluminum meeting ASTM Specification A380. It must be substantial and adequate enough to withstand the strains likely to be imposed on the housing when installed and in service. The housing must enclose the slipfitter, LED arrays, photo-control receptacle, terminal board, surge protector, and the electronic driver, with provision for proper mounting of these parts. The housing must have provision on its top surface to permit leveling with a spirit level. The housing must have integral heat sink characteristics, such that all enclosed components will operate within their designed operating temperatures under expected service conditions. No extra items shall be installed as heat shields or heat sinks. All heat shields and heat sinks shall be integral to the luminaire. The housing will have an appearance similar to existing cobra-head housings typically in use on Chicago's arterial streets.
- The housing shall be designed to allow water shedding. The housing shall be designed to minimize dirt or bug accumulation on the optic surface.
- (c) Slip Fitter. The slip fitter shall be suitable for attachment over the end of a two (2) inch steel pipe with an approved means of clamping it firmly in place, and must provide a cast-in pipe-stop. The slip fitter must be designed to permit adjustment of not less than five (5) degrees above and below the axis of the mounting bracket. The slip fitter must contain an approved shield around the pipe entrance to block entry of birds.
- (d) Driver Door-Panel. The driver components must be completely assembled and mounted on a die-cast aluminum door-panel composed of aluminum alloy A380. The door-panel must be hinged to the luminaire housing, suitably latched and fastened at the closing end. It must be made to be removed easily. The hinge and fastening devices must be captive parts which will not become disengaged from the door panel.
- (e) Gaskets. Wherever necessary, in order to make a completely dustproof assembly, gaskets of silicone rubber or other specifically approved material must be provided.
- (f) Hardware. All machine screws, locknuts, pins and set screws necessary to make a firm assembly, and for its secure attachment to the mast arm, must be furnished in place. All hardware must be of stainless steel, copper silicon alloy or other non-corrosive metal, and where necessary must be suitably plated to prevent electrolytic action by contact with aluminum.

- (g) Finish. The luminaire shall have a polyester powder coat with a minimum 2.0 mil thickness. Surface texture and paint quality will be subject to approval. Color must be gloss black or gray (designated ANSI No. 70) as specified in the order. A paint chip must be submitted as a sample upon request. The finish shall pass 1000 hours of salt spray per ASTM B117.
- (h) Ingress Protection. The luminaire housing shall have an ingress protection rating of IP54 or better as described in IEC standard 60529 (also ANSI C136.25-2009). The optical system shall have an IP66 rating.
- (i) The luminaire shall be UL listed. It shall be suitable for wet locations per UL 1598.
- (j) The luminaire shall be rated to operate between -40° to +50° Centigrade.
- (k) The luminaire shall have the option of adding a house side shield.
- (l) A bar code with pertinent information for warranty and maintenance shall be attached to the inside of the housing. A separate bar code label shall be on the inside of the driver door.
- (m) On the underside of the housing there should be a decal indicating the total wattage and street application for the luminaire (i.e. "54W,LED, AR" for a 54 watt LED luminaire for standard arterial streets). The decal should have black characters on a white background and be legible from ground level.

## I. ELECTRICAL COMPONENTS

4. (a) LED Optical Array. The LED arrays shall be optimized for the required roadway photometrics. The arrays must be properly secured at the factory and must not require field adjustment for optimum photometric performance. The LEDs shall deliver a minimum of 70% of initial lumen output at 100,000 hours (L70 at 100K). LEDs shall provide a color rendition index (CRI) of 70. The color temperature of the LEDs shall be 4000° Kelvin. The optical unit shall have an IP66 rating.

(b) Terminal Board-Fuse Block. A terminal block of high grade molded plastic of the barrier or safety type must be mounted within the housing in a readily accessible location. It must provide all terminals needed to completely prewire all luminaire components. The terminal block must either incorporate a barrier isolated section with fuse clips to take a "small-dimension" cartridge fuse, or a separate barrier protected fuse block must be provided. It must be UL and CSA certified.

The fuses shall be rated at 10 amps 600 VAC with a 100,000 AMPS interrupting capacity. Fuses shall be Buss type KTK, or equal. The fuse block must be wired to the appropriate terminals. The terminal board-fuse block must have plated copper or plated brass, clamp-type pressure terminals of an approved type for "line" connections, to accommodate wire sizes from #12 to #8 A.W.G. The terminals for connection of internal components must be either the screw-clamp or quick disconnect type.

(c) Driver Requirements.

1. Voltage. The electronic driver shall operate at a nominal input voltage range of between 120 and 277 volts, 60 Hertz.
  2. The driver shall provide the proper operating voltage to the LED arrays. Output frequency must be equal to or greater than 120 Hertz to avoid flicker.
  3. Power Factor. The power factor of the driver over the design range of input voltages specified above must not be less than 90%.
  4. The driver input current must have Total Harmonic Distortion (THD) of less than 20% when operated at nominal line voltage.
  5. The driver must be thermally protected to shut off when operating temperatures reach unacceptable levels.
  6. The driver shall be short circuit protected and over load protected.
  7. The driver must meet the EMI (electromagnetic interference) requirements of the FCC rules and regulations, Title 47 CFR, Part 15.
  8. The driver shall have a Class A sound rating per ANSI C63.4.
  9. Transient voltage complies with ANSI C62.41 Category A.
  10. The current shall be as recommended by the LED manufacturer. The current level should be such that the LEDs are not overdriven or underdriven. LED current should produce the most efficient light output without compromising the life of the LEDs.
- (d) Surge Protection. Surge protection shall be 10kV/10kA per ANSI C62.41.2. The surge protection device shall be a 3 wire device. The suppressor shall be NRTL listed and be in accordance with UL 1449.
- (e) The minimum luminaire efficacy shall be 90 lumens per watt.
- (f) Mounting. The driver shall be mounted and fastened on the driver door in a manner such that the driver will remain secure and capable of withstanding the vibrations and shocks likely to occur when installed and in service. The driver must be readily removable for replacement.



- (g) Wiring. All components must be completely factory wired with non-fading, color coded leads. These leads must be insulated with an approved class of insulation and must be #16 AWG conductor minimum. All wires within a single circuit path must be of the same size. No wire nuts will be allowed. No unnecessary splices will be allowed. The use of wiring smaller than #16 AWG will require the written approval of the Commissioner. Color coding will be in a manner approved by the Commissioner. A complete wiring diagram must be displayed at an approved location on the interior of the luminaire and must include all luminaire and component identification and ratings. The wiring diagram must be provided on high quality material that will be resistant to cracking, yellowing, and fading in a luminaire environment. Quick disconnects must be provided for all components.
- (h) Photo-control Receptacle and Cap. A twist-lock receptacle for a photo-control that meets ANSI Standard C136.41 for dimming receptacles must be mounted in the top of the housing with provision for proper positioning of the photo-control. The receptacle shall be a 7 position unit having 3 power prongs and 4 contacts. Two contacts shall be for 0-10 volt DC dimming. The other 2 contacts will be for a digital addressable lighting interface. All wire leads from the receptacle must be properly terminated. The receptacle must be able to be repositioned without the use of tools. A photo-control is not required to be furnished, but a shorting cap with a 3 prong plug that meets ANSI Standard C136.10 must be provided.
- (i) Component Mounting.
1. Modular Construction. All electrical components must be securely mounted in such manner that individual components can be easily maintained or replaced. Permanent straps or tie-wraps will not be permitted. The entire assembly should be easily disconnected and removed for replacement.
  2. Interchangeability. Components must be mutually field interchangeable so that units can be restored to working condition without trouble shooting components.

**PHOTOMETRIC REQUIREMENTS**

5. (a) The manufacturer must demonstrate that the luminaires will meet or exceed the specified photometric requirements. The manufacturer must provide photometric calculations using published luminaire data as part of the submitted package. The proposal must contain luminaire photometric performance with results equal to or better than those listed in this specification. Submittal information must include computer calculations based on the controlling given conditions which demonstrate achievement of all listed performance requirements. Computer calculations must be performed for roadway lighting and for sidewalk/parkway lighting. The submitted roadway lighting calculations must be done in accordance with I.E.S. RP-8-14, and must include point-by-point illuminance, luminance and veiling luminance as well as listings of all indicated averages and ratios. The submitted sidewalk/parkway calculations must be done in accordance with I.E.S. RP-8-14, and must include point-by-point horizontal illuminance and vertical illuminance as well as listings of all indicated averages and ratios.

(b) Unless otherwise indicated, the light distribution will be I.E.S. classified as medium-cutoff-Type II/III (M-C-II/III), as defined in Appendix E of I.E.S. RP-8-14.

(c) Performance Requirements (0.7 light loss factor):

1. Roadway Illuminance:

Average Horizontal		1.7 fc
Uniformity Ratio Av/Min	3:1	

2. Roadway Luminance:

Average Luminance		1.2 cd/m <sup>2</sup>
Uniformity Ratio Av/Min	3:1	
Uniformity Ratio Max/Min	5:1	
Max Veiling Luminance	0.3	

(d) The photometrics shall be run for the specific requirements. If the luminaires are to be obtained for no specific project, the luminaires must meet the performance requirements for the following physical conditions:

Right-of-way	66'
Curb-to-curb	48'
Mounting height	35'
Setback	3'
Arm length	8'
Sidewalk width	6'
Parkway width	4'
Spacing (opposite)	120'
Pavement	R3

## **TESTING**

6. (a) Testing. All testing must be done on a prototype of the actual luminaire to be provided under this specification. If recent test results are available, they may be considered as meeting the testing requirements of this specification. The Commissioner or Commissioner's representative will have the final approval of which tests are adequate.
- (b) The manufacturer will be responsible for all costs associated with the specified testing, incidental to this contract.
- (c) Photometric testing must be in accordance with IES recommendations. The tests, at a minimum, must yield:
1. An isofootcandle chart with maximum candela and half maximum candela trace.
  2. An isocandela diagram.
  3. Maximum plane and maximum cone plots of candela.
  4. A candlepower table (house and street side).
  5. A coefficient of utilization chart.
  6. A luminous flux distribution table.
- (d) The luminaire must meet the electrical and photometric requirements of IESNA LM -79.
- (e) The luminaire must meet the lumen maintenance requirements of IESNA LM -80.
- (f) The luminaire must meet the requirements of IESNA TM -21 for long term maintenance of LED light sources.
- (g) The LEDs must meet the requirements for chromaticity per ANSI C78.377.
- (h) The following applicable UL standards shall be met:
1. 8750 LED Light Sources in Lighting Products
  2. 1598 Luminaires
  3. 1012 power units other than Class 2
  4. 1310 Class 2 power units
  5. 2108 low voltage lighting systems

(i) Additional Types of Testing.

1. Interchangeability of all component parts.
  2. Thermal testing in accordance with U.L. Standard 1572 or Standard 1598. The fixture must be placed in a controlled 25° Celsius environment and be energized for a minimum of 8 hours. At no time will any of the components exceed the manufacturer's recommended operating temperatures. At no time will any surface of the refractor exceed the manufacturer's recommended temperature limits.
  3. Vibration testing in accordance with ANSI Standard C136.31. Upon completion of the test, all set screws, castings, and components must be secure and undamaged. The luminaire will not be energized for this test. However, the luminaire must be fully operational after the test.
4. Moisture testing in accordance with U.L. Standard 1572 or Standard 1598. The luminaire will be subjected to a water spray from various directions for a sufficient amount of time. After the water spray the inside of the refractor must remain dry and the fixture should be demonstrated to operate properly.

**PACKAGING**

7. (a) Packing. Each luminaire assembly must be packed in a suitable carton so secure that it must not be damaged in shipment and handling.
- (b) Marking. Each carton containing a luminaire must be clearly marked on the outside in letters not less than three-eighths (3/8) inch tall with the legend: "LUMINAIRE, LED, ARTERIAL STANDARD, IES CUTOFF TYPE II/III", the appropriate City Commodity Code Number, the name of the manufacturer, the date of manufacture, and the contract number under which the luminaire is furnished.

**ELECTRICAL SPECIFICATION 1447  
DIVISION OF ENGINEERING  
DEPARTMENT OF TRANSPORTATION  
CITY OF CHICAGO  
REVISED MARCH 20, 2007**

**POLE: ANCHOR BASE, 3 AND 7 GAUGE, TAPERED TUBULAR STEEL, WITH HANDHOLE  
ENTRY**

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**SUBJECT**

1. This specification states the requirements for tapered, tubular, 3 gauge and 7 gauge steel anchor base poles with mast arm supports. They will support street light luminaires and/or traffic signal mast arms and will be served by underground cables.

**GENERAL**

2. (a) Specifications. The poles shall conform in detail to the requirements herein stated, and to the requirements of the following organizations cited herein, of which the most recent revisions shall govern:
  - American Association of State Highway and Transportation Officials (AASTHO)
  - American National Standards Institute (ANSI)
  - American Society for Testing and Materials (ASTM)
  - American Welding Society (AWS)
  - Society for Protective Coatings (SSPC)
- (b) Acceptance. Poles not conforming to this specification will not be accepted.
- (c) Bidders Drawings. Bidders shall submit with their bids detailed scale drawings of the mast showing actual dimensions, details, and welds. Shop drawings must be original engineering drawings created by the manufacturer. The drawings must show every dimension necessary to show how all parts will fit each other and be properly held in assembly. These drawings must also be submitted in electronic format, preferably Microstation 95, if so requested by the City.

- (d) Drawings. The drawings mentioned herein are drawings of the Department of Transportation being an integral part of this specification cooperating to state necessary requirements.
- (e) Sample. If requested by the Chief Procurement Officer, one completely assembled anchor-base pole of the manufacture intended to be furnished, must be submitted for review within fifteen (15) business days of receiving the request.
- (f) Warranty. The manufacturer shall warrant the performance and construction of the light poles to meet the requirements of this Specification and must warrant all parts, components, and appurtenances against defects due to design, workmanship, or material developing within a period of five years after the light poles have been delivered. This will be interpreted particularly to mean structural or mechanical failure of any element or weld, or failure of any portion of the painting system. The warranty must be furnished in writing guaranteeing material replacement including shipment, free of charge to the City. The Commissioner will be the sole judge in determining which replacements are to be made and the Commissioner's decision will be final.

### **STANDARDS**

3. (a) Assembly. Each anchor base pole shall consist of a steel mast with handhole entry, entry door with machine screws, grounding nut, mast base plate, top cap for mast, two (2) mast arm supports, bolt covers, and all necessary hardware required for complete assembly of these parts, ready for assembly, without special tools.
- (b) Interchangeability. Members of each pole type shall be mutually interchangeable for assembly, so that no reworking will be required to make any member fit properly in the place of any other similar member of any other similar pole.
- (c) Design. Each pole type shall conform in design and dimensions to the pertinent drawing(s) listed in Table "A".

## **MASTS**

4. (a) Mast Size. The outside diameters of the mast of each pole type shall be as listed in Table A. The mast must be tapered at 0.14 inches per foot.
- (b) Material. The mast must be fabricated from one length of No. 3, No. 7, or No. 11 Standard gauge steel meeting the material requirements of ASTM A606 for low alloy high strength coil steel, which, after fabrication, must possess an ultimate tensile strength of not less than 70,000 psi and a yield strength of not less than 60,000 psi, in accordance with ASTM A595, Grade C. Chemistry of the steel must be such as to insure resistance to atmospheric corrosion superior to that of ordinary copper bearing steel. Material certification is required. Manufacturer's steel meeting the specified physical and chemical requirements, and approved by the Commissioner, will be accepted.
- (c) Fabrication. The mast must be fabricated with not more than one (1) longitudinal weld. The weld shall be ground smooth so that it is virtually invisible. There shall be no lateral welds in the masts other than where the masts are welded to the steel bases. Each mast must be straight and centered on its longitudinal axis. Each mast must be formed on a mandrel and worked to form a round cross-section. The completed, unpainted masts shall have smooth external surfaces free from protuberances, dents, cracks or other imperfections marring their appearance.
- (d) Base. The mast base shall be a steel plate, of low alloy, high strength steel as noted in Par. 4 (b).

Plate Base. The base plate for each pole type shall be as listed in Table "A". It must be fabricated from the same ASTM A606 low alloy, high strength steel as is used for the mast. After fabrication the steel must meet the requirements of ASTM A588. The mast must be inserted into the base to a maximum depth which will still allow for an adequate weld to be made between the bottom of the mast and the plate. A circumferential weld must be made between the mast and the base at both the top and underside of the plate. Non-metallic removable bolt covers which completely cover the anchor bolts and nuts shall be provided. The covers must be attached with stainless steel screws coated with a non-seizing compound, or another type of non-seizing fastener, as approved by the Commissioner. The covers shall enclose the anchor bolts and be secured in an approved manner. The base shall be attached to the mast so that the bearing surface of the base is at right angles to the longitudinal axis of the mast. The vertical center line of the seam must be positioned so that no welds for the simplex attachments or the handhole opening will go through the seam.

Anchor Rod Openings. All anchor rod openings for each pole type shall have a width as listed in Table "A". Each opening must be sized to have a circumferential slot length equal to 15° of the circumference.

(e) Mast Arm Support Plates. The mast arm support plates will be made of cast steel conforming to the requirements for Grade 65-35 cast steel of ASTM A27, or equivalent, subject to approval. They shall neatly fit the external surface of the mast. The upper mast arm support plate must have a hollow protuberance, the hole of which must be approximately equivalent to two (2) inches in diameter, extending into the interior of the pole providing a smooth surface for the lamp cables to rest upon. The mast arm support plates shall be designed so that they will carry the mast arm and hold it in the proper position for fastening the mast arm to the mast. The design of the mast arm support plates must be a two (2) bolt type as shown on Drawing No. 659.

(f) Provision for Ground. A 1/2-13 UNC (unified thread – course ANSI B1.1) square nut must be welded to the inside of the mast on the handhole entry frame for a ground connection.

(g) Entry. A vertical doorframe carrying a removable door providing access to the interior of the mast must be welded into a close fitting opening centered approximately 15 inches above the bottom of the base. The doorframe must be formed and welded of steel with a cross section of two and one-quarter (2-1/4) inches wide by one-quarter (1/4) inch thick so as to adequately reinforce the opening of the mast. The internal horizontal clearance of the doorframe must be four and three-quarter (4-3/4) inches; its internal vertical clearance must be seven (7) inches. Its upper and lower ends must be semi-circular meeting its straight sides tangentially. The radius of this opening must be two and three-eighths (2-3/8) inches. The vertical center line of the entry must be at a right angle clockwise from the vertical center line of the mast arm supports. The frame must have two welded tabs; one at the top and one at the bottom of the door frame. These tabs must be drilled and tapped to accept a 1/4-20 UNC screw. The top hole must be located 13/16 of an inch from the top of the opening. The bottom hole must be located 13/16 of an inch from the bottom of the opening. The 1/4-20 UNC machine screws must be stainless steel with hex heads, meeting the requirements of ASTM A193. The screws shall be treated with a compound to prevent seizing. Other non-seizing types of screws and fasteners may be considered. An alternate method of attachment consisting of a removable hinge on the bottom with a screw connection at the top may be considered. (The above requirements apply to all pole masts except those with a 10 inch bolt circle. Poles with 10 inch bolt circles must have handhole openings of 3" by 5". All other requirements apply.)

(h) Door. The removable door must be formed of sheet steel approximately one-eighth (1/8) inch thick. It shall be flat or dished depending upon the pole type, and fit the doorframe closely so that it will stay in proper position even if its locking screws are slightly loosened. The door must be drilled top and bottom to accept the 1/4-20 UNC hex head machine screws which will fasten the door to the doorframe. A half-circle piece of steel must be welded by the screw opening, to allow only a socket wrench to be used. All doors shall be interchangeable. An alternate method of attachment using an internal hinge at the bottom of the door with a screw at the top of the door will be considered. Any alternate method will be subject to approval by the Commissioner or his duly authorized representative.



- (i) Locking Device. Any other door locking device, other than the one outlined above in (g) and (h), must be approved by the Commissioner or his duly authorized representative.
- (j) Tag. To each pole must be attached immediately below the handhole, by mechanical means and not by adhesive, a stainless steel tag with a stamped or embossed legend which must include the pole outside diameter at the base, the overall length, and the gauge; i.e., 12.5" X 34'-6" X 3 gauge.
- (k) Structural Requirements. The mast shall be manufactured in accordance with AASTHO's 1994 version of the "Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals". The shaft and base assembly must be designed to meet AASTHO's 1994 criteria for 80 MPH wind loading with a 30% gust factor. The poles shall be designed appropriately for Chicago applications for both street lighting and traffic signal applications, including signal mast arms.

## **TOP**

- 5. (a) Design. The mast top shall be essentially conical with a globe-shaped upper-end and having a minimum wall thickness throughout of not less than 1/4 inch. The cone portion must meet the skirted portion of the top in a smooth filet, the skirt must enclose the top 7/8" inches of the mast. Three stainless steel, or other similar approved material, set screws not less than 3/4 inches long must be equally spaced in tapped holes around the skirt and must hold the top securely in place atop the mast. The design of the top shall be similar to one shown on Drawing #11420A.
- (b) Material. The top must be aluminum alloy 356-F per ASTM B108. It shall have smooth surfaces, neat edges and corners and be free from fins, holes or other casting flaws. Non-metallic tops may be substituted if approved by the Commissioner.
- (c) Finish. Tops shall be painted as herein specified.

## **HARDWARE**

- 6. All the hardware necessary to complete the assembly of the pole shall be furnished. All hardware will be as specified elsewhere in these specifications. Hardware not specified elsewhere must be stainless steel meeting the requirements of ASTM A193, or equal corrosion-resistant non-seizing metal, or a non-metallic material subject to approval by the Commissioner.

## **WELDING**

7. (a) General. Every welded joint shall be made in conformity with the proper interpretation of the standard welding symbols of the American Welding Society as indicated on the drawings; however, each bidder must submit with his proposal a drawing showing the sizes and types of welds, must state the type of electrode, and must describe the welding methods, he proposes to use in fabricating the pole.
- (b) Testing. Welds shall be inspected for penetration and soundness of the welds by the magnetic particle inspection method or by radiography. Acceptance or rejection will be governed by the same conditions as in Section 9. If the magnetic inspection process is to be used, the dry method with the direct current must be employed. All transverse welds must be magnetized by the "prod" (Circular magnetization) method. Longitudinal welds may be magnetized by either circular or longitudinal magnetization.

## **PAINTING**

8. (a) Oil and Grease Removal. All metal surfaces shall be washed with an alkaline detergent to remove any oils or grease.
- (b) Metal Cleaning. All exterior metal surfaces shall be cleaned by blasting with a combination of shot and grit to remove all dirt, mill scale, rust, corrosion, oxides and foreign matter and provide a "near white" surface in accordance with SSPC-SP10. Included in this process will be the interior base section of the mast to a minimum height of twelve (12) inches.
- (c) Chemical Pretreatment. The cleaned metal surfaces shall then be treated with a hot, pressurized iron phosphate wash and shall be dried by convection heat.
- (d) Primer Coat. All exterior surfaces are to be coated with Tnemec 90-97 corrosion-inhibiting zinc-rich aromatic urethane to a minimum dry film thickness of 2.5 mils (.0025"). The aromatic urethane is to consist of a zinc dust content not less than 83% by weight in dried film. The coating shall be airless-spray applied and moisture cured.
- (e) Finish Coat. All exterior surfaces are to be subsequently coated with Tnemec Endura-Shield II 1074 aliphatic acrylic polyurethane to a minimum dry film thickness of 3.0 mils (.003"). The coating shall be airless-spray applied and cured in a gas-fired convection oven by heating the steel substrate to between 150° Fahrenheit and 220° Fahrenheit.
- (f) Interior Coat. Interior surfaces are to be coated with red oxide rust inhibitive alkyd primer to a dry film thickness of 1.5 mils.

- (g) Durability. Both the exterior and interior coats must be capable of passing 1,000 hours of salt spray exposure as per ASTM B117 in a 5% NaCl (by weight) solution at 95°F and 95% relative humidity without blistering. Before test, the panel must be scribed with an "X" down to bare metal.
- (h) Coating Measurement. Measurement of coating thickness must be done in accordance with SSPC-Pa 2-73T, "Measurement of Dry Paint Thickness with Magnetic Gauges," except that the lowest "single spot measurement" in an area of two square inches must be not less than 5.5 mils.
- (i) Color. Color must be gloss black unless otherwise noted in the order. A color sample must be submitted for approval prior to fabrication.
- (j) Alternate Methods. Alternate painting methods may be reviewed and tested on a case by case basis. However, no coating method will be accepted unless the Commissioner judges such alternate to be equal to the coating herein specified.

## **MAST TEST**

- 9. (a) General. All completed masts shall be available for testing for maximum deflection and set. The masts shall meet the structural requirements of Section 4(k). Unless specifically authorized in writing, all tests shall be made at the works of the manufacturer. A record of every test must be made and a certified copy of the test record must be submitted to the Commissioner before the masts are shipped.
- (b) Lot. Tests for welds, deflection and set of the mast and of the mast arm supports shall be made upon three (3) masts of the first fifty (50) in every order. An additional one (1) mast shall be tested for each additional fifty (50) masts in the order. The selection of masts for testing shall be random from the entire completed lot. If any of the masts in any lot fail to meet the test, an additional three (3) masts of the same lot must be tested. If any of these masts fail to meet the test requirements, the entire lot will be subject to rejection, except that the manufacturer may subject each mast in the lot to the test, and those which fulfill the requirement will be accepted. After testing, each base weld must be inspected by the magnetic particle method to determine that the welds have not been affected.

(c) Mast Requirements. With base rigidly anchored, a test load as indicated in Table A must be applied at a point approximately two feet (2'0") from the free end. The load must be applied at right angles to the center line of the mast and in the same vertical plane. The deflection must not be greater than that indicated in Table A. Within one (1) minute after the test load is released, measurement must be made of the set taken by the mast. This set must not be greater than that indicated in Table A. The deflection measurement device must be reset to zero and the test load must be reapplied. The deflection must not change from the deflection noted in the first test by more than  $\pm 5\%$ . No measurable set must be noted within one (1) minute after test load is released.

(d) Mast Arm Support (simplex) Requirements. With an appropriate mast arm firmly attached to the mast, a test load of 300 pounds must be applied to the mast arm as a side pull at a point seven (7) feet from the mast. After the test, the mast arm support welds on the mast must be tested by the magnetic particle method to determine that they have not been affected.

## **PACKAGING**

10. (a) General. The poles must be shipped in twelve (12) pole bundles. Each pole must be individually wrapped so that the pole can be bundled for shipping and unbundled for delivery to the City without damaging the pole or its finish.
- (b) Bundles. The bundles shall consist of twelve (12) poles laid base to top to form an approximately rectangular cylinder. Materials such as lumber (2" x 4" min.), non-marring banding, and other appropriate bundling materials must be used to make a rigid, long lasting, bundle capable of being handled, shipped and stored without shifting of contents or breaking, subject to approval. Any bundles, in which either poles or packaging is received broken, damaged or with contents shifted, will not be accepted and it will be the responsibility of the supplier to return the bundle to its original destination at no cost to the City of Chicago. The bundles should be capable of being stacked two (2) high without breaking, or shifting of the contents. Each bundle must be capable of being lifted by a fork lift truck or crane and the bundles must be shipped on a flat bed truck to facilitate unloading. Each pole wrapping must be clearly labeled indicating the pole size, i.e. 34'6", 7 GAUGE, STEEL POLE, 15" B.C.
- (c) Hardware. The bolt covers and their attachment devices must be shipped with each bundle and packaged in twelve (12) sets of four (4) each. The package must be labeled and placed in a prominent position to facilitate accessibility, and must be attached to, or within, the bundle in such a manner as to assure safe delivery. Payment will be withheld for any bundle delivered without the accompanying hardware. Pole caps must be attached at the manufacturer's facilities, or be packed separately in a manner similar to the bolt covers, and the same payment conditions will prevail. Cracked, broken or chipped parts will be considered as an incomplete delivery as regards payment.

**TABLE A**

POLE	GAUGE	BOLT CIRCLE	ANCHOR ROD	BASE PLATE	TEST LOAD	MAX. DEF	MAX. SET	DRAWING
7.67"x12.5" x34'6"	3	16.5"	1.5"	1.75"	3200#	22"	2.5"	827
6.17"x11"x 34'6"	3	17.25"	1.25"	1.5"	2500#	26"	2.5"	824
5.17"x10.0" x34'6"	3	15.0"	1.25"	1.5"	2000#	30"	2.5"	808
5.17"x10.0" x34'6"	7	15.0"	1.25"	1.5"	1500#	30"	2.5"	808
3.95"x8.5"x 32'6"	3	11.5"	1.25"	1.5"	1500#	33"	2.5"	763
3.95"x8.5"x 32'6"	7	11.5"	1.0"	1.25"	1200#	33"	2.5"	762
3.87"x8.0"x 29'6"	3	10.0"	1.0"	1.5"	1500#	28"	1.0"	657
3.87"x8.0"x 29'6"	7	10.0"	1.0"	1.25"	1200#	28"	1.0"	656
4.15"x8.0"x 27'6"	3	10.0"	1.0"	1.5"	1500#	23"	1.0"	655
4.15"x8.0"x 27'6"	7	10.0"	1.0"	1.25	1200#	23"	1.0"	654
4.20"x7.0"x 20'0"	3	10.0"	1.0"	1.0"	1500#	13"	1.0"	653
3.70"x6.5"x 20'0"	11	10.0"	1.0"	1.0"	800#	14"	1.0"	652

## HIGH LOAD MULTI-ROTATIONAL BEARINGS

Effective: October 13, 1988

Revised: April 1, 2016

Description. This work shall consist of furnishing and installing High Load Multi-Rotational type bearing assemblies at the locations shown on the plans.

High Load Multi-Rotational (HLMR) bearings shall be one of the following at the Contractors option unless otherwise noted on the plans:

- a) Pot Bearings. These bearings shall be manufactured so that the rotational capability is provided by an assembly having a rubber disc of proper thickness, confined in a manner so it behaves like a fluid. The disc shall be installed, with a snug fit, into a steel cylinder and confined by a tight fitting piston. The outside diameter of the piston shall be no more than 0.03 in. (750 microns) less than the inside diameter of the cylinder at the interface level of the piston and rubber disc. The sides of the piston shall be beveled. PTFE sheets, or silicone grease shall be utilized to facilitate rotation of the rubber disc. Suitable brass sealing rings shall be provided to prevent any extrusion between piston and cylinder.
- b) Shear Inhibited Disc Type Bearing. The Structural Element shall be restricted from shear by the pin and ring design and need not be completely confined as with the Pot Bearing design. The disc shall be a molded monolithic Polyether Urethane compound.

These bearings shall be further subdivided into one or more of the following types:

- 1) Fixed. These allow rotation in any direction but are fixed against translation.
- 2) Guided Expansion. These allow rotation in any direction but translation only in limited directions.
- 3) Non-Guided Expansion. These allow rotation and translation in any direction.

The HLMR bearings shall be of the type specified and designed for the loads shown on the plans. The design of the top and bottom bearing plates are based on detail assumptions which are not applicable to all suppliers and may require modifications depending on the supplier chosen by the Contractor. The overall depth dimension for the HLMR bearings shall be as specified on the plans. The horizontal dimensions shall be limited to the available bearing seat area. Any modifications required to accommodate the bearings chosen shall be submitted to the Engineer for approval prior to ordering materials. Modifications required shall be made at no additional cost to the State. Inverted pot bearing configurations will not be permitted.

The Contractor shall comply with all manufacturer's material, fabrication and installation requirements specified.

All bearings shall be supplied by prequalified manufacturers. The Department will maintain a list of prequalified manufacturers.

Submittals. Shop drawings shall be submitted to the Engineer for approval according to Article 105.04 of the Standard Specifications. In addition the Contractor shall furnish certified copies of the bearing manufacturer's test reports on the physical properties of the component materials for the bearings to be furnished and a certification by the bearing manufacturer stating the bearing assemblies furnished conform to all the requirements shown on the plans and as herein specified. Submittals with insufficient test data and supporting certifications will be rejected.

Materials. The materials for the HLMR bearing assemblies shall be according to the following:

- (a) Elastomeric Materials. The rubber disc for Pot bearings shall be according to Article 1083.02(a) of the Standard Specifications.
- (b) Polytetrafluoroethylene (PTFE) Material. The PTFE material shall be according to Article 1083.02(b) of the Standard Specifications.
- (c) Stainless Steel Sheets: The stainless steel sheets shall be of the thickness specified and shall be according to Article 1083.02(c).
- (d) Structural Steel. All structural steel used in the bearing assemblies shall be according to AASHTO M 270, Grade 50 (M 270M Grade 345), unless otherwise specified.
- (e) Threaded studs. The threaded stud, when required, shall conform to the requirements of Article 1083.02(d)(4) of the Standard Specifications.
- (f) Polyether Urethane for Disc bearings shall be according to all of the following requirements:

PHYSICAL PROPERTY	ASTM TEST METHOD	REQUIREMENTS	
Hardness, Type D durometer	D 2240	45 Min	65 Max
Tensile Stress, psi (kPa) At 100% elongation, min	D 412	1500 psi (10,350 kPa)	2300 psi (15,900 kPa)
Tensile Stress, psi (kPa) At 200% elongation, min	D 412	2800 psi (19,300 kPa)	4000 psi (27,600 kPa)
Tensile Strength, psi (kPa), min	D 412	4000 psi (27,600 kPa)	6000 psi (41,400 kPa)
Ultimate Elongation, %, min	D 412	350	220
Compression Set 22 hr. at 158 °F (70 °C), Method B %, max	D 395	40	40

The physical properties for a durometer hardness between the minimum and maximum values shown above shall be determined by straight line interpolation.

Design. The fabricator shall design the HLMR bearings according to the appropriate AASHTO Design Specifications noted on the bridge plans.

Fabrication. The bearings shall be complete factory-produced assemblies. They shall provide for rotation in all directions and for sliding, when specified, in directions as indicated on the plans. All bearings shall be furnished as a complete unit from one manufacturing source. All material used in the manufacture shall be new and unused with no reclaimed material incorporated into the finished assembly.

The translation capability for both guided and non-guided expansion bearings shall be provided by means of a polished stainless steel sliding plate that bears on a PTFE sheet bonded and recessed to the top surface of the piston or disc. The sliding element of expansion bearings shall be restrained against movement in the fixed direction by exterior guide bars capable of resisting the horizontal forces or 20 percent of the vertical design load on the bearing applied in any direction, whichever is greater. The sliding surfaces of the guide bar shall be of PTFE sheet and stainless steel. Guiding off of the fixed base, or any extension of the base, will not be permitted.



Structural steel bearing plates shall be fabricated according to Article 505.04(l) of the Standard Specifications. Prior to shipment the exposed edges and other exposed portions of the structural steel bearing plates shall be cleaned and given a corrosion protection coating as specified on the plans and according to the applicable Special Provisions and Articles 506.03 and 506.04 of the Standard Specifications. During cleaning and coating the stainless steel, PTFE sheet and neoprene shall be protected from abrasion and coating material.

PTFE sheets shall be bonded to steel under factory controlled conditions using heat and pressure for the time required to set the epoxy adhesive used. The PTFE sheet shall be free from bubbles and the sliding surface shall be burnished to an absolutely smooth surface.

The steel piston and the steel cylinder for pot bearings shall each be machined from a solid piece of steel. The steel base cylinder shall be either integrally machined, recessed into with a snug fit, or continuously welded to its bottom steel bearing plate.

Packaging. Each HLMR bearing assembly shall be fully assembled at the manufacturing plant and delivered to the construction site as complete units. The assemblies shall be packaged, crated or wrapped so the assemblies will not be damaged during handling, transporting and shipping. The bearings shall be held together with removable restraints so sliding surfaces are not damaged.

Centerlines shall be marked on both top and base plates for alignment in the field. The bearings shall be shipped in moisture-proof and dust-proof covers.

Performance Testing. The following performance tests are required. All tests shall be performed by the manufacturer prior to shipment. Where lot testing is permitted, a lot size shall be the number of bearings per type on the project but not to exceed 25 bearings per type.

Dimension Check. Each bearing shall be checked dimensionally to verify all bearing components are within tolerances. Failure to satisfy any dimensional tolerance shall be grounds for rejecting the bearing component or the entire bearing assembly.

Clearance Test. This test shall be performed on one bearing per lot. The bearing selected for this test shall be the one with the least amount of clearance based on the dimension check. The bearing assembly shall be loaded to its service limit state rated capacity at its full design rotation but not less than 0.02 radians to verify the required clearances exist. This test shall be performed twice for each bearing with the rotation oriented longitudinally with the bridge once in each direction. Any visual signs of rubbing or binding shall be grounds for rejection of the lot.

Proof Load Test. This test shall be performed on one bearing per lot. The bearing assembly shall be load tested to 150 percent of the service limit state rated capacity at a rotation of 0.02 radians. The load shall be maintained for 5 minutes, removed then reapplied for 5 minutes. If the load drops below the required value during either application, the test shall be restarted from the beginning. This test shall be performed twice for each bearing with the rotation oriented longitudinally with the bridge once in each direction.

The bearing shall be visually examined both during the test and upon disassembly after the test. Any resultant visual defects include, but are not limited to:

1. Extruded or deformed elastomer, polyether urethane, or PTFE.
2. Insufficient clearances such as evidence of metal to metal contact between the pot wall and the top plate.
3. Damaged components such as cracked steel, damaged seal rings, or damaged limiting rings.
4. Bond failure.

If any of the above items are found it shall be grounds for rejection of the lot.

Sliding Friction Test. For expansion bearings, this test shall be performed on one bearing per lot. The sliding surfaces shall be thoroughly cleaned with a degreasing solvent. No lubrication other than that specified for the bearing shall be used. The bearing shall be loaded to its service limit state rated capacity for 1 hour prior to and throughout the duration of the sliding test. At least 12 cycles of plus and minus sliding with an amplitude equaling the smaller of the design displacement and 1 inch (25 mm) shall then be applied. The average sliding speed shall be between 0.1 inch and 1.0 inches (2.5 mm and 25 mm) per minute. The sliding friction coefficient shall be computed for each direction of each cycle and its mean and standard deviation shall be computed for the sixth through twelfth cycles.

The friction coefficient for the first movement and the mean plus two standard deviations for the sixth through twelfth cycles shall not exceed the design value used. In addition, the mean value for the sixth through twelfth cycles shall not exceed 2/3 of the design value used. Failure of either of these shall result in rejection of the lot.

The bearing shall also be visually examined both during and after the testing, any resultant defects, such as bond failure, physical destruction, or cold flow of the PTFE shall also be cause for rejection of the lot.

The Contractor shall furnish to the Department a notarized certification from the bearing manufacturer stating the HLMR bearings have been performance tested as specified. The Contractor shall also furnish to the Engineer of Tests at the Bureau of Materials and Physical Research (126 East Ash Springfield, IL 62704) a purchase order prior to fabrication. The purchase order shall contain, as a minimum, the quantity and size of each type of bearing furnished. The Department reserves the right to perform any of the specified tests on one or more of the furnished bearings. If the tested bearing shows failure it shall be replaced and the remaining bearings shall be similarly tested for acceptance at the Contractor's expense.

When directed by the Engineer, the manufacturer shall furnish an additional bearing assembly and/or random samples of component materials used in the bearings, for testing by the Department, according to Article 1083.04 of the Standard Specifications.

Installation. The HLMR bearings shall be erected according to Article 521.05 of the Standard Specifications.

Exposed edges and other exposed portions of the structural steel plates shall be field painted as specified for Structural Steel.

Basis of Payment. This work will be paid for at the contract unit price each for HIGH LOAD MULTI-ROTATIONAL BEARINGS, FIXED; HIGH LOAD MULTI-ROTATIONAL BEARINGS, GUIDED EXPANSION; or HIGH LOAD MULTI-ROTATIONAL BEARINGS, NON-GUIDED EXPANSION of the load rating specified.

When the fabrication and erection of HLMR bearings is accomplished under separate contracts, the applicable requirements of Article 505.09 shall apply.

Fabricated HLMR bearings and other materials complying with the requirements of this item, furnished and accepted, will be paid for at the contract unit price each for FURNISHING HIGH LOAD MULTI-ROTATIONAL BEARINGS, FIXED, FURNISHING HIGH LOAD MULTI-ROTATIONAL BEARINGS, GUIDED EXPANSION or FURNISHING HIGH LOAD MULTI-ROTATIONAL BEARINGS, NON-GUIDED EXPANSION of the load rating specified.

Storage and care of fabricated HLMR bearings and other materials complying with the requirements of this item by the Fabrication Contractor beyond the specified storage period, will be paid for at the contract unit price per calendar day for STORAGE OF HIGH LOAD MULTI-ROTATIONAL BEARINGS if a pay item is provided for in the contract, or will be paid for according to Article 109.04 if a pay item is not provided in the contract.

HLMR bearings and other materials fabricated under this item erected according to the requirements of the specifications, and accepted, will be paid for at the contract unit price each for ERECTING HIGH LOAD MULTI-ROTATIONAL BEARINGS, FIXED, ERECTING HIGH LOAD MULTI-ROTATIONAL BEARINGS, GUIDED EXPANSION or ERECTING HIGH LOAD MULTI-ROTATIONAL BEARINGS, NON-GUIDED EXPANSION of the load rating specified.

**BONDED PREFORMED JOINT SEAL**

Effective: July 12, 1994

Revised: August 9, 2019

Description. This work shall consist of preparing the joint opening faces and furnishing and installing a bonded preformed joint seal with the necessary bonding epoxy into bridge joints.

Materials. The material quality of bonded preformed joint seal shall be according to the physical requirements of Table 1 of ASTM D2628 with the following exceptions: compression set shall not be over 40 percent when tested according to Method B (Modified) of ASTM D 395 after 70 hours at 212 °F (100 °C). The Compression-Deflection requirement will not apply to the bonded preformed joint seal.

The adhesive used to bond the joint sealer shall be supplied by the manufacturer of the bonded preformed joint seal and shall meet the following requirements:

The adhesive shall be epoxy base, dual component, which resists salt, diluted acids, alkalis, solvents, greases, oils, moisture, sunlight and weathering. Temperatures up to 200 °F (93 °C) shall not reduce bond strength. At 68 °F (20 °C), the bond strength shall be a minimum of 1000 psi (6.9 MPa) within 24 hours.

Pot Life; min.	40 minutes @ 68 °F (20 °C)
Tensile Strength; min.	4000 psi (28 MPa)
Solids Hardness; max.	5 mohs
Flash Point; min.	200 °F (93 °C)
Axial Compression; min.	8760 psi (60 MPa)
Complete Cure; max.	7 days @ 68 °F (20 °C)
Concrete Bond Strength; min.	4000 psi (28 MPa)
Steel Bond Strength; min.	4000 psi (28 MPa)

Any primers or cleaning solutions used on the faces of the joint or on the profile of the sides of the bonded preformed joint seal shall be supplied by the manufacturer of the bonded preformed joint seal. Any additional installation materials and adhesive for splicing joint sections, shall be as supplied by the manufacturer of the bonded preformed joint seal.

### **Construction Requirements**

Installation. The inside surfaces of the joint opening shall be roughened by sand blasting to bare white metal on a metal walled joint or to clean elastomeric polymer concrete on a elastomeric polymer concrete walled joint. The depth of roughening of the joint shall equal the depth of the bonded portion of the preformed joint material. After roughening, the joint shall be cleaned with compressed air. The compressed air shall be according to the cleanliness requirements of ASTM D 4285. The bonded preformed joint seal shall be wiped with a primer that promotes adhesion when recommended by the joint manufacturer. The epoxy adhesive shall then be applied, both to the inner walls of the joint, and to the exterior surfaces of the joint seal. Immediately after blow down, the primer and adhesive shall be applied in the amounts recommended by the joint manufacturer. Maximum application lengths of joints for a pound (kilogram) of epoxy shall be supplied by the joint seal manufacturer.

The joint seal with epoxy shall be inserted into the joint and held tightly against both sides of the joint until sufficient bond strength has been developed to resist the expected expansion forces. The seal shall be placed so the top of the seal is approximately 1/8 in. (3 mm) recessed.

Bonded preformed joint seals shall not be installed when temperatures below 50 °F (10 °C) are predicted within a 48 hour period.

Method of Measurement. The bonded preformed joint seal will be measured in place, in feet (meters) along the centerline of the joint.

Basis of Payment. This work will be paid for at the contract unit price per foot (meter) for BONDED PREFORMED JOINT SEAL, of the size specified.

## **PIPE UNDERDRAINS FOR STRUCTURES**

Effective: May 17, 2000

Revised: January 22, 2010

Description. This work shall consist of furnishing and installing a pipe underdrain system as shown on the plans, as specified herein, and as directed by the Engineer.

Materials. Materials shall meet the requirements as set forth below:

The perforated pipe underdrain shall be according to Article 601.02 of the Standard Specifications. Outlet pipes or pipes connecting to a separate storm sewer system shall not be perforated.

The drainage aggregate shall be a combination of one or more of the following gradations, FA1, FA2, CA5, CA7, CA8, CA11, or CA13 thru 16, according to Sections 1003 and 1004 of the Standard Specifications.

The fabric surrounding the drainage aggregate shall be Geotechnical Fabric for French Drains according to Article 1080.05 of the Standard Specifications.

Construction Requirements. All work shall be according to the applicable requirements of Section 601 of the Standard Specifications except as modified below.

The pipe underdrains shall consist of a perforated pipe drain situated at the bottom of an area of drainage aggregate wrapped completely in geotechnical fabric and shall be installed to the lines and gradients as shown on the plans.

Method of Measurement. Pipe Underdrains for Structures shall be measured for payment in feet (meters), in place. Measurement shall be along the centerline of the pipe underdrains. All connectors, outlet pipes, elbows, and all other miscellaneous items shall be included in the measurement. Concrete headwalls shall be included in the cost of Pipe Underdrains for Structures, but shall not be included in the measurement for payment.

Basis of Payment. This work will be paid for at the contract unit price per foot (meter) for PIPE UNDERDRAINS FOR STRUCTURES of the diameter specified. Furnishing and installation of the drainage aggregate, geotechnical fabric, forming holes in structural elements and any excavation required, will not be paid for separately, but shall be included in the cost of the pipe underdrains for structures.

**STRUCTURAL REPAIR OF CONCRETE**

Effective: March 15, 2006

Revised: August 9, 2019

Description. This work shall consist of structurally repairing concrete.

Materials. Materials shall be according to the following.

Item	Article/Section
(a) Portland Cement Concrete (Note 1) .....	1020
(b) R1, R2, or R3 Concrete (Note 2)	
(c) Normal Weight Concrete (Notes 3 and 4)	
(d) Shotcrete (High Performance) (Notes 5 and 6)	
(e) Reinforcement Bars .....	1006.10
(f) Anchor Bolts .....	1006.09
(g) Water .....	1002
(h) Curing Compound .....	1022.01
(i) Cotton Mats .....	1022.02
(j) Protective Coat .....	1023.01
(k) Epoxy (Note 7) .....	1025
(l) Mechanical Bar Splicers .....	508.06(c)

Note 1. The concrete shall be Class SI, except the cement factor shall be a minimum 6.65 cwt/cu yd (395 kg/cu m), the coarse aggregate shall be a CA 16, and the strength shall be a minimum 4000 psi (27,500 kPa) compressive or 675 psi (4650 kPa) flexural at 14 days. A high range water-reducing admixture shall be used to obtain a 5-7 in. (125-175 mm) slump, but a cement factor reduction according to Article 1020.05(b)(8) is prohibited. A self-consolidating concrete mixture is also acceptable per Article 1020.04, except the mix design requirements of this note regarding the cement factor, coarse aggregate, strength, and cement factor reduction shall apply.

Note 2. The R1, R2, or R3 concrete shall be from the Department's qualified product list of Packaged, Dry, Rapid Hardening, Cementitious Materials for Concrete Repairs. The R1, R2, or R3 concrete shall comply with the air content and strength requirements for Class SI concrete as indicated in Note 1. Mixing shall be per the manufacturer's recommendations, except the water/cement ratio shall not exceed the value specified for Class SI concrete as indicated in Note 1. A high range water-reducing admixture shall be used to obtain a 5-7 in. (125-175 mm) slump, and a retarder may be required to allow time to perform the required field tests. The admixtures shall be per the manufacturer's recommendation, and the Department's qualified product list of Concrete Admixtures shall not apply.



- Note 3. The “high slump” packaged concrete mixture shall be from the Department’s qualified product list of Packaged, Dry, Formed, Concrete Repair Mixtures. The materials and preparation of aggregate shall be according to ASTM C 387. The cement factor shall be 6.65 cwt/cu yd (395 kg/cu m) minimum to 7.05 cwt/cu yd (418 kg/cu m) maximum. Cement replacement with fly ash or ground granulated blast-furnace slag shall be according to Section 1020. The “high slump” packaged concrete mixture shall have a water soluble chloride ion content of less than 0.40 lb/cu yd (0.24 kg/cu m). The test shall be performed according to ASTM C 1218, and the “high slump” packaged concrete mixture shall have an age of 28 to 42 days at the time of test. The ASTM C 1218 test shall be performed by an independent lab a minimum of once every two years, and the test results shall be provided to the Department. The coarse aggregate shall be a maximum size of 1/2 in. (12.5 mm). The packaged concrete mixture shall comply with the air content and strength requirements for Class SI concrete as indicated in Note 1. Mixing shall be per the manufacturer’s recommendations, except the water/cement ratio shall not exceed the value specified for Class SI concrete as indicated in Note 1. A high range water-reducing admixture shall be used to obtain a 5-7 in. (125-175 mm) slump. The admixture shall be per the manufacturer’s recommendation, and the Department’s qualified product list of Concrete Admixtures shall not apply. A maximum slump of 10 in. (250 mm) may be permitted if no segregation is observed by the Engineer in a laboratory or field evaluation.
- Note 4 The “self-consolidating concrete” packaged concrete mixture shall be from the Department’s qualified product list of Packaged, Dry, Formed, Concrete Repair Mixtures. The materials and preparation of aggregate shall be according to ASTM C 387. The cement factor shall be 6.65 cwt/cu yd (395 kg/cu m) minimum to 7.05 cwt/cu yd (418 kg/cu m) maximum. Cement replacement with fly ash or ground granulated blast-furnace slag shall be according to Section 1020. The “self-consolidating concrete” packaged concrete mixture shall have a water soluble chloride ion content of less than 0.40 lb/cu yd (0.24 kg/cu m). The test shall be performed according to ASTM C 1218, and the “self-consolidating concrete” packaged concrete mixture shall have an age of 28 to 42 days at the time of test. The ASTM C 1218 test shall be performed by an independent lab a minimum of once every two years, and the test results shall be provided to the Department. The concrete mixture should be uniformly graded, and the coarse aggregate shall be a maximum size of 1/2 in. (12.5 mm). The fine aggregate proportion shall be a maximum 50 percent by weight (mass) of the total aggregate used. The packaged concrete mixture shall comply with the air content and strength requirements for Class SI concrete as indicated in Note 1. Mixing shall be per the manufacturer’s recommendations, except the water/cement ratio shall not exceed the value specified for Class SI concrete as indicated in Note 1. The admixtures used to produce self-consolidating concrete shall be per the manufacturer’s recommendation, and the Department’s qualified product list of Concrete Admixtures shall not apply. The packaged concrete mixture shall meet the self-consolidating requirements of Article 1020.04.

Note 5. Packaged shotcrete that includes aggregate shall be from the Department's qualified product list of Packaged High Performance Shotcrete, and independent laboratory test results showing the product meets Department specifications will be required. The product shall be a packaged, pre-blended, and dry combination of materials, for the wet-mix shotcrete method according to ASTM C 1480. A non-chloride accelerator may be used according to the shotcrete manufacturer's recommendations. The shotcrete shall be Type FA or CA, Grade FR, and Class I. The fibers shall be Type III synthetic according to ASTM C 1116.

The packaged shotcrete shall have a water soluble chloride ion content of less than 0.40 lb/cu yd (0.24 kg/cu m). The test shall be performed according to ASTM C 1218, and the hardened shotcrete shall have an age of 28 to 42 days at the time of test. The ASTM C 1218 test shall be performed by an independent lab a minimum of once every two years, and the test results shall be provided to the Department.

Each individual aggregate used in the packaged shotcrete shall have either a maximum ASTM C 1260 expansion of 0.16 percent or a maximum ASTM C 1293 expansion of 0.040 percent. However, the ASTM C 1260 value may be increased to 0.27 percent for each individual aggregate if the cement total equivalent alkali content ( $\text{Na}_2\text{O} + 0.658\text{K}_2\text{O}$ ) does not exceed 0.60 percent. As an alternative to these requirements, ASTM C 1567 testing which shows the packaged shotcrete has a maximum expansion of 0.16 percent may be submitted. The ASTM C 1260, C 1293, or C 1567 test shall be performed a minimum of once every two years.

The 7 and 28 day compressive strength requirements in ASTM C 1480 shall not apply. Instead the shotcrete shall obtain a minimum compressive strength of 4000 psi (27,500 kPa) at 14 days.

The packaged shotcrete shall be limited to the following proportions:

The portland cement and finely divided minerals shall be 6.05 cwt/cu yd (360 kg/cu m) to 8.50 cwt/cu yd (505 kg/cu m) for Type FA and 6.05 cwt/cu yd (360 kg/cu. m) to 7.50 cwt/cu yd (445 kg/cu m) for Type CA. The portland cement shall not be below 4.70 cwt/cu yd (279 kg/cu m) for Type FA or CA.

The finely divided mineral(s) shall constitute a maximum of 35 percent of the total cement plus finely divided mineral(s).

Class F fly ash is optional and the maximum shall be 20 percent by weight (mass) of cement.

Class C fly ash is optional and the maximum shall be 25 percent by weight (mass) of cement.

Ground granulated blast-furnace slag is optional and the maximum shall be 30 percent by weight (mass) of cement.

Microsilica is required and shall be a minimum of 5 percent by weight (mass) of cement, and a maximum of 10 percent. As an alternative to microsilica, high-reactivity metakaolin may be used at a minimum of 5 percent by weight (mass) of cement, and a maximum of 10 percent.

Fly ash shall not be used in combination with ground granulated blast-furnace slag. Class F fly ash shall not be used in combination with Class C fly ash. Microsilica shall not be used in combination with high-reactivity metakaolin. A finely divided mineral shall not be used in combination with a blended hydraulic cement, except for microsilica or high-reactivity metakaolin.

The water/cement ratio as defined in Article 1020.06 shall be a maximum of 0.42.

The air content as shot shall be 4.0 – 8.0 percent.

Note 6 Packaged shotcrete that does not include pre-blended aggregate shall be from the Department's qualified product list of Packaged High Performance Shotcrete, and independent laboratory test results showing the product meets Department specifications will be required. The shotcrete shall be according to Note 5, except the added aggregate shall be according to Articles 1003.02 and 1004.02 in addition to each individual aggregate meeting the maximum expansion requirements of Note 5. The aggregate gradation shall be according to the manufacturer. The shotcrete shall be batched and mixed with added aggregate according to the manufacturer.

Note 7. In addition ASTM C 881, Type IV, Grade 2 or 3, Class A, B, or C may be used.

Equipment. Equipment shall be according to Article 503.03 and the following.

Chipping Hammer – The chipping hammer for removing concrete shall be a light-duty pneumatic or electric tool with a 15 lb. (7 kg) maximum class or less.

Blast Cleaning Equipment – Blast cleaning equipment for concrete surface preparation shall be the abrasive type, and the equipment shall have oil traps.

Hydrodemolition Equipment – Hydrodemolition equipment for removing concrete shall be calibrated, and shall use water according to Section 1002.

High Performance Shotcrete Equipment – The batching, mixing, pumping, hose, nozzle, and auxiliary equipment shall be for the wet-mix shotcrete method, and shall meet the requirements of ACI 506R.

### Construction Requirements

General. The repair methods shall be either formed concrete repair or shotcrete. The repair method shall be selected by the Contractor with the following rules.

- (a) Rule 1. For formed concrete repair, a subsequent patch to repair the placement point after initial concrete placement will not be allowed. As an example, this may occur in a vertical location located at the top of the repair.
- (b) Rule 2. Formed concrete repair shall not be used for overhead applications.
- (c) Rule 3. If formed concrete repair is used for locations that have reinforcement with less than 0.75 in. (19 mm) of concrete cover, the concrete mixture shall contain fly ash or ground granulated blast-furnace slag at the maximum cement replacement allowed.
- (d) Rule 4. Shotcrete shall not be used for any repair greater than 6 in. (150 mm) in depth, except in horizontal applications, where the shotcrete may be placed from above in one lift.
- (e) Rule 5. Shotcrete shall not be used for column repairs greater than 4 in. (100 mm) in depth, unless the shotcrete mixture contains 3/8 in. (9.5 mm) aggregate.

Temporary Shoring or Cribbing. When a temporary shoring or cribbing support system is required, the Contractor shall provide details and computations, prepared and sealed by an Illinois licensed Structural Engineer, to the Department for review and approval. When ever possible the support system shall be installed prior to starting the associated concrete removal. If no system is specified, but during the course of removal the need for temporary shoring or cribbing becomes apparent or is directed by the Engineer due to a structural concern, the Contractor shall not proceed with any further removal work until an appropriate and approved support system is installed.

Concrete Removal. The Contractor shall provide ladders or other appropriate equipment for the Engineer to mark the removal areas. Repair configurations will be kept simple, and squared corners will be preferred. The repair perimeter shall be sawed a depth of 1/2 in. (13 mm) or less, as required to avoid cutting the reinforcement. Any cut reinforcement shall be repaired or replaced at the expense of the Contractor. If the concrete is broken or removed beyond the limits of the initial saw cut, the new repair perimeter shall be recut. The areas to be repaired shall have all loose, unsound concrete removed completely by the use of chipping hammers, hydrodemolition equipment, or other methods approved by the Engineer. The concrete removal shall extend along the reinforcement bar until the reinforcement is free of bond inhibiting corrosion. Reinforcement bar with 50 percent or more exposed shall be undercut to a depth of 3/4 in. (19 mm) or the diameter of the reinforcement bar, whichever is greater.

If sound concrete is encountered before existing reinforcement bars are exposed, further removal of concrete shall not be performed unless the minimum repair depth is not met.

The repair depth shall be a minimum of 1 in. (25 mm). The substrate profile shall be  $\pm 1/16$  in. ( $\pm 1.5$  mm). The perimeter of the repair area shall have a vertical face.

If a repair is located at the ground line, any excavation required below the ground line to complete the repair shall be included in this work.

The Contractor shall have a maximum of 14 calendar days to complete each repair location with concrete or shotcrete, once concrete removal has started for the repair.

The Engineer shall be notified of concrete removal that exceeds 6 in. (150 mm) in depth, one fourth the cross section of a structural member, more than half the vertical column reinforcement is exposed in a cross section, more than 6 consecutive reinforcement bars are exposed in any direction, within 1.5 in. (38 mm) of a bearing area, or other structural concern. Excessive deterioration or removal may require further evaluation of the structure or installation of temporary shoring and cribbing support system.

Surface Preparation. Prior to placing the concrete or shotcrete, the Contractor shall prepare the repair area and exposed reinforcement by blast cleaning. The blast cleaning shall provide a surface that is free of oil, dirt, and loose material.

If a succeeding layer of shotcrete is to be applied, the initial shotcrete surface and remaining exposed reinforcement shall be free of curing compound, oil, dirt, loose material, rebound (i.e. shotcrete material leaner than the original mixture which ricochets off the receiving surface), and overspray. Preparation may be by lightly brushing or blast cleaning if the previous shotcrete surface is less than 36 hours old. If more than 36 hours old, the surface shall be prepared by blast cleaning.

The repair area and perimeter vertical face shall have a rough surface. Care shall be taken to ensure the sawcut face is roughened by blast cleaning. Just prior to concrete or shotcrete placement, saturate the repair area with water to a saturated surface-dry condition. Any standing water shall be removed.

Concrete or shotcrete placement shall be done within 3 calendar days of the surface preparation or the repair area shall be prepared again.

Reinforcement. Exposed reinforcement bars shall be cleaned of concrete and corrosion by blast cleaning. After cleaning, all exposed reinforcement shall be carefully evaluated to determine if replacement or additional reinforcement bars are required.

Reinforcing bars that have been cut or have lost 25 percent or more of their original cross sectional area shall be supplemented by new in kind reinforcement bars. New bars shall be lapped a minimum of 32 bar diameters to existing bars. A mechanical bar splicer shall be used when it is not feasible to provide the minimum bar lap. No welding of bars shall be performed.

Intersecting reinforcement bars shall be tightly secured to each other using 0.006 in. (1.6 mm) or heavier gauge tie wire, and shall be adequately supported to minimize movement during concrete placement or application of shotcrete.

For reinforcement bar locations with less than 0.75 in. (19 mm) of cover, protective coat shall be applied to the completed repair. The application of the protective coat shall be according to Article 503.19, 2nd paragraph, except blast cleaning shall be performed to remove curing compound.

The Contractor shall anchor the new concrete to the existing concrete with 3/4 in. (19 mm) diameter hook bolts for all repair areas where the depth of concrete removal is greater than 8 in. (205 mm) and there is no existing reinforcement extending into the repair area. The hook bolts shall be spaced at 15 in. (380 mm) maximum centers both vertically and horizontally, and shall be a minimum of 12 in. (305 mm) away from the perimeter of the repair. The hook bolts shall be installed according to Section 584.

Repair Methods. All repair areas shall be inspected and approved by the Engineer prior to placement of the concrete or application of the shotcrete.

- (a) Formed Concrete Repair. Falsework shall be according to Article 503.05. Forms shall be according to Article 503.06. Formwork shall provide a smooth and uniform concrete finish, and shall approximately match the existing concrete structure. Formwork shall be mortar tight and closely fitted where they adjoin the existing concrete surface to prevent leakage. Air vents may be provided to reduce voids and improve surface appearance. The Contractor may use exterior mechanical vibration, as approved by the Engineer, to release air pockets that may be entrapped.

The concrete for formed concrete repair shall be a Class SI Concrete, or a packaged R1, R2, or R3 Concrete,, or a packaged Normal Weight Concrete at the Contractor's option. The concrete shall be placed and consolidated according to Article 503.07. The concrete shall not be placed when frost is present on the surface of the repair area, or the surface temperature of the repair area is less than 40 °F (4 °C). All repaired members shall be restored as close as practicable to their original dimensions.

Curing shall be done according to Article 1020.13.

If temperatures below 45°F (7°C) are forecast during the curing period, protection methods shall be used. Protection Method I according to Article 1020.13(d)(1), or Protection Method II according to Article 1020.13(d)(2) shall be used during the curing period.

The surfaces of the completed repair shall be finished according to Article 503.15.

- (b) Shotcrete. Shotcrete shall be tested by the Engineer for air content according to Illinois Modified AASHTO T 152. The sample shall be obtained from the discharge end of the nozzle by shooting a pile large enough to scoop a representative amount for filling the air meter measuring bowl. Shotcrete shall not be shot directly into the measuring bowl for testing.

For compressive strength of shotcrete, a 18 x 18 x 3.5 in. (457 x 457 x 89 mm) test panel shall be shot by the Contractor for testing by the Engineer. A steel form test panel shall have a minimum thickness of 3/16 in. (5 mm) for the bottom and sides. A wood form test panel shall have a minimum 3/4 in. (19 mm) thick bottom, and a minimum 1.5 in. (38 mm) thickness for the sides. The test panel shall be cured according to Article 1020.13 (a) (3) or (5) while stored at the jobsite and during delivery to the laboratory. After delivery to the laboratory for testing, curing and testing shall be according to ASTM C 1140.

The method of alignment control (i.e. ground wires, guide strips, depth gages, depth probes, and formwork) to ensure the specified shotcrete thickness and reinforcing bar cover is obtained shall be according to ACI 506R. Ground wires shall be removed after completion of cutting operations. Guide strips and formwork shall be of dimensions and a configuration that do not prevent proper application of shotcrete. Metal depth gauges shall be cut 1/4 in. (6 mm) below the finished surface. All repaired members shall be restored as close as practicable to their original dimensions.

For air temperature limits when applying shotcrete in cold weather, the first paragraph of Article 1020.14(b) shall apply. For hot weather, shotcrete shall not be applied when the air temperature is greater than 90°F (32°C). The applied shotcrete shall have a minimum temperature of 50°F (10°C) and a maximum temperature of 90°F (32°C). The shotcrete shall not be applied during periods of rain unless protective covers or enclosures are installed. The shotcrete shall not be applied when frost is present on the surface of the repair area, or the surface temperature of the repair area is less than 40°F (4°C). If necessary, lighting shall be provided to provide a clear view of the shooting area.

The shotcrete shall be applied according to ACI 506R, and shall be done in a manner that does not result in cold joints, laminations, sandy areas, voids, sags, or separations. In addition, the shotcrete shall be applied in a manner that results in maximum densification of the shotcrete. Shotcrete which is identified as being unacceptable while still plastic shall be removed and re-applied.



The nozzle shall normally be at a distance of 2 to 5 ft. (0.6 to 1.5 m) from the receiving surface, and shall be oriented at right angles to the receiving surface. Exceptions to this requirement will be permitted to fill corners, encase large diameter reinforcing bars, or as approved by the Engineer. For any exception, the nozzle shall never be oriented more than 45 degrees from the surface. Care shall be taken to keep the front face of the reinforcement bar clean during shooting operations. Shotcrete shall be built up from behind the reinforcement bar. Accumulations of rebound and overspray shall be continuously removed prior to application of new shotcrete. Rebound material shall not be incorporated in the work.

Whenever possible, shotcrete shall be applied to the full thickness in a single layer. The maximum thickness shall be according to Rules 4 and 5 under Construction Requirements, General. When two or more layers are required, the minimum number shall be used and shall be done in a manner without sagging or separation. A flash coat (i.e. a thin layer of up to 1/4 in. (6 mm) applied shotcrete) may be used as the final lift for overhead applications.

Prior to application of a succeeding layer of shotcrete, the initial layer of shotcrete shall be prepared according to the surface preparation and reinforcement bar cleaning requirements. Upon completion of the surface preparation and reinforcement bar treatment, water shall be applied according to the surface preparation requirements unless the surface is moist. The second layer of shotcrete shall then be applied within 30 minutes.

Shotcrete shall be cut back to line and grade using trowels, cutting rods, screeds or other suitable devices. The shotcrete shall be allowed to stiffen sufficiently before cutting. Cutting shall not cause cracks or delaminations in the shotcrete. For depressions, cut material may be used for small areas. Rebound material shall not be incorporated in the work. For the final finish, a wood float shall be used to approximately match the existing concrete texture. A manufacturer approved finishing aid may be used. Water shall not be used as a finishing aid. All repaired members shall be restored as close as practicable to their original dimensions.

Contractor operations for curing shall be continuous with shotcrete placement and finishing operations. Curing shall be accomplished using wetted cotton mats, membrane curing, or a combination of both. Cotton mats shall be applied according to Article 1020.13(a)(5) except the exposed layer of shotcrete shall be covered within 10 minutes after finishing, and wet curing shall begin immediately. Curing compound shall be applied according to Article 1020.13(a)(4), except the curing compound shall be applied as soon as the shotcrete has hardened sufficiently to prevent marring the surface, and each of the two separate applications shall be applied in opposite directions to ensure coverage. The curing compound shall be according to Article 1022.01. Note 5 of the Index Table in Article 1020.13 shall apply to the membrane curing method.

When a shotcrete layer is to be covered by a succeeding shotcrete layer within 36 hours, the repair area shall be protected with intermittent hand fogging, or wet curing with either burlap or cotton mats shall begin within 10 minutes. Intermittent hand fogging may be used only for the first hour. Thereafter, wet curing with burlap or cotton mats shall be used until the succeeding shotcrete layer is applied. Intermittent hand fogging may be extended to the first hour and a half if the succeeding shotcrete layer is applied by the end of this time.

The curing period shall be for 7 days, except when there is a succeeding layer of shotcrete. In this instance, the initial shotcrete layer shall be cured until the surface preparation and reinforcement bar treatment is started.

If temperatures below 45°F (7°C) are forecast during the curing period, protection methods shall be used. Protection Method I according to Article 1020.13(d)(1), or Protection Method II according to Article 1020.13(d)(2) shall be used during the curing period

Inspection of Completed Work. The Contractor shall provide ladders or other appropriate equipment for the Engineer to inspect the repaired areas. After curing but no sooner than 28 days after placement of concrete or shooting of shotcrete, the repair shall be examined for conformance with original dimensions, cracks, voids, and delaminations. Sounding for delaminations will be done with a hammer or by other methods determined by the Engineer.

The acceptable tolerance for conformance of a repaired area shall be within 1/4 in. (6 mm) of the original dimensions. A repaired area not in dimensional conformance or with delaminations shall be removed and replaced.

A repaired area with cracks or voids shall be considered as nonconforming. Exceeding one or more of the following crack and void criteria shall be cause for removal and replacement of a repaired area.

1. The presence of a single surface crack greater than 0.01 in. (0.25 mm) in width and greater than 12 in. (300 mm) in length.
2. The presence of two or more surface cracks greater than 0.01 in. (0.25 mm) in width that total greater than 24 in. (600 mm) in length.
3. The presence of map cracking in one or more regions totaling 15 percent or more of the gross surface area of the repair.
4. The presence of two or more surface voids with least dimension 3/4 in. (19 mm) each.

A repaired area with cracks or voids that do not exceed any of the above criteria may remain in place, as determined by the Engineer.

If a nonconforming repair is allowed to remain in place, cracks greater than 0.007 in. (0.2 mm) in width shall be repaired with epoxy according to Section 590. For cracks less than or equal to 0.007 in. (0.2 mm) in width, the epoxy may be applied to the surface of the crack. Voids shall be repaired according to Article 503.15.

Publications and Personnel Requirements. The Contractor shall provide a current copy of ACI 506R to the Engineer a minimum of one week prior to start of construction.

The shotcrete personnel who perform the work shall have current American Concrete Institute (ACI) nozzle men certification for vertical wet and overhead wet applications, except one individual may be in training. This individual shall be adequately supervised by a certified ACI nozzle men as determined by the Engineer. A copy of the nozzle men certificate(s) shall be given to the Engineer.

Method of Measurement. This work will be measured for payment in place and the area computed in square feet (square meters). For a repair at a corner, both sides will be measured.

Basis of Payment. This work will be paid for at the contract unit price per square foot (square meter) for STRUCTURAL REPAIR OF CONCRETE (DEPTH GREATER THAN 5 IN. (125 MM), STRUCTURAL REPAIR OF CONCRETE (DEPTH EQUAL TO OR LESS THAN 5 IN. (125 MM).

When not specified to be paid for elsewhere, the work to design, install, and remove the temporary shoring and cribbing will be paid for according to Article 109.04.

With the exception of reinforcement damaged by the Contractor during removal, the furnishing and installation of supplemental reinforcement bars, mechanical bar splicers, hook bolts, and protective coat will be paid according to Article 109.04.

## **BRIDGE DECK CONSTRUCTION**

Effective: October 22, 2013

Revised: December 21, 2016

When Diamond Grinding of Bridge Sections is specified, hand finishing of the deck surface shall be limited to areas not finished by the finishing machine and to address surface corrections according to Article 503.16(a)(2). Hand finishing shall be limited as previously stated solely for the purpose of facilitating a more timely application of the curing protection. In addition the requirements of 503.16(a)(3)a. and 503.16(a)(4) will be waived.

### **Revise the Second Paragraph of Article 503.06(b) to read as follows.**

“When the Contractor uses cantilever forming brackets on exterior beams or girders, additional requirements shall be as follows.”

### **Revise Article 503.06(b)(1) to read as follows.**

“(1) Bracket Placement. The spacing of brackets shall be per the manufacturer’s published design specifications for the size of the overhang and the construction loads anticipated. The resulting force of the leg brace of the cantilever bracket shall bear on the web within 6 inches (150 mm) of the bottom flange of the beam or girder.”

### **Revise Article 503.06(b)(2) to read as follows.**

“(2) Beam Ties. The top flange of exterior steel beams or girders supporting the cantilever forming brackets shall be tied to the bottom flange of the next interior beam. The top flange of exterior concrete beams supporting the cantilever forming brackets shall be tied to the top flange of the next interior beam. The ties shall be spaced at 4 ft (1.2 m) centers. Permanent cross frames on steel girders may be considered a tie. Ties shall be a minimum of 1/2 inch (13 mm) diameter threaded rod with an adjusting mechanism for drawing the tie taut. The ties shall utilize hanger brackets or clips which hook onto the flange of steel beams. No welding will be permitted to the structural steel or stud shear connectors, or to reinforcement bars of concrete beams, for the installation of the tie bar system. After installation of the ties and blocking, the tie shall be drawn taut until the tie does not vary from a straight line from beam to beam. The tie system shall be approved by the Engineer.”

**Revise Article 503.06(b)(3) to read as follows.**

“(3) Beam Blocks. Suitable beam blocks of 4 in x 4 in (100 x 100 mm) timbers or metal structural shapes of equivalent strength or better, acceptable to the Engineer, shall be wedged between the webs of the two beams tied together, within 6 inches (150 mm) of the bottom flange at each location where they are tied. When it is not feasible to have the resulting force from the leg brace of the cantilever brackets transmitted to the web within 6 inches (150 mm) of the bottom flange, then additional blocking shall be placed at each bracket to transmit the resulting force to within 6 inches (150 mm) of the bottom flange of the next interior beam or girder.”

**Delete the last paragraph of Article 503.06(b).**

**METALLIZING OF STRUCTURAL STEEL**

Effective: October 4, 2016

Revised: October 20, 2017

**Description:** This work consists of furnishing all materials, equipment, labor, and other essentials necessary to accomplish the surface preparation and application of thermal spray metallizing to all new structural steel, or portions thereof as detailed in the plans, in the shop. Also included in this work, when specified on the Contract plans, is the application of a paint system over the metallizing in the shop and/or in the field.

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

**Metallizing Wire:** All thermal spray feedstock (metallizing wire) shall be the products of a single manufacturer, meet the requirements below, and meet the thermal spray equipment manufacturer's specifications.

- a. The metallizing wire shall consist of 99.9% zinc or 85/15 zinc/aluminum complying with ASTM B-833 and ANSI/AWS C2.25/C2.25M
- b. The Contractor shall provide a certificate of chemical composition of the proposed metallizing wire from the metallizing wire manufacturer.

**Paint:** All materials to be used on an individual structure shall be produced by the same manufacturer.

The Bureau of Materials and Physical Research has established a list of all paint products that have met preliminary requirements. Each batch of material, except for the clear aliphatic urethane and the penetrating sealer shall be tested and approved for use. The specified colors shall be produced in the coating manufacturer's facility. Tinting of coating after it leaves the manufacturing facility is not allowed.

The paint materials shall meet the following requirements of the Standard Specification and as noted below:

<u>Item</u>	<u>Article</u>
(a) Waterborne Acrylic	1008.04
(b) Aluminum Epoxy Mastic (Note 1)	1008.03
(c) Epoxy/ Aliphatic Urethane (Note 1)	1008.05
(d) Penetrating Sealer (Note 2)	
(e) Clear Aliphatic Urethane (Note 3)	

Note 1: If the finish coats are being applied in the field over a shop applied epoxy, select an epoxy intermediate for shop application with a recoat window that is long enough to support the construction schedule.

Note 2: The Epoxy Penetrating Sealer shall be a cross-linked multi component sealer. The sealer shall have the following properties:

- (a) The volume solids shall be 98 percent (plus or minus 2 percent).
- (b) Shall be clear or slightly tinted color.

Note 3: The Clear Aliphatic Urethane material shall be one of the following products:

- (a) Carbothane Clear Coat by Carboline Company
- (b) Pitthane Ultra Clear 95-8000 by Pittsburgh Paints (PPG)
- (c) ArmorSeal Rextthane I MCU by Sherwin-Williams

**Shop Prequalification:** The Contractor performing the shop work shall have either an SSPC-QP 3 Certification or an AISC Sophisticated Paint Endorsement certification. The certification(s) shall remain current throughout the duration of the contract.

The Contractor performing the shop work shall have satisfactorily performed a minimum of three (3) previous projects involving abrasive blast cleaning, metallizing, and paint application. At least one project within the past two (2) years shall have involved a bridge or similar industrial type application. The suitability of the Contractor's qualifications and prior experience will be considered by the Department before granting approval to proceed.

**Submittals:** The Contractor performing the shop work shall submit the following plans and information for Engineer review and acceptance within 30 days of contract execution (unless written permission from the Engineer states otherwise). When full coats are being applied in the field, the field painting contractor shall comply with the submittal requirements of Article 506.03. Work in the shop or field shall not proceed until submittals are accepted by the Engineer.

- (a) Contractor Personnel Qualifications: Evidence of experience and the names and qualifications/experience/training of the personnel managing and implementing the Quality Control program, and for those performing the quality control tests. QC personnel qualification requirements are found under “Quality Control (QC) Inspection.”

All metallizing applicators shall be qualified in accordance with AWS C2.16/C2.16M.

- (b) Quality Control (QC) Plan: A Quality Control Plan that identifies: test instruments to be used, a schedule of required measurements and observations, procedures for correcting unacceptable work, and procedures for improving surface preparation and metallizing/painting quality as a result of quality control findings. The program shall incorporate the IDOT Quality Control Daily Report Forms as supplied by the Engineer, or equivalent information on Engineer-approved Shop Contractor-designed forms.
- (c) Surface Preparation Plan: The surface preparation plan shall include the methods of surface preparation and types of equipment that will be used to prepare the surfaces as specified herein. Also any solvents proposed for solvent cleaning shall be identified and MSDS provided.
- (d) Abrasives: Identify the type and brand name of the abrasive proposed for use, provide MSDS and manufacturer’s data indicating that the abrasive meets requirements of the SSPC-AB 1 or AB 3 standards as specified herein.
- (e) Metallizing Plan: Written procedures for the shop application of metallizing, including the brand name and type of metallizing wire and application equipment to be used. Proof that the metallizing wire complies with ASTM B-833 and ANSI/AWS C2.25/C2.25M shall also be provided. Provide written documentation verifying that all metallizing applicators are qualified in accordance with ANSI/AWS C2.16/C2.16M.
- (f) Painting Plan: If shop painting is specified to be applied over the metallizing or if galvanizing is used in lieu of metallizing on minor bridge members, procedures for the application of the coating system shall be provided along with MSDS and product data sheets. A description of the application equipment to be used shall be included. The plan shall include the requirements to be followed by the field contractor for field touch up.
- (g) Shipping and Handling Plan: A written plan outlining the precautions that shall be taken for the protection of the finished surface during shipping and handling. The plan shall address the steps to be taken, such as insulating padding, wood dunnage, load securing strapping, binding apparatus, etc.

- (h) **Galvanizing Option:** At the Contractor's option, hot dip galvanizing may be proposed as a substitute for shop metallizing of bearings, typical cross frames, or diaphragms on non-curved structures; expansion joint assemblies; and other elements not carrying calculated stress. Submittal requirements are found under "Hot Dip Galvanizing Option." Include the proposed cleaning and painting plan.

The Engineer will provide written notification to the Contractor when submittals are complete and acceptable. No surface preparation work shall begin until that notification is received. This acceptance shall not be construed to imply approval of any particular method or sequence for conducting the work, or for addressing health and safety concerns. Acceptance does not relieve the Contractor from the responsibility to conduct the work according to the requirements of Federal, State, or Local regulations and this specification, or to adequately protect the health and safety of all workers involved in the project and any members of the public who may be affected by the project. The Contractor remains solely responsible for the adequacy and completeness of the programs and work practices, and adherence to them.

**Quality Control (QC) Inspections:** The Contractor performing the shop work shall perform first line, in process QC inspections. The Contractor shall implement the accepted QC Program to insure that the work complies with these specifications. The designated Quality Control inspector shall be onsite full time during any operations that affect the quality of the system (e.g., surface preparation, metallizing application, paint application, and final inspection at project completion). The Contractor shall use the IDOT Contractor Daily (QC) Metallizing & Painting Report form (supplied by the Engineer, or Engineer-approved Contractor-designed forms that contain the same information, to record the results of quality control tests and inspections. The completed reports shall be given to the Engineer before work resumes the following day.

QC inspections shall include, but are not limited to the following:

- Ambient conditions.
- Surface preparation (solvent cleaning, abrasive blast cleanliness, surface profile depth, etc.).
- Metallizing application (specified materials used, bend test, continuity and coverage, adhesion, dry film thickness).
- Verification that the MISTIC test ID number for the paint system has been issued when painting is specified.
- Paint Application (when specified)(specified materials used, continuity and coverage, dry film thickness, freedom from overspray, dry spray, pinholes, skips, misses, etc.).



The personnel managing the QC Program shall possess a minimum classification as a NACE CIP Level 2, or shall provide evidence of successful inspection of three projects of similar or greater complexity and scope completed in the last two years. References shall include the name, address, and telephone number of a contact person employed by the facility owner.

The personnel performing the QC tests shall be trained in all tests, inspections, and instrument use required for the inspection of surface preparation, metallizing and paint application. Documentation of training shall be provided. The QC personnel shall be solely dedicated to quality control activities and shall not perform any production work. QC personnel shall take the lead in all inspections, but applicators shall perform wet film thickness measurements during application of the coatings, with QC personnel conducting random spot checks. The Contractor shall not replace the QC personnel assigned to the project without advance notice to the Engineer, and acceptance of the replacement(s), by the Engineer.

The Contractor performing the shop work shall supply all necessary equipment to perform the QC tests and inspections as specified. Equipment shall include the following at a minimum:

- Psychrometer or comparable equipment for measurement of dew point and relative humidity, including weather bureau tables or psychrometric charts
- Surface temperature thermometer
- SSPC Visual Standard VIS 1
- Surface profile replica tape and spring micrometer or electronic micrometer designed for use with replica tape; or electronic profilometer designed for measuring blast profile.
- Blotter paper for compressed air cleanliness checks
- Type 2 Electronic Dry Film Thickness Gage
- Calibration standards for dry film thickness gage
- Bend test coupons and bend test mandrel
- Adhesion testing instrument
- Companion panels for adhesion testing (if that option is selected)
- All applicable ASTM, ANSI, AWS, and SSPC Standards used for the work (reference list attached)

The instruments shall be verified for accuracy and adjusted by the Contractor's personnel in accordance with the equipment manufacturer's recommendations and the Contractor's QC Program. All inspection equipment shall be made available to the Engineer for QA observations as needed.

**Hold Point Notification:** Specific inspection and testing requirements within this specification are designated as Hold Points. Unless other arrangements are made, the Contractor shall provide the Engineer with a minimum four-hour notification in advance of the Hold Point. If four-hour notification is provided and the work is ready for inspection at that time, the Engineer will conduct the necessary observations. If the work is not ready at the appointed time, unless other arrangements are made, an additional four-hour notification is required. Permission to proceed beyond a Hold Point without a QA inspection will be at the sole discretion of the Engineer and will only be granted on a case-by-case basis.

**Quality Assurance (QA) Observations:** The Engineer will conduct QA observations of any or all phases of the work. The presence or activity of Engineer observations in no way relieves the Contractor of the responsibility to perform all necessary daily QC inspections of their own and to comply with all requirements of this Specification.

The Engineer has the right to reject any work that was performed without adequate provision for QA observations.

### **CONSTRUCTION REQUIREMENTS**

The surface preparation and metallizing shall be according to the SSPC Specification for the Application of Thermal Spray Coatings (Metallizing) of Aluminum, Zinc and their Alloys and Composites for the Corrosion Protection of Steel, SSPC-CS 23.00/AWS C2.23M/NACE No. 12 except as modified herein. In the event of a conflict, the requirements of this specification shall prevail.

**Hot Dip Galvanizing Option:** At the Contractor's option, hot dip galvanizing may be substituted for shop metallizing of bearings, typical cross frames, or diaphragms on non-curved structures; expansion joint assemblies; and other elements not carrying calculated stress. Galvanized surfaces which shall have concrete poured against them shall be chemically passivated or otherwise protected by a method approved by the Engineer. Galvanized bearings for exterior members and elements readily visible after erection shall be prepared for field painting, but galvanized items obscured from public view will not require field painting. The Contractor shall submit a proposal for substituting galvanizing to the Engineer, showing items to be field painted, applicable provisions of AASHTO M 111 (ASTM A 123), drain/vent holes and any other necessary modifications.

**Notification:** The Contractor shall notify the Engineer 24-hours in advance of beginning surface preparation operations.

**Surface Preparation, Metallizing and Painting Equipment:** The Contractor shall provide surface preparation, metallizing, and painting equipment as needed to perform the work as specified herein.

Metallizing application equipment shall be portable electric arc thermal spray units that are set-up, adjusted and operated in accordance with the manufacturer's written instructions.

All cleaning and painting equipment shall include gages capable of accurately measuring fluid and air pressures and shall have valves capable of regulating the flow of air, water or paint as recommended by the equipment manufacturer. The equipment shall be maintained in proper working order.

Diesel or gasoline powered equipment shall be positioned or vented in a manner to prevent deposition of combustion contaminants on any part of the structure.

Hand tools, power tools, pressure washing, water jetting, abrasive blast cleaning equipment, brushes, rollers, and spray equipment shall be of suitable size and capacity to perform the work required by this specification. Appropriate filters, traps and dryers shall be provided for the compressed air used for abrasive blast cleaning and conventional spray application. Paint pots shall be equipped with air operated continuous mixing devices unless prohibited by the coating manufacturer.

**Test Areas (Sections):** Prior to proceeding with production work on the project, the Contractor shall prepare test sections of at least 10 square feet (0.93 sq. m). More than one test section may be needed to represent the various design configurations of the structure. The test section(s) shall be blast cleaned, metallized and painted (if specified) in accordance with the requirements specified herein using the same equipment, materials and procedures that will be used for the production.

During the blast cleaning, metallizing, and painting of the test section(s), in the presence of the Engineer, the Contractor shall perform all quality control tests and inspections required by this specification including complete documentation. In addition, the Contractor shall allow sufficient time for the Engineer to perform any or all quality assurance tests and inspections desired.

Production work shall not proceed until the Engineer agrees that the blast cleaning, metallizing, and painting work, along with the quality control testing, inspection, and documentation are acceptable.

No additional compensation will be paid for the preparation of the test section(s).

**Protective Coverings and Damage:** The Contractor shall apply protective coverings to all surfaces of the structural steel that are not scheduled for surface preparation, metallizing, and painting. The coverings shall be maintained and remain in place until the work is completed and then shall be removed prior to shipping.

Metallized or painted surfaces damaged by any Contractor's operation shall be repaired, and re-metallized and/or re-painted, as directed by the Engineer, at no additional cost to the Department.

**Ambient Conditions:** Surfaces prepared for metallizing or painting shall be free of moisture and other contaminants. The Contractor shall control operations to insure that dust, dirt, or moisture do not come in contact with surfaces on which work will take place. The surface temperature shall be at least 5°F (3°C) above the dew point during final surface preparation operations, and the application of metallizing. Metallizing shall only be applied when the surface and air temperatures are above 32°F (0°C). The manufacturers' published literature shall be followed for specific temperature, dew point, and humidity restrictions during the application of each paint coat. Metallizing or paint shall not be applied in rain, wind, snow, fog or mist. Ambient conditions shall be maintained during the drying period specified by the manufacturer.

**Compressed Air Cleanliness:** Prior to using compressed air for abrasive blast cleaning, blowing down surfaces, and metallizing or painting application, the Contractor shall verify that the compressed air is free of moisture and oil contamination according to the requirements of ASTM D 4285. The tests shall be conducted at least one time per shift for each compressor system in operation. If air contamination is evident, the Contractor shall change filters, clean traps, add moisture separators or filters, or make other adjustments as necessary to achieve clean, dry air. The Contractor shall also examine the work performed since the last acceptable test for evidence of defects or contamination caused by the contaminated compressed air. Contaminated work shall be repaired at no additional cost to the Department.

**Solvent Cleaning (HOLD POINT):** All traces of oil, grease, and other detrimental contaminants on the steel surfaces to be metallized shall be removed by solvent cleaning in accordance with SSPC-SP 1. The brand name of proposed cleaning solvent(s) and/or proprietary chemical cleaners including manufacturers' product data sheet and MSDS shall be submitted for Engineer acceptance prior to use.

Under no circumstances shall blast cleaning be performed in areas containing surface contaminants or in areas where the Engineer has not accepted the solvent cleaning. Rejected surfaces shall be re-cleaned to the specified requirements at no additional cost to the Department.

**Abrasives:** Abrasive blast cleaning shall be performed using either expendable abrasives or recyclable steel grit abrasives. Expendable abrasives shall be used one time and discarded. The abrasive shall be angular in shape. Acceptable angular shaped abrasives include, but are not limited to, aluminum oxide, steel grit, and crushed slag. Silica sand shall not be used. Steel shot and other abrasives producing a rounded surface profile are not acceptable, even if mixed with angular grit abrasives.

Abrasive suppliers shall provide written certification that expendable abrasives and recyclable steel grit abrasives meet the requirements of SSPC-AB 1 and AB 3, respectively. Abrasive suppliers shall certify that abrasives are not oil contaminated and shall have a water extract pH value within the range of 6 to 8. On a daily basis, the Contractor shall verify that recycled abrasives are free of oil and contamination by performing a vial test in accordance with SSPC-AB 2.

All surfaces that are found to have been prepared using abrasives not meeting the SSPC-AB 1, AB 2, or AB 3 requirements, as applicable, are oil contaminated, or have a pH outside the specified range, shall be solvent cleaned or low pressure water cleaned, and re-blast cleaned at no cost to the Department.

**Surface Preparation (HOLD POINT):** The following method of surface preparation shall be used:

- (a) Flame Cut Steel: Prior to blast cleaning, all flame cut edges shall be ground to remove hardened steel and any sharp or irregular shapes.
- (b) Near-White Metal Blast Cleaning: All steel surfaces to be metallized shall be near white metal blast cleaned in accordance with SSPC-SP 10 using dry abrasive blast cleaning methods.
- (c) Galvanized Minor Bridge Members: If galvanizing of minor bridge members is selected in lieu of metallizing, prepare all galvanized surfaces for painting by brush-off blast cleaning in accordance with SSPC-SP 16 or by using proprietary solutions that are specifically designed to clean and etch (superficially roughed) galvanized steel for painting. If cleaning and etching solutions are selected, submit manufacturer's technical product literature and MSDS for Engineer's review and written acceptance prior to use.
- (d) Base Metal Irregularities: If hackles, burrs, or slivers in the base metal are visible on the steel surface after cleaning, the Contractor shall remove them by grinding followed by re-blast cleaning.

**Surface Profile (HOLD POINT):** Blast cleaning abrasives shall be of the size and grade that will produce a uniform angular surface profile depth of 3.5 to 4.5 mils (89 to 114 microns). If the metallizing wire manufacturer's profile requirements are more restrictive, the Contractor shall advise the Engineer and comply with those requirements. For recycled abrasives, an appropriate operating mix shall be maintained in order to control the profile within these limits.

The average surface profile shall be determined each work day with a minimum frequency of one location per every 200 sq ft (18.6 sq m) per piece of equipment. All surfaces, including flame cut edges, shall be tested in accordance with SSPC-PA 17. Surface profile replica tape or electronic profilometer shall be used. The tape shall be retained and included with the daily QC report. Single measurements less than 3.5 mils (89 microns) are unacceptable. In that event, additional testing shall be done to determine the limits of the deficient area and, if it is not isolated, work will be suspended. The Contractor shall submit a plan for making the necessary adjustments to insure that the specified surface profile is achieved on all surfaces. Work shall not resume until the Engineer provides written acceptance.

**Surface Condition Prior to Metallizing (HOLD POINT):** Prepared surfaces shall meet the requirements of SSPC-SP 10 immediately prior to metallizing, and shall be metallized within six hours of blast cleaning. If rust appears or bare steel has been exposed for more than six hours, the affected area shall be re-blasted at no additional cost to the Department.

All dust and surface preparation residue on steel surfaces shall be removed prior to metallizing.

The quality of surface preparation and cleaning of surface dust and debris shall be accepted by the Engineer prior to metallizing.

The Engineer has the right to reject any work that was performed without adequate provision for QA observations to accept the degree of cleaning. Rejected metallizing work shall be removed and replaced at no additional cost to the Department.

**Daily Metallizing Operator-Equipment Qualification – Bend Tests:** Unless directed otherwise by the Engineer, each day that metallizing will be applied, the Contractor shall perform bend testing prior to beginning production work. For each metallizing applicator, five carbon steel coupons measuring 2 inch wide x 8 inch long x 0.05 inch (50mm x 400 mm x 1.3 mm) thick shall be blast cleaned using the same equipment and abrasive used for the production work. Each applicator shall apply the metallizing to five coupons in accordance with the requirements of this Specification to a dry film thickness of 8.0 to 12.0 mils (200 to 300µm). 180 degree bend testing shall be performed on all five coupons using a 13mm (1/2") mandrel in accordance with the requirements and acceptance criteria of SSPC-CS 23/AWS C2.23M/NACE 12. Minor cracks that cannot be lifted from the substrate with knife blade are acceptable. If lifting occurs on any coupon, the surface preparation and/or metallizing process shall be modified until acceptable results are achieved before proceeding with production work.

**Application of Metallizing:** Application shall be done in overlapping passes in a cross-hatch pattern (i.e., a second set of overlapping passes shall be applied at right angles to the first set of overlapping passes) to ensure uniform coverage. The gun shall be held at such a distance from the work surfaces that the metal is still molten on impact. The metallizing shall be applied as a continuous film of uniform thickness, firmly adherent, and free from thin spots, misses, lumps or blisters, and have a fine sprayed texture. Thin spots and misses shall be re-metallized. If touch up metallizing or the application of additional metallizing to previously applied metallizing does not occur within 24 hours, the surface of the metallizing shall be brush off blast cleaned according to SSPC-SP7 to remove oxidation and surface contaminants prior to the application of additional metallizing. The final appearance of the metallizing when left un-top coated or top coated with System 1 shall be uniform without excessive blotchiness or contrast in color. If the surface does not have a uniform appearance, remove and replace the metallizing at no cost to the Department. If the configuration of the surface being metallized does not allow for a proper gun-to-work piece standoff distance, the Contractor shall notify the Engineer.

Unless required by the contract plans, the top of the top flanges shall not be metallized or painted. If the contract plans indicate that the top flange is to be metallized, only the first coat of the paint system shall be applied to the top flange.

**Metallizing Thickness:** The thickness of the metallizing shall be 8.0 to 12.0 mils (200-300 microns). Thickness shall be measured as specified by SSPC-PA 2 (use a Type 2 Electronic Gauge only).

**Metallizing Adhesion:** Adhesion testing of metallizing applied each day shall be determined with a self-adjusting adhesion tester in accordance with ASTM D 4541. Unless otherwise directed by the Engineer, a minimum of one test shall be conducted for every 500 sq ft (46sq m) of metallized surface. The tests shall be conducted prior to application of any coating. If any of the tests exhibit less than 700 psi (4.83 MPa) for 85/15 or less than 500 psi (3.45 MPa) for zinc, additional tests shall be conducted to determine the extent of the deficient material. All deficient metallizing shall be removed by blast cleaning and re-applied at no additional cost to the Department.

At the discretion of the Engineer, a representative blast cleaned test panel (or steel companion panel approximately 12 inch x 12 inch x 1/4 inch thick) can be metallized at the same time each 500 sq ft (46sq m) of surface area, or portion thereof, is metallized. Adhesion testing can be performed on the companion panel rather than on the structure. If the adhesion tests on the panels are acceptable, the metallizing on the structure is considered acceptable and testing on the structure is not required. If adhesion testing of the panels fails, testing shall be conducted on the structure. If adhesion testing on the structure is acceptable, the metallizing on the structure is considered to be acceptable. If tests on the structure are unacceptable, complete removal of the failing metallizing and re-metallizing in accordance with this Specification shall be performed at no additional cost to the Department.

**Application of Paint Systems Over Metallizing:**

When painting over the metallizing is specified, three painting system options exist for application over the metallizing as shown below. Systems, or components of systems, specified to be shop applied shall not be applied to the faying surfaces of bolted connections. The system to be applied shall be as designated on the plans.

- (a) **System 1** is a single coat system consisting of a full clear aliphatic urethane coat shop applied to all metallized surfaces except as noted above.

The thickness of the clear coat to be applied is dependent on the product selected and shall be as follows:

**TABLE 1**

**CLEAR URETHANE COAT (SINGLE COAT SYSTEM)**

<b>MANUFACTURER</b>	<b>SEALER COAT ONLY (DFT)</b>
Carboline Company	Carbothane Clear Coat  (3.0 to 5.0 mils) (75 to 125 microns)
Pittsburgh Paints (PPG)	Pitthane Ultra Clear 95-8000  (2.0 to 3.0 mils) (50 to 75 microns)
Sherwin-Williams	ArmorSeal Rexthane I MCU  (3.0 to 5.0 mils) (75 to 125 microns)

The clear urethane shall be applied in a 2 step process. The first step shall be to apply a “mist coat” that is thinned at the maximum allowable thinning rate as listed on the manufacturer’s product data sheet that is compliant with VOC regulations. The intent of the mist coat is to saturate the porous metallizing surface and displace entrapped air within the porosity of the metallizing. After allowing the mist coat to flash off for 20 minutes, the full coat of clear urethane shall be applied to achieve the manufacturer’s recommended dry film thickness.



- (b) **System 2** is a four coat system consisting of a full shop coat of epoxy penetrating sealer coat, a full shop coat of an extended recoat epoxy and two full field applied coats of waterborne acrylic.

The epoxy penetrating sealer shall be applied in accordance with the coating manufacturer's instructions at a coverage rate designed to achieve a theoretical dry film thickness of 1.5 mils (38 microns). The intent of the epoxy penetrating sealer coat is to saturate the metallizing and cover the surface rather than to build a film thickness; therefore, dry film thickness measurement of the epoxy penetrating sealer coat is not required. The top of top flanges that are specified to be metallized and embedded in concrete shall receive the epoxy penetrating sealer only.

The thicknesses of the epoxy and waterborne acrylic coats shall be according to Article 506.09(f)(1).

- (c) **System 3** is a three coat system consisting of a full epoxy penetrating sealer coat, a full epoxy intermediate coat, and a full urethane finish coat. All coats shall be shop-applied unless specified otherwise. If the urethane is field-applied, an extended recoat epoxy shall be applied in the shop.

The epoxy penetrating sealer shall be applied in accordance with the coating manufacturer's instructions at a coverage rate designed to achieve a theoretical dry film thickness of 1.5 mils (38 microns). The intent of the epoxy penetrating sealer coat is to saturate the metallizing and cover the surface rather than to build a film thickness; therefore, dry film thickness measurement of the epoxy penetrating sealer coat is not required. The top of top flanges that are specified to be metallized and embedded in concrete shall receive the epoxy penetrating sealer only.

The thicknesses of the epoxy and urethane coats shall be according to Article 506.09(f)(2).

The single clear urethane coat or the epoxy penetrating sealer coat shall be applied within 24 hours of metallizing providing that the immediate work environment is controlled. If temperature and humidity cannot be controlled, that time frame shall be reduced to within 8 hours. The metallizing shall be dry and free of any visible debris or oxidation (zinc oxide) at the time of application. Visible oxidation shall be removed by mechanical methods such as stiff bristle or wire brushing. Contact surfaces for bolted connections shall consist of bare, uncoated metallizing only and shall be masked off prior to the application of any shop applied coatings.

The clear urethane coat or the epoxy penetrating sealer shall be applied in accordance with the manufacturer's instructions and in such a manner to assure thorough wetting and sealing of the metallizing.

For systems 2 and 3, prior to application of any subsequent coat, the surface of the previous coat shall be dry in accordance with the manufacturer's instructions and free of any visible contamination. If the manufacturer's specified recoat times are exceeded, the effected coat(s) shall be completely roughened or removed and replaced, according to the manufacturer's instructions, at no cost to the Department. The same restrictions regarding film appearance and continuity for the seal coat apply to the intermediate coat and topcoat.

All coats shall be applied to achieve a smooth, uniform appearance that is free of dryspray, overspray, and orange peel. Shadow-through, pinholes, bubbles, skips, misses, lap marks between applications, runs, sags, or other visible discontinuities are unacceptable.

Masked off areas around field connections shall be coated in the field after the steel is fully erected according to the touch-up procedure for the completed system.

When the application of field coat(s) is required, the existing shop applied coats shall be prepared and field painting performed according to the applicable provisions of Article 506.10. If any coat has exceeded its recoat time, the surface shall be completely roughened or removed and replaced according to the manufacturer's instructions, prior to the application of the topcoat.

All coatings shall be applied by spray, supplemented with brushing or rolling, if needed. Special attention shall be given to obtaining complete coverage and proper coating thickness in crevices, on welds and edges, and in hard to reach areas.

**Application of Paint System over Galvanizing:** If galvanizing is used in lieu of metallizing and Paint System 1, no further painting is required. If galvanizing is used in lieu of metallizing and Paint System 2, apply a two-coat system consisting of a full waterborne acrylic intermediate coat and a full waterborne acrylic finish coat from System 2. If galvanizing is used in lieu of metallizing and Paint System 3, apply a full epoxy intermediate coat and a full urethane coat from System 3. To minimize handling and erection damage the acrylic coats of System 2 shall be applied in the field. Except as noted on the plans, the epoxy and urethane coats of System 3 can be applied in the shop or field.

**Touch-Up of Completed Coating System:** The Contractor shall repair all damaged and/or unacceptable areas of the completed coating system (all metallizing, galvanizing, and paint layers) prior to shipment as defined below. The same process shall be followed for the repair of shipping, handling, and erection damage.

Damage to the metallizing, galvanizing, and/or paint that does not expose the substrate shall be prepared by solvent cleaning in accordance with SSPC-SP 1 followed by power tool cleaning in accordance with SSPC-SP 3 to remove loose material. For the repair of damaged metallizing or galvanizing that exposes the substrate, the surface shall be spot blast cleaned in accordance with SSPC-SP 10. If blast cleaning cannot be performed, as authorized by the Engineer, the damage shall be spot power tool cleaned to SSPC-SP11.

The metallizing, galvanizing and/or paint surrounding each repair area shall be feathered for a distance of 1 to 2 inches (25 to 50 mm) to provide a smooth, tapered transition into the existing intact material. The surrounding intact paint shall be roughened to promote adhesion of the repair coats.

Damage to metallizing or galvanizing extends to the substrate shall be repaired. For metallizing it is critical that all remnants of sealer or paint have been removed from the porosity of the metallizing before applying new metallizing or an adhesion failure can occur. If it is no longer feasible to apply metallizing, spot-apply an organic zinc primer meeting the requirements of Section 1008. For galvanizing, spot apply organic zinc. After priming, for both the metallizing and galvanizing, apply the same intermediate and finish coats used on the surrounding steel. If the damage does not expose the substrate, only the effected paint coat(s) shall be applied.

**Surface Preparation and Painting of Galvanized Fasteners:** All ASTM A 325 or ASTM F 3125 high strength steel bolts, nuts and washers shall be hot dip galvanized according to AASHTO M232, except in areas where the metallized surfaces are to be top coated, in which case they shall be mechanically galvanized according to Article 1006.08(a) of the Standard Specifications.

The Contractor shall prepare all fasteners (i.e., galvanized nuts, bolts, etc.) by power tool cleaning in accordance with SSPC-SP 3. Following power tool cleaning and prior to painting, the surfaces shall be solvent cleaned according to SSPC-SP 1. Slight stains of torqueing compound dye may remain after cleaning provided the dye is not transferred to a cloth after vigorous rubbing. If any dye is transferred to a cloth after vigorous rubbing, additional cleaning is required.

Spot paint the fasteners with one coat of an aluminum epoxy mastic coating meeting the requirements of Article 1008.03 of the Standard Specifications.

**Shipping and Handling:** The Contractor shall take special care in handling the steel in the shop and when loading for shipment. Painted, metallized, or galvanized steel shall not be moved or handled until sufficient cure time has elapsed to prevent handling damage. During shipping, the steel shall be insulated from the moving apparatus (i.e., chains, cables, hooks, clamps, etc.) by softeners approved by the Engineer. Apparatus used to hoist the steel shall be padded. Steel shall be placed on wood dunnage and spaced in such a manner that no rubbing will occur during shipment that could damage the paint, metallizing or galvanizing.

**Special Instructions:** At the completion of the work, the Contractor shall stencil on the bridge, using a contrasting colored paint, the date of metallizing and painting. The letters shall be capitals, not less than 2 inches (50 mm) and not more than 3 inches (75 mm) in height. The information defined below shall be stenciled on the exterior face of the first girders at the bridge abutments (approximately 1 or 2 feet outward from the abutment end of the girders). The Engineer will identify the bridge member(s) to be stenciled.

When all coats are applied in the shop with the exception of touch-up, the shop Contractor shall do the stenciling. The stencil shall contain the following words on four lines: "METALLIZED BY" on the first line; name of the Contractor on the second line; and the month and year in which the coating was completed on the third line; and the applicable system Code on the fourth line.

When the finish coat is applied in the field, the Contractor shall do the stenciling as described above, but insert "PAINTED BY" and the Contractor's name after the fourth line.

**Basis of Payment:** This work shall not be paid for separately but shall be included in the unit price bid for furnishing and/or erecting structural steel according to Article 505.13.

## **Appendix 1 – Reference List**

The Shop and Field Contractor(s) shall maintain the following regulations and references on site for the duration of the project:

### **Illinois Environmental Protection Act**

#### **American Society of Testing Material**

- ASTM D 4285, Standard Test Method for Indicating Oil or Water in Compressed Air
- ASTM B833, Standard Specifications for Zinc Wire for Thermal Spraying (Metallizing)
- ASTM D4541, Standard Test Method for Pull-Off Strength of Coatings Using Portable Adhesion Testers

#### **Society of Protective Coatings**

- SSPC-AB 1, Mineral and Slag Abrasives
- SSPC-AB 2, Specification for Cleanliness of Recycled Ferrous Metallic Abrasives
- SSPC-AB 3, Newly Manufactured or Re-Manufactured Steel Abrasives
- SSPC-PA 2, Measurement of Dry Coating Thickness with Magnetic Gages
- SSPC-QP 1, Standard Procedure for Evaluating Painting Shop Contractors (Field Application to Complex Structures)
- SSPC-QP 2, Standard Procedure for Evaluating the Qualifications of Painting Shop Contractors to Remove Hazardous Paint
- SSPC-SP 1, Solvent Cleaning
- SSPC-SP 5/NACE No. 1, White Metal Blast Cleaning
- SSPC-SP 11, Power Tool Cleaning to Bare Metal
- SSPC-SP 12/NACE No. 5, Surface Preparation and Cleaning of Metals by Water Jetting Prior to Recoating

- SSPC-SP 16, Brush-Off Blast Cleaning of Coated and Uncoated Galvanized Steel, Stainless Steels, and Non-Ferrous Metals
- SSPC-PA 17, Procedure for Determining Conformance to Steel Profile/Surface Roughness/Peak Count Requirements.
- SSPC-VIS 1, Guide and Reference Photographs for Steel Surfaces Prepared by Dry Abrasive Blast Cleaning
- SSPC-VIS 5, Guide and Reference Photographs for Steel Prepared by Wet Abrasive Blast Cleaning
- SSPC-Guide 15, Field Methods for Retrieval and Analysis of Soluble Salts on Steel and Other Nonporous Surfaces
- SSPC-CS 23.00/AWS C2.23M/NACE No. 12, Specification for the Application of Thermal Spray Coatings (Metallizing) of Aluminum, Zinc, and Their Alloys and Composites for the Corrosion Protection of Steel

**American National Standards Institute/American Welding Society**

- ANSI/AWS C2.25/C2.25M, Specification for Solid and Composite Wires, and Ceramic Rods for Thermal Spraying
- AWS C2.6/C2.6M, Guide for Thermal-Spray Operator Qualification

Metallizing wire and coating manufacturer's application instructions, MSDS and product data sheets

## **MICROPILES**

Effective: April 19, 1996

Revised: August 9, 2019

Description. This work shall consist of designing, furnishing, installing and testing the proposed micropiles according to the plans, approved shop drawings, and this Special Provision.

The Contractor shall be responsible for selecting the micropile type, installation method, bond lengths, grout pressures, and any necessary changes to the structural elements, such that the micropiles will carry both the compressive and tension design loads indicated on the plans at the maximum tolerable deflections specified. The Contractor shall demonstrate the micropile adequacy by performing pile load test(s) and micropile proof tests that satisfy the acceptance criteria of this Special Provision.

Submittals. The Contractor selected to perform this work shall satisfy the qualification requirements and shall provide shop drawings for the proposed micropile installation.

- (a) Qualifications: The Contractor performing the work shall have personnel experienced in the design, construction and testing of micropiles. The Contractor shall have successfully installed a total of at least 100 micropiles on no less than five (5) different projects completed within the last five (5) years of similar project conditions and capacities to those required on this project.

The Contractor shall assign a field supervisor with experience on at least three (3) projects of similar scope to this project, completed over the past five (5) years. The on-site foreman and drill rig operator(s) must have completed three (3) projects within the last five (5) years involving micropiles of equal or greater capacity than required on this project. The Department may suspend the micropile work if the Contractor substitutes unqualified personnel and the Contractor shall be liable for additional costs resulting from the suspension.

The above experience qualifications list and personnel list shall be submitted for approval prior to or with the shop drawings submittal.

(b) Design Calculations and Shop Drawings. At least five weeks before work is to begin, the Contractor shall submit to the Engineer for review and approval, design calculations and complete shop drawings describing the micropile system, or systems, intended for use. The micropiles shall be designed and detailed to carry the tension and compression loadings indicated on the plans. The submittal shall be prepared and sealed by an Illinois Licensed Structural Engineer and include (as a minimum) the following:

(1) Design calculations including the following:

- a. Geotechnical design computations that describe how the micropile bonded lengths were designed.
- b. Applicable code requirements and design reference literature used in the geotechnical and structural computations.
- c. Micropile design profile cross-section(s) geometry including casing plunge length(s), bonded lengths and minimum diameter, the soil/rock strata anticipated, and the piezometric levels.
- d. Design criteria including soil/rock shear strengths (friction angle and cohesion), unit weights, minimum grout compressive strength, ground/grout bond values, and assumptions for each soil/rock strata.
- e. Resistance factors used and the resulting factored geotechnical resistance of each portion of the micropile.
- f. Structural design calculations sizing the load and proof testing frame, reaction piles and connections to both the reaction piles and micropiles. Geotechnical calculations shall be submitted to indicate that a minimum factored resistance exists for the reaction piling equal to twice the maximum test loading.
- g. If proposing to modify the anchorage head assembly, connection to footing, casing, reinforcement, bearing plate or weld details shown in the plans, structural calculations supporting these changes shall also be submitted.



(2) Shop drawings including the following:

- a. Plan view of the project showing:
  1. All proposed micropiles with each labeled with a unique identification number.
  2. Locations of subsurface exploration borings plotted and labeled.
  3. Proposed overall sequence of construction.
  4. Locations of micropiles to be proof tested and load tested.
- b. Elevation view of project showing:
  1. The location of the existing substructures and all soil boring data plotted with all major changes in soil type or stratification identified.
  2. The proposed micropile lengths plotted at each substructure as well as the bottom of casing, top of bonded length, plunge length and minimum tip elevations indicated.
  3. All general notes for constructing the micropiles.
- c. Micropile typical section showing:
  1. The proposed typical micropile configuration(s) including steel casing, reinforcement sizes, grout tubes and minimum grouted diameters (in both the cased and bonded lengths).
  2. Step by step installation procedure(s) including casing advancement, grouting elevations, re-grouting, etc.
  3. Reinforcement centralizers and spacer locations and details.
  4. Casing splice details.
- d. Anchorage head assembly details including reinforcement, casing, bearing plate, embedment/connection to footing and required weld sizes if proposing to deviate from those provided in the plans.
- e. Any revisions to details shown on the plans necessary to accommodate the micropile system intended for use.
- f. Micropile load and proof testing sheet showing:
  1. Load frame and anchor pile details for load tests.
  2. Load frame and reaction pile connection for proof testing production piles.
  3. Any additional reinforcement and grout strength required in the load test micropiles to permit testing to 1.5 times the design loadings.
  4. Jack, pressure gauge and load cell calibration curves.
- g. The grout mix design and procedures for monitoring and recording the grout depth, volume and pressure during the grouting process.

Work shall not start on any micropile, nor shall materials be ordered, until the shop drawings and qualifications have been approved in writing by the Engineer.

Materials. The materials used for the construction of the micropiles shall satisfy the following requirements:

- (a) Reinforcement Steel: Micropiles reinforcement shall consist of single or multiple elements of either 150 ksi (1034 MPa) or 75ksi (520 MPa) ( $f_u$ ) high strength threadbars or deformed bars conforming to ASTM A722 or A706.
- (b) Steel Couplers: Prestressing steel couplers shall be capable of developing 95 percent of the minimum specified ultimate tensile strength of the reinforcement steel.
- (c) Grout: The grout shall consist of a neat cement or sand cement mixture of Type II, III or V portland cement conforming to Section 1024.01 of the Standard Specifications. The minimum compressive strength of the grout shall be as specified on the plans but not less than 4 ksi (27.6 MPa). Expansive admixtures may not be used except to seal the encapsulations and anchorage covers. Admixtures to control bleed, improve flowability, reduce water content, and retard set may be used if approved by the Engineer. Accelerators and admixtures containing chlorides are not permitted.
- (d) Fine Aggregate: If sand-cement grout is used, sand shall conform to the requirements for fine aggregates according to Section 1003 of the Standard Specifications.
- (e) Spacers: Spacers for separation of elements of a multi-element reinforcement shall permit the free flow of grout. They shall be fabricated from plastic, steel or material which is not detrimental to the reinforcement. Wood shall not be used. Spacers shall be placed along the total length of the micropile so that the steel will bond to the grout. They shall be located at 10 ft (3 m) maximum centers with the upper one located a maximum of 5 ft (1.5 m) from the top of the micropile and the lower one located a maximum of 5 ft (1.5 m) from the bottom of the bonded length.
- (f) Centralizers: Centralizers shall be fabricated from plastic, steel or material which is not detrimental to the reinforcing steel. Wood shall not be used. Centralizers shall be able to maintain the reinforcement position and alignment so that a minimum of 1.5 inches (38 mm) of grout cover is obtained at all locations below the cased micropile length. They shall be located at 10 ft (3 m) maximum centers with the lower one located one foot from the bottom of the bonded length.
- (g) Anchorage head assembly: The materials properties, dimensions, and design details for the micropile anchorage head assembly components shall be as specified on the contact plans unless otherwise proposed by the Contractor and approved as part of the shop drawings submittal. Anchorage components may include bearing plates (ASTM A572 Grade 50), shear studs, reinforcement steel, nuts, casing and other approved components.

- (h) Steel casing: Steel casing shall be flush joint API N-80 Pipe of the wall thickness and diameter shown on the plans. Any changes to this casing shall be submitted to the Department for review and approval as part of the shop drawing submittal.

Construction Requirements. The drilling method used may be rotary drilling, percussion drilling or an approved alternate. The method of installation used shall be that which prevents loss of ground around the drilled hole that may be detrimental to the structure. The drillhole shall be maintained open along its full length at the minimum drillhole diameter specified on the approved shop drawings prior to placing reinforcement and grout. Temporary casing or other approved method of micropile drillhole support shall be required in caving or unstable conditions.

The Contractor shall notify the Engineer if an obstruction is encountered. An obstruction is an unknown isolated object that causes the excavation to experience a significant decrease in the actual production rate and requires the Contractor to core, break up, push aside, or use other means to mitigate the obstruction. Subsurface conditions such as boulders, cobbles, or logs and buried infrastructure such as footings, piling, or abandoned utilities, when shown on the plans, shall not constitute an obstruction. When an obstruction is encountered, the Contractor shall notify the Engineer immediately and upon concurrence of the Engineer, the Contractor shall mitigate the obstruction with an approved method unless relocating the micropile would be less expensive.

Casing shall be installed in sections of appropriate lengths with threaded connections. The casing shall be capable of advancing the hole through the soil strata as indicated in the boring data. Welded Joints may be used if the welding detail is submitted and approved as part of the shop drawings.

The reinforcement shall be placed prior to grouting. The reinforcement shall be inserted to the desired depth without undue stress or difficulty (not driven or forced). When the reinforcement cannot be completely inserted it shall be removed and the drill hole cleaned or re-drilled to permit insertion. The reinforcement shall be free of soil, grease, or oil that might reduce the grout to bar bond.

The micropiles shall be grouted within 24 hours after the load transfer bond length is drilled. Grout shall be free of any lumps and undispersed cement. The grout volumes and pressures shall be measured and recorded during the placement operation. The pump shall be equipped with a grout pressure gauge at the pump and a second gauge placed at the point of injection at the top of the casing to monitor grout pressures. The gauges shall be capable of measuring pressures of at least 150 psi (1.0 MPa ) or twice the actual grout pressures used, whichever is greater. The grout shall be continuously agitated after mixing. All grout shall be placed within one hour of mixing. The grouting equipment shall be sized to enable each pile to be grouted in one continuous operation. The grout shall be injected from the lowest point of the drillhole (through grout tubes, casing, drill rods, etc.) and continued until uncontaminated grout flows from the top of the micropile. Temporary casing, if used, shall be extracted in stages ensuring that, after each length of casing is removed, the grout level is brought up to ground level before the next length is removed. The casing or grout tube shall always extend below the level of the grout in the drillhole. Upon completion of grouting, the grout tube or access valve may remain in the drill hole and anchorage head assembly provided it is filled with grout. The grout take and pressure shall be controlled to prevent any heave of the ground surface or foundations.

The Contractor shall monitor the existing foundation for movement. If movement is detected, the Contractor shall immediately stop production and notify the Engineer. Work shall not resume until the Contractor's recommendations to remedy the situation are approved by the Engineer.

The following construction tolerances shall apply to all production micropiles:

- (a) The center of the micropile casing shall be within 2 in. (50 mm) of plan location in any direction at the top of the pile.
- (b) The deviation of the shaft batter from that specified shall not exceed 1/8 in./ft. (10 mm/m).
- (c) The top of the casing shall be within  $\pm 2$  inches (50 mm) of the plan elevation.

Micropile Load Test and Micropile Proof Test. The Contractor shall install and load test non-production micropile(s) as well as proof test selected production micropiles. The load testing shall be performed by incrementally loading the micropiles according to ASTM D 1143 for the compression loading and ASTM D 3689 for the tension loading using the Quick Load Test Method except as modified herein. Testing shall not take place until the grout has acquired the specified design strength.

The jack ram travel shall be positioned at the beginning of the test so that unloading and repositioning during the test shall not be required. When both compression and tension loading is to be performed, it shall be performed on the same micropile and the compression loading shall be conducted first. Dial gauges capable of measuring displacements to 0.001 inch (0.025 mm) shall be used to measure micropile movement of the jack from an independent reference point. If the test setup requires reaction against the ground or a single row of reaction piles, two gauges shall be used on either side of the micropile. The reaction frame and piles shall be adequately stiff to prevent excessive deformation, misalignment or racking under peak loading. The stressing equipment shall be placed over the micropile in such a manner that the jack, load cell, and load test reaction frame are axially aligned with the anchorage head assembly reinforcement. Gauges shall have adequate travel so the total micropile movements can be measured without resetting the devices.

Test loads shall be applied with a hydraulic jack and measured with a pressure gauge. The pressure gauge shall be graduated in 72 psi (500 kPa) increments or less. The jack and pressure gauge shall have a pressure range not exceeding twice the anticipated maximum test pressure. Monitor the creep test load hold during testing with both the pressure gauge and electronic load cell. The load cell shall be used to accurately maintain a constant load hold during the creep test load hold increment of the testing.

Micropile Load Test. The Contractor shall perform non-production micropile load test(s) to verify the design and the construction methods proposed prior to installing production micropiles. The number and general location of the load test(s) are indicated in the plans and shall be constructed and tested according to this specification and the approved shop drawings.

The micropile load test Design Load shall be taken as the maximum factored compression and tension strength group loadings indicated at any substructure covered by the load test as shown on the plans. Micropiles not founded in rock shall follow the test loading schedule shown below. Micropiles founded in rock may omit increments 1 through 12:

Load Test Schedule

Increment	Loading Applied	Increment	Loading Applied
1	Alignment Load	13	Alignment Load
2	0.25 Design Load	14	0.25 Design Load
3	0.50 Design Load	15	0.50 Design Load
4	Alignment Load	16	0.75 Design Load
5	0.25 Design Load	17	1.00 Design Load
6	0.50 Design Load	18	1.25 Design Load
7	0.75 Design Load	19	1.50 Design Load
8	Alignment Load	20	1.00 Design Load
9	0.25 Design Load	21	0.50 Design Load
10	0.50 Design Load	22	0.25 Design Load
11	0.75 Design Load	23	Alignment Load
12	1.00 Design Load		

The dial gauges shall be reset to zero after the initial Alignment Load increment is applied. The Alignment Load is defined as the minimum load necessary to maintain alignment of the stressing equipment and reaction frame. The load holding period shall start as soon as each load increment is fully applied and last for 1 minute for each increment with the exception of the 1.0 load increments which shall be held for 10 minutes. The jack shall be re-pumped as necessary in order to maintain a constant load during this period. The micropile deflections shall be measured and recorded at the end of the load holding period. In addition, the 1.0 load hold increment shall be monitored for creep by recording the micropile movements at 1, 2, 3, 5, 6, and 10 minutes during the load hold. If the movement between the 1 and 10 minute increments exceeds 0.04 inches (1 mm), the load hold shall be extended and held for an additional 50 minutes. Movement shall be recorded at the 15, 20, 30, 40, 50 and 60 minute time increments.

A graph shall be constructed showing a plot of anchorage head assembly movement deflections versus test loading (both tension and compression) at the end of each load increment in the test schedule including the rebound measurements after unloading.

The acceptance criteria, demonstrating a successful load test, are as follows:

- (a) The micropile shall carry at least 1.0 times the design compression and tension loadings with a deflection of the anchorage head assembly less than the theoretical elastic deflection from its anchorage head to the midpoint of the bonded length.
- (b) The micropile shall have a creep rate not exceeding 0.08 inch (2 mm)/log cycle of time at the end of the 1.5 times the Design Load increment. The creep rate graphed on log scale shall be linear or decreasing throughout the creep load hold period.
- (c) The nominal geotechnical resistance shall exceed 1.5 times the factored compression and tension design loads shown on the plans, as determined using Davisson Method as presented in AASHTO article 10.7.3.8.2.

In the event that a load tested micropile fails the acceptance criteria, the Contractor shall re-evaluate his/her design and construction procedures, making the necessary changes to install an additional non-production micropile and any additional anchor pile(s) to allow another load test. The above process shall be repeated until a successful micropile passes the load test acceptance criteria. Payment for the successful load test shall include all work associated with any failed micropile load test(s).

The Engineer will provide the Contractor with written confirmation of the micropile design and construction within 10 working days of the completion of the load test(s). This written confirmation shall confirm the adequacy of the bonded lengths and tip elevations shown on the Contractor's shop drawing or the revised values required due to any failed micropile.

Load tested micropiles and reaction piles located in non-production locations shall be cut 2 ft. (600 mm) below finished grade after completion.

Micropile Proof Test: The Contractor shall install a set of micropiles at each substructure unit designated to have micropiles for the purpose of conducting a proof test on a production micropile. A set of micropiles is defined as the minimum number of micropiles (production or sacrificial) required to proof test a production micropile and provide the proof test load frame reaction capacity. If the contractor chooses to install additional production micropiles prior to proof testing, re-grouting or additional micropiles may be required at the contractor expense should the proof test not pass the acceptance criteria.

The proof test Design Load shall be taken as the maximum factored compression and maximum tension strength group loadings indicated at each substructure, shown on the plans. The loadings shall be incrementally applied according to the schedule shown below:

**Proof Test Schedule**

Increment	Loading Applied	Increment	Loading Applied
1	Alignment Load	7	0.90 Design Load
2	0.15 Design Load	8	1.00 Design Load
3	0.30 Design Load	9	0.75 Design Load
4	0.45 Design Load	10	0.50 Design Load
5	0.60 Design Load	11	0.25 Design Load
6	0.75 Design Load	12	Alignment Load

The dial gauges shall be reset to zero after the initial Alignment Load increment is applied. The Alignment Load is defined as the minimum load necessary to maintain alignment of the stressing equipment and reaction frame. The load holding period shall start as soon as each load increment is fully applied and last for 1 minute for each increment with the exception of the 1.00 load increment which shall have a 10 minute load hold. If the top of the micropile movement between the 1 minute and 10 minute time intervals exceeds 0.04 inches (1 mm), the 1.00 load hold shall be maintained for an additional 50 minutes. The jack shall be re-pumped as necessary in order to maintain a constant load during this period. The micropile deflections shall be measured and recorded at the end of the load holding period. The 1.00 load hold increment shall be monitored by recording the micropile movements at 1, 2, 3, 5, 6, and 10 minutes and if extended shall be recorded at the 20, 30, 50, and 60 minutes during the load hold.

A graph shall be constructed showing a plot of anchorage head assembly movement deflections versus test loading (both tension and compression) at the end of each load increment in the test schedule including the rebound measurements after unloading.

The acceptance criteria, demonstrating a successful load test, are as follows:

- (a) The micropile shall carry at least 1.0 times the design compression and tension loadings with a deflection of the anchorage head assembly less than the theoretical elastic deflection from its anchorage head to the midpoint of the bonded length.
- (b) The micropile shall have a creep rate not exceeding 0.08 inch (2 mm)/log cycle of time at the end of the 1.0 times the Design Load increment. The creep rate graphed on log scale shall be linear or decreasing throughout the creep load hold period.

In the event that a production micropile fails the proof test acceptance criteria, the Contractor shall re-evaluate his/her design and construction procedures, make the necessary changes and install an additional non-production micropile and additional anchor pile(s), outside the proposed footing and proof test the revised micropile. The above process shall be repeated until a micropile passes the acceptance criteria. The set of production micropiles installed as part of the failed proof test shall be cut flush with the bottom of the footing and supplemented by micropiles installed using improved design and installation methods adjacent to the failed micropiles. The failed load test(s), any supplemental or additional anchor piles, or micropiles cut flush with the bottom of the footing shall be included with the successful micropile proof test loading.

Basis of Payment. This work will be paid for at the contract unit price each for MICROPILES, and shall be compensation in full for designing, furnishing and installing the production micropiles incorporated in the final structure, according to the contract plans, approved shop drawings, and the Special Provisions. Pile load testing of non-production micropiles passing the acceptance criteria will be paid for at the contract unit price each for MICROPILE LOAD TEST and shall be compensation in full for designing, furnishing and installing the load tested micropile(s), anchor piles, reaction frame, and applying the test loads. Micropile proof testing of selected production micropiles will be paid for at the contract unit price each for MICROPILE PROOF LOAD TEST and shall be compensation in full for installing the anchor piles, reaction frame, and applying the test loads.

Obstruction mitigation will be paid for according to Article 109.04 of the Standard Specifications.

**DRILLED SHAFTS**

Effective: October 5, 2015

Revised: October 4, 2016

Revise Section 516 of the Standard Specifications to read:

**“SECTION 516. DRILLED SHAFTS**

**516.01 Description.** This work shall consist of constructing drilled shaft foundations.

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

Item	Article/Section
(a) Portland Cement Concrete (Note 1) .....	1020
(b) Reinforcement Bars.....	1006.10
(c) Grout (Note 2) .....	1024.01
(d) Permanent Steel Casing .....	1006.05(d)
(e) Slurry (Note 3)	

Note 1. When the soil contains sulfate contaminates, ASTM C 1580 testing will be performed to assess the severity of sulfate exposure to the concrete. If the sulfate contaminate is >0.10 to < 0.20 percent by mass, a Type II (MH) cement shall be used. If the sulfate contaminate is >0.20 to < 2.0 percent by mass, a Type V cement shall be used. If the sulfate contaminate is ≥ 2.0 percent by mass, refer to ACI 201.2R for guidance.

Note 2. The sand-cement grout mix shall be according to Section 1020 and shall be two to five parts sand and one part Type I or II cement. The maximum water cement ratio shall be sufficient to provide a flowable mixture with a typical slump of 10 in. (250 mm).

Note 3. Slurry shall be bentonite, emulsified polymer, or dry polymer, and shall be approved by the Engineer.



**516.03 Equipment.** Equipment shall be according to the following.

Item	Article/Section
(a) Concrete Equipment	1020.03
(b) Drilling Equipment (Note 1)	
(c) Hand Vibrator	1103.17(a)
(d) Underwater Concrete Placement Equipment	1103.18

Note 1. The drilling equipment shall have adequate capacity, including power, torque and down thrust, to create a shaft excavation of the maximum diameter specified to a depth of 20 percent beyond the depths shown on the plans.

**516.04 Submittals.** The following information shall be submitted on form BBS 133.

- (a) Qualifications. At the time of the preconstruction conference, the Contractor shall provide the following documentation.
- (1) References. A list containing at least three projects completed within the three years prior to this project's bid date which the Contractor performing this work has installed drilled shafts of similar diameter, length, and site conditions to those shown in the plans. The list of projects shall contain names and phone numbers of owner's representatives who can verify the Contractor's participation on those projects.
  - (2) Experience. Name and experience record of the drilled shaft supervisor, responsible for all facets of the shaft installation, and the drill operator(s) who will be assigned to this project. The supervisor and operator(s) shall each have a minimum of three years experience in the construction of drilled shafts.
- (b) Installation Procedure. A detailed installation procedure shall be submitted to the Engineer for acceptance at least 28 days prior to drilled shaft construction and shall address each of the following items unless otherwise directed by the Engineer in writing.
- (1) Equipment List. List of proposed equipment to be used including cranes, drill rigs, augers, belling tools, casing, vibratory hammers, core barrels, bailing buckets, final cleaning equipment, slurry equipment, tremies, or concrete pumps, etc.
  - (2) General Sequence. Details of the overall construction operation sequence, equipment access, and the sequence of individual shaft construction within each substructure bent or footing group. The submittal shall address the Contractor's proposed time delay and/or the minimum concrete strength necessary before initiating a shaft excavation adjacent to a recently installed drilled shaft.
  - (3) Shaft Excavation. A site specific step by step description of how the Contractor anticipates the shaft excavation to be advanced based on their evaluation of the subsurface data and conditions expected to be encountered. This sequence shall note the method of casing advancement, anticipated casing lengths, tip elevations and diameters, the excavation tools used and drilled diameters created. The Contractor shall indicate whether wet or dry drilling conditions are expected and if groundwater will be sealed from the excavation.

- (4) Slurry. When the use of slurry is proposed, details on the types of additives to be used and their manufacturers shall be provided. In addition, details covering the measurement and control of the hardness of the mixing water, agitation, circulation, de-sanding, sampling, testing, and chemical properties of the slurry shall be submitted.
- (5) Shaft Cleaning. Method(s) and sequence proposed for the shaft cleaning operation.
- (6) Reinforcement Cage and Permanent Casing. Details of reinforcement placement including rolling spacers to be used and method to maintain proper elevation and location of the reinforcement cage within the shaft excavation during concrete placement. The method(s) of adjusting the reinforcement cage length and permanent casing if rock is encountered at an elevation other than as shown on the plans. As an option, the Contractor may perform soil borings and rock cores at the drilled shaft locations to determine the required reinforcement cage and permanent casing lengths.
- (7) Concrete Placement. Details of concrete placement including proposed operational procedures for free fall, tremie or pumping methods. The sequence and method of casing removal shall also be stated along with the top of pour elevation, and method of forming through water above streambed.
- (8) Mix Design. The proposed concrete mix design(s).
- (9) Disposal Plan. Containment and disposal plan for slurry and displaced water. Containment and disposal plan for contaminated concrete pushed out of the top of the shaft by uncontaminated concrete during concrete placement.
- (10) Access and Site Protection Plan. Details of access to the drilled shafts and safety measures proposed. This shall include a list of casing, scaffolding, work platforms, temporary walkways, railings, and other items needed to provide safe access to the drilled shafts. Provisions to protect open excavations during non-working hours shall be included.

The Engineer will evaluate the drilled shaft installation procedure and notify the Contractor of acceptance, need for additional information, or concerns with the installation's effect on the existing or proposed structure(s).

## CONSTRUCTION REQUIREMENTS

**516.05 General.** Excavation for drilled shaft(s) shall not proceed until written authorization is received from the Engineer. The Contractor shall be responsible for verification of the dimensions and alignment of each shaft excavation as directed by the Engineer.

Unless otherwise approved in the Contractor's installation procedure, no shaft excavation, casing installation, or casing removal with a vibratory hammer shall be made within four shaft diameters center to center of a shaft with concrete that has a compressive strength less than 1500 psi (10,300 kPa). The site-specific soil strengths and installation methods selected will determine the actual required minimum spacing, if any, to address vibration and blow out concerns.

Lost tools shall not remain in the shaft excavation without the approval of the Engineer.

Blasting shall not be used as a method of shaft excavation.

**516.06 Shaft Excavation Protection Methods.** The construction of drilled shafts may involve the use of one or more of the following methods to support the excavation during the various phases of shaft excavation, cleaning, and concrete placement dependent on the site conditions encountered. Surface water shall not flow uncontrolled into the shaft excavation, however water may be placed into the shaft excavation in order to meet head pressure requirements according to Articles 516.06(c) and 516.13.

The following are general descriptions indicating the conditions when these methods may be used.

- (a) **Dry Method.** The dry construction method shall only be used at sites where the groundwater and soil conditions are suitable to permit the drilling and dewatering of the excavation without causing subsidence of adjacent ground, boiling of the base soils, squeezing, or caving of the shaft side walls. The dry method shall consist of drilling the shaft excavation, removing accumulated water, cleaning the shaft base, and placing the reinforcement cage and concrete in a predominately dry excavation.
- (b) **Slurry Method.** The slurry construction method may be used at sites where dewatering the excavation would cause collapse of the shaft sidewalls or when the volume and head of water flowing into the shaft is likely to contaminate the concrete during placement resulting in a shaft defect. This method uses slurry, or in rare cases water, to maintain stability of the shaft sidewall while advancing the shaft excavation. After the shaft excavation is completed, the slurry level in the shaft shall be kept at an elevation to maintain stability of the shaft sidewall, maintain stability of the shaft base, and prevent additional groundwater from entering the shaft. The shaft base shall be cleaned, the reinforcement cage shall be set, and the concrete shall be discharged at the bottom of the shaft excavation, displacing the slurry upwards.

- (c) Temporary Casing Method. Temporary casing shall be used when either the dry or slurry methods provide inadequate support to prevent sidewall caving or excessive deformation of the shaft excavation. Temporary casing may be used with slurry or be used to reduce the flow of water into the excavation to allow dewatering and concrete placement in a dry shaft excavation. Temporary casing shall not be allowed to remain permanently without the approval of the Engineer.

During removal of the temporary casing, the level of concrete in the casing shall be maintained at a level such that the head pressure inside the casing is a minimum of 1.25 times the head pressure outside the casing, but in no case is less than 5 ft (1.5 m) above the bottom of the casing. Casing removal shall be at a slow, uniform rate with the pull in line with the shaft axis. Excessive rotation of the casing shall be avoided to limit deformation of the reinforcement cage. In addition, the slump requirements during casing removal shall be according to Article 516.12.

When called for on the plans, the Contractor shall install a permanent casing as specified. Permanent casing may be used as a shaft excavation support method or may be installed after shaft excavation is completed using one of the above methods. After construction, if voids are present between the permanent casing and the drilled excavation, the voids shall be filled with grout. Permanent casing shall not remain in place beyond the limits shown on the plans without the specific approval of the Engineer.

When the shaft extends above the streambed through a body of water and permanent casing is not shown, the portion above the streambed shall be formed with removable casings, column forms, or other forming systems as approved by the Engineer. The forming system shall not scar or spall the finished concrete or leave in place any forms or casing within the removable form limits as shown on the plans unless approved as part of the installation procedure. The forming system shall not be removed until the concrete has attained a minimum compressive strength of 2500 psi (17,200 kPa) and cured for a minimum of 72 hours. For shafts extending through water, the concrete shall be protected from water action after placement for a minimum of seven days.

**516.07 Slurry.** When slurry is used, the Contractor shall provide a technical representative of the slurry additive manufacturer at the site prior to introduction of the slurry into the first shaft where slurry will be used, and during drilling and completion of a minimum of one shaft to adjust the slurry mix to the specific site conditions. During construction, the level of the slurry shall be maintained a minimum of 5 feet (1.5 m) above the height required to prevent caving of the shaft excavation. In the event of a sudden or significant loss of slurry in the shaft excavation, the construction of that foundation shall be stopped and the shaft excavation backfilled or supported by temporary casing, until a method to stop slurry loss, or an alternate construction procedure, has been approved by the Engineer.

- (a) General Properties. The material used to make the slurry shall not be detrimental to the concrete or surrounding ground. Mineral slurries shall have both a mineral grain size that remains in suspension and sufficient viscosity and gel characteristics to transport excavated material to a suitable screening system. Polymer slurries shall have sufficient viscosity and gel characteristics to transport excavated material to suitable screening systems or settling tanks. The percentage and specific gravity of the material used to make the slurry shall be sufficient to maintain the stability of the excavation and to allow proper concrete placement.

If approved by the Engineer, the Contractor may use water and excavated soils as drilling slurry. In this case, the range of acceptable values for density, viscosity and pH, as shown in the following table for bentonite slurry shall be met.

When water is used as the slurry to construct rock sockets in limestone, dolomite, sandstone or other formations that are not erodible, the requirements for slurry testing shall not apply if the entire fluid column is replaced with fresh water after drilling. To do so, fresh water shall be introduced at the top of the shaft excavation and existing water used during drilling shall be pumped out of the shaft excavation from the bottom of the shaft excavation until the entire volume of fluid has been replaced.

- (b) Preparation. Prior to introduction into the shaft excavation, the manufactured slurry admixture shall be pre-mixed thoroughly with clean, fresh water and for adequate time in accordance with the slurry admixture manufacturer's recommendations. Slurry tanks of adequate capacity shall be used for slurry mixing, circulation, storage and treatment. No excavated slurry pits will be allowed in lieu of slurry tanks without approval from the Engineer. Adequate desanding equipment shall be provided to control slurry properties during the drilled shaft excavation in accordance with the values provided in Table 1.
- (c) Quality Control. Quality control tests shall be performed on the slurry to determine density, viscosity, sand content and pH of freshly mixed slurry, recycled slurry and slurry in the shaft excavation. Tests of slurry samples from within two feet of the bottom and at mid-height of the shaft excavation shall be conducted in each shaft excavation during the excavation process to measure the consistency of the slurry. A minimum of four sets of tests shall be conducted during the first eight hours of slurry use on the project. When a series of four test results do not change more than 1% from the initial test, the testing frequency may be decreased to one set every four hours of slurry use. Reports of all tests, signed by an authorized representative of the Contractor, shall be furnished to the Engineer upon completion of each drilled shaft. The physical properties of the slurry shall be as shown in Table 1.

The slurry shall be sampled and tested less than 1 hour before concrete placement. Any heavily contaminated slurry that has accumulated at the bottom of the shaft shall be removed. The contractor shall perform final shaft bottom cleaning after suspended solids have settled from the slurry. Concrete shall not be placed if the slurry does not have the required physical properties.

Table 1 – SLURRY PROPERTIES				
	Bentonite	Emulsified Polymer	Dry Polymer	Test Method
Density, lb/cu ft (kg/cu m) (at introduction)	65.2 ± 1.6 <sup>1</sup> (1043.5 ± 25.6)	63 (1009.0) max.	63 (1009.0) max.	ASTM D 4380
Density, lb/cu ft (kg/cu m) (prior to concrete placement)	67.0 ± 3.5 <sup>1</sup> (1073.0 ± 56.0)	63 (1009.0) max.	63 (1009.0) max.	ASTM D 4380
Viscosity <sup>2</sup> , sec/qt (sec/L)	46 ± 14 (48 ± 14)	38 ± 5 (40 ± 5)	65 ± 15 (69 ± 16)	ASTM D 6910
pH	9.0 ± 1.0	9.5 ± 1.5	9.0 ± 2.0	ASTM D 4972
Sand Content, percent by volume (at introduction)	4 max.	1 max.	1 max.	ASTM D 4381
Sand Content, percent by volume (prior to concrete placement)	10 max.	1 max.	1 max.	ASTM D 4381
Contact Time <sup>3</sup> , hours	4 max.	72 max.	72 max	

Note 1. When the slurry consists of only water and excavated soils, the density shall not exceed 70 lb/cu ft (1121 kg/cu m).

Note 2. Higher viscosities may be required in loose or gravelly sand deposits.

Note 3. Contact time is the time without agitation and sidewall cleaning.

**516.08 Obstructions.** An obstruction is an unknown isolated object that causes the shaft excavation method to experience a significant decrease in the actual production rate and requires the Contractor to core, break up, push aside, or use other means to mitigate the obstruction. Subsurface conditions such as boulders, cobbles, or logs and buried infrastructure such as footings, piling, or abandoned utilities, when shown on the plans, shall not constitute an obstruction. When an obstruction is encountered, the Contractor shall notify the Engineer immediately and upon concurrence of the Engineer, the Contractor shall mitigate the obstruction with an approved method.

**516.09 Top of Rock.** The top of rock will be considered as the point where rock, defined as bedded deposits and conglomerate deposits exhibiting the physical characteristics and difficulty of rock removal as determined by the Engineer, is encountered which cannot be drilled with augers and/or underreaming tools configured to be effective in the soils indicated in the contract documents.

**516.10 Design Modifications.** If the top of rock elevation differs from that shown on the plans by more than 10 percent of the length of the drilled shaft above the rock, the Engineer shall be contacted to determine if any drilled shaft design changes may be required. In addition, if the type of soil or rock encountered is not similar to that shown in the subsurface exploration data, the Contractor may be required to extend the drilled shaft length(s) beyond those specified in the plans. In either case, the Engineer will determine if revisions are necessary and the extent of the modifications required.

**516.11 Excavation Cleaning and Inspection.** Materials removed or generated from the shaft excavations shall be disposed of according to Article 202.03.

After excavation, each shaft shall be cleaned. For a drilled shaft terminating in soil, the depth of sediment or debris shall be a maximum of 1 1/2 in. (38 mm). For a drilled shaft terminating in rock, the depth of sediment or debris shall be a maximum of 1/2 in. (13 mm).

A shaft excavation shall be overreamed when, in the opinion of the Engineer, the sidewall has softened, swelled, or has a buildup of slurry cake. Overreaming may also be required to correct a shaft excavation which has been drilled out of tolerance. Overreaming may be accomplished with a grooving tool, overreaming bucket, or other approved equipment. Overreaming thickness shall be a minimum of 1/2 in. (13 mm) and a maximum of 3 in. (75 mm).

**516.12 Reinforcement.** This work shall be according to Section 508 and the following.

The shaft excavation shall be cleaned and inspected prior to placing the reinforcement cage. The reinforcement cage shall be completely assembled prior to drilling and be ready for adjustment in length as required by the conditions encountered. The reinforcement cage shall be lifted using multiple point sling straps or other approved methods to avoid reinforcement cage distortion or stress. Cross frame stiffeners may be required for lifting or to keep the reinforcement cage in proper position during lifting and concrete placement.

The Contractor shall attach rolling spacers to keep the reinforcement cage centered within the shaft excavation during concrete placement and to ensure that at no point will the finished shaft have less than the minimum concrete cover(s) shown on the plans. The rolling spacers or other approved non-corrosive spacing devices shall be installed within 2 ft (0.6 m) of both the top and bottom of the drilled shaft and at intervals not exceeding 10 ft (3 m) throughout the length of the shaft to ensure proper reinforcement cage alignment and clearance for the entire shaft. The number of rolling spacers at each level shall be one for each 1.0 ft (300 mm) of shaft diameter, with a minimum of four rolling spacers at each level. For shafts with different shaft diameters throughout the length of the excavation, different sized rolling spacers shall be provided to ensure the reinforcement cage is properly positioned throughout the entire length of the shaft.

When a specific concrete cover between the base of the drilled shaft and the reinforcement cage is shown on the plans, the bottom of the reinforcement cage shall be supported so that the proper concrete cover is maintained.

If the conditions differ such that the length of the shaft is increased, additional longitudinal bars shall be either mechanically spliced or lap spliced to the lower end of the reinforcement cage and confined with either hoop ties or spirals. The Contractor shall have additional reinforcement available or fabricate the reinforcement cages with additional length as necessary to make the required adjustments in a timely manner as dictated by the encountered conditions. The additional reinforcement may be non-epoxy coated.

**516.13 Concrete Placement.** Concrete work shall be performed according to the following.

Throughout concrete placement the head pressure inside the drilled shaft shall be at least 1.1 times the head pressure outside the drilled shaft.

Concrete placement shall begin within 1 hour of shaft cleaning and inspection. The pour shall be made in a continuous manner from the bottom to the top elevation of the shaft as shown on the contract plan or as approved in the Contractor's installation procedure. Concrete placement shall continue after the shaft excavation is full and until 18 in. (450 mm) of good quality, uncontaminated concrete is expelled at the top of shaft. Vibration of the concrete will not be allowed when the concrete is displacing slurry or water. In dry excavations, the concrete in the top 10 ft (3 m) of the shaft shall be vibrated.

When using temporary casing or placing concrete under water or slurry, a minimum of seven days prior to concrete placement, a 4 cu yd (3 cu m) trial batch of the concrete mixture shall be performed to evaluate slump retention. Temporary casing shall be withdrawn before the slump of the concrete drops below 6 in. (150 mm). For concrete placed using the slurry method of construction, the slump of all concrete placed shall be a minimum of 6 in. (150 mm) at the end of concrete placement.



Devices used to place concrete shall have no aluminum parts in contact with concrete.

When the top of the shaft is at the finished elevation and no further concrete placement above the finished elevation is specified, the top of the shaft shall be level and finished according to Article 503.15(a).

Concrete shall be placed by free fall, tremie, or concrete pump subject to the following conditions.

- (a) Free Fall Placement. Concrete shall only be placed by free fall when the rate of water infiltration into the shaft excavation is less than 12 in. (300 mm) per hour and the depth of water in the shaft excavation is less than 3 in. (75 mm) at the time of concrete placement.

Concrete placed by free fall shall fall directly to the base without contacting the reinforcement cage, cross frame stiffeners, or shaft sidewall. Drop chutes may be used to direct concrete to the base during free fall placement.

Drop chutes used to direct placement of free fall concrete shall consist of a smooth tube. Concrete may be placed through either a hopper at the top of the tube or side openings as the drop chute is retrieved during concrete placement. The drop chute shall be supported so that free fall does not exceed 60 ft (18.3 m) for conventional concrete or 30 ft (9.1 m) for self-consolidating concrete. If placement cannot be satisfactorily accomplished by free fall in the opinion of the Engineer, either a tremie or pump shall be used to accomplish the pour.

- (b) Tremie and Concrete Pump Placement. Concrete placement shall be according to Article 503.08, except the discharge end of the steel pipe shall remain embedded in the concrete a minimum of 10 ft (3.0 m) throughout concrete placement when displacing slurry or water.

**516.14 Construction Tolerances.** The following construction tolerances shall apply to all drilled shafts.

- (a) Center of Shaft. The center of the drilled shaft shall be within 3 in. (75 mm) of the plan station and offset at the top of the shaft.
- (b) Center of Reinforcement Cage. The center of the reinforcement cage shall be within 1 1/2 in. (40 mm) of plan station and offset at the top of the shaft.
- (c) Vertical Plumbness of Shaft. The out of vertical plumbness of the shaft shall not exceed 1.5 percent.
- (d) Vertical Plumbness of Reinforcement Cage. The out of vertical plumbness of the shaft reinforcement cage shall not exceed 0.83 percent.

- (e) Top of Shaft. The top of the shaft shall be no more than 1 in. (25 mm) above and no more than 3 in. (75 mm) below the plan elevation.
- (f) Top of Reinforcement Cage. The top of the reinforcement cage shall be no more than 1 in. (25 mm) above and no more than 3 in. (75 mm) below the plan elevation.
- (g) Bottom of shaft. Excavation equipment and methods used to complete the shaft excavation shall have a nearly planar bottom. The cutting edges of excavation equipment used to create the bottom of shafts in rock shall be normal to the vertical axis of the shaft within a tolerance of 6.25 percent.

**516.15 Method of Measurement.** This work will be measured for payment in place and the volume computed in cubic yards (cubic meters). The volume will be computed using the plan diameter of the shaft multiplied by the measured length of the shaft. The length of shaft in soil will be computed as the difference in elevation between the top of the drilled shaft shown on the plans, or as installed as part of the Contractor's installation procedure, and the bottom of the shaft or the top of rock (when present) whichever is higher. The length of shaft in rock will be computed as the difference in elevation between the measured top of rock and the bottom of the shaft.

When permanent casing is specified, it will be measured for payment in place, in feet (meters). Permanent casing installed at the Contractor's option will not be measured for payment.

Reinforcement furnished and installed will be measured for payment according to Article 508.07.

**516.16 Basis of Payment.** This work will be paid for at the contract unit price per cubic yard (cubic meter) for DRILLED SHAFT IN SOIL, and/or DRILLED SHAFT IN ROCK.

Permanent casing will be paid for at the contract unit price per foot (meter) for PERMANENT CASING.

Reinforcement furnished and installed will be paid for according to Article 508.08.

Obstruction mitigation will be paid for according to Article 109.04."

## **PREFORMED PAVEMENT JOINT SEAL**

Effective: October 4, 2016

Revised: March 1, 2019

Description. This work shall consist of furnishing all labor, equipment and materials necessary to prepare the joint opening and install pavement joint seal(s) at the locations specified. Unless otherwise detailed on the plans, the joint shall be sized for a rated movement of 2 inches (50 mm).

Materials: Unless otherwise specified, one of the following prefabricated joint seals will be permitted.

- (a) Preformed Elastomeric Joint Seal. This material shall be according to Section 1053.01.
- (b) Preformed Pre-compressed, Silicone Coated, Self-Expanding Sealant System. This Sealant system shall be comprised of three components: 1) cellular polyurethane foam impregnated with hydrophobic 100% acrylic, water-based emulsion, factory coated with highway-grade, fuel resistant silicone; 2) field-applied epoxy adhesive primer, 3) field-injected silicone sealant bands.

The preformed, pre-compressed silicone joint seal shall, as a minimum, be according to the following:

- The joint seal shall be held in place by a non-sag, high modulus silicone adhesive.
- The joint seal shall be compatible with the epoxy and header material.
- The joint seal shall withstand the effects of vertical and lateral movements, skew movements and rotational movement without adhesive or cohesive failure.
- The joint seal shall be designed so that, the material is capable of movement of +50%, - 50% (100% total) of nominal material size.
- Changes in plane and direction shall be executed using factory fabricated 90 degree transition assemblies. The transitions shall be watertight at the inside and outside corners through the full movement of the product.
- The depth of the joint shall be recessed 3/4 in. (19 mm) below the riding surface throughout the normal limits of joint movement.
- The joint seal shall be resistant to ultraviolet rays.
- The joint seal shall be resistant to abrasion, oxidation, oils, gasoline, salt, and other materials that may be spilled on or applied to the surface.
- The manufacturer shall certify that the joint composition shall be free of any waxes or wax compounds; asphalts or asphalt compounds.

The joint material shall meet the following physical properties:

<b>Property</b>	<b>Requirement</b>	<b>Test Method</b>
Tensile Strength of Silicone Coating (min)	140 psi	ASTM D 412
UV Resistance of Joint System	No Changes--2000 Hours	ASTM C793
Density of Cellular Polyurethane Foam	4.0 lb/ cu ft (200kg/cu m)	ASTM D545
Heat Aging Effects (Silicone Coating)	No cracking, chalking	ASTM C 792
Joint System Operating temp range (min)	-40° F to 185° F	ASTM C 711

The adhesive shall be a two-component, 100% solid, modified epoxy meeting the requirements of ASTM C881, Type I, Grade 3, Class B & C. The adhesive shall also have the following properties:

<b>Property</b>	<b>Requirement</b>	<b>Test method</b>
Tensile Strength	2,500 psi (24 MPa) min.	ASTM D638
Compressive Strength	7000 psi (48 MPa) min.	ASTM D695
Bond Strength (Dry Cure)	2000 psi (28MPa) min	ASTM C882
Water Absorption	0.1% by weight	ASTM D570

The silicone band adhesive shall have the following properties:

<b>Property</b>	<b>Requirement</b>	<b>Test Method</b>
Movement Capability	+50/-50%	ASTM C 719
Elongation at Break	>600%	ASTM D 5893
Slump	≤=0.3"	ASTM D 2202
Hardness (Shore A) max.	20	ASTM C 661
Tack free time (max)	60 minutes	ASTM C 679
Heat Aging Effects	No cracking, chalking	ASTM C 792
Resilience	≥ 75%	ASTM D5329
Bond	0% Adhesive or Cohesive Failure after 5 cycles @100%extension	ASTM D 5329

- (c) Performed Silicone Joint Seal. The preformed silicone joint seal used for this item shall conform to the following specifications:

**Table 1**  
**Physical Properties of Preformed Silicone Gland**

<b>Property</b>	<b>Requirement</b>	<b>Test Method</b>
Rated Movement Capability	+2 ¼ inch total	N/A
Tensile Strength, psi.	1000 min	ASTM D 412
Elongation	400% min	ASTM D 412
Tear (die B)	100 ppi. min	ASTM D 624
Hardness Durometer (Shore A).	55 +/- 5 max	ASTM D 2240
Compression set at 212°F, 70 hrs	30% max	ASTM D 395
Heat Aged Properties	5pt max loss on Durometer	ASTM D 573
Tensile and Elongation % Loss	10 % max	

The color of the preformed silicone seal shall be black, made by the addition of Carbon Black fillers which increases UV resistance, tensile strength, and abrasion wear properties.

The locking adhesive shall be non-sag, high modulus silicone adhesive conforming to the following specifications:

**Table 2**  
**Physical Properties of the Silicone Locking Adhesive**

<b>Property</b>	<b>Requirement</b>	<b>Test Method</b>
Tensile Strength, psi.	200 min	ASTM D 412
Elongation, %	450 min	ASTM D 412
Tack Free Time, minutes.	20 max.	ASTM C 679
Cure Time ¼" bead, hrs	24 max	ASTM C 679
Resistance to U.V.	No cracking, chalking, or degradation	ASTM C793
VOC (g/L)	0	ATSM D 3960

Any rips, tears, or bond failure will be cause for rejection.

The two part epoxy primer shall be supplied for application to the vertical faces of the joint opening. The supplied primer shall be equally as effective when bonded to concrete or steel. This primer shall meet the following criteria:

**Table 3**  
**Physical Properties of Preformed Silicone Joint System Primer**

<b>Property</b>	<b>Requirement</b>	<b>Test Method</b>
Viscosity (cps)	44	ASTM D 2196
Color	Light Amber	Visual
Solids (%)	41	ASTM D 4209
Specific Gravity	0.92	ATSM D 1217
Product Flash Point (°F, T.C.C.)	48	ATSM D 56
Package Stability	N/A	One year in tightly sealed containers
Cleaning	N/A	Mineral Spirits
VOC (g/L)	520	ATSM D 3960

- (a) Preformed Inverted EPDM Joint Seal. The preformed inverted EPDM joint seal used for this item shall conform to the following specifications:

**Table 1**  
**Physical Properties of Preformed Silicone Gland**

Property	Requirement	Test Method
Rated Movement Capability	Up To 5 inch total	N/A
Tensile Strength, psi.	1200 psi min	ASTM D 412
Elongation	400 % min	ASTM D 412
Tear (Die C)	150 pli. min	ASTM D 624
Durometer Content	50 +/- 5 max	ASTM D 2240
Water Resistance (70 hrs @ 100c)	10% max	ASTM D 471
Ozone Resistance	100 min	ASTM D 1171

**Table 2**  
**Physical Properties of the V-Epoxy-R**

V-Epoxy-R adhesive meets the requirements of ASTM C881 Type III, Grade 2. The adhesive shall also have the following properties:

Property	Requirement	Test Method
Color	Gray	Visual
Viscosity	45,000 CP (typ.)	N/A
Gel Time (minutes)	30 min.	ASTM C 881
Shelf Life (Separate Sealed Containers)	12 Months	N/A
Resistance to U.V.	No cracking, chalking, or degradation	ASTM C793
VOC (g/L)	0	ATSM D 3960

Any rips, tears, or bond failure will be cause for rejection.

- (e) Bonded Preformed Joint Seal. This joint system shall consist of preformed elastomeric seal bonded to the side walls of the joint opening using an adhesive as specified by the Manufacturer of the joint seal.

The bonded preformed joint seal shall be according to Table 1 of ASTM D2628 with the following exceptions: Compression set shall not be over 40 percent when tested according to Method B (Modified) of ASTM D 395 after 70 hours at 212 °F (100 °C). The Compression-Deflection requirement will not apply to the bonded preformed joint seal.

The adhesive shall be epoxy base, dual component, which resists salt, diluted acids, alkalis, solvents, greases, oils, moisture, sunlight and weathering. Temperatures up to 200 °F (93 °C) shall not reduce bond strength. At 68 °F (20 °C), the bond strength shall be a minimum of 1000 psi (6.9 MPa) within 24 hours.

Any primers or cleaning solutions used on the faces of the joint or on the profile of the sides of the bonded preformed joint seal shall be supplied by the manufacturer of the bonded preformed joint seal.

Any additional installation materials and adhesive for splicing joint sections shall be as supplied by the manufacturer of the preformed joint seal.

The Contractor shall submit the Manufacturer's material certification documentation stating that their materials meet the applicable requirements of this specification for the joint seal(s) installed.

## **CONSTRUCTION REQUIREMENTS**

General. The Contractor shall furnish the Engineer with the manufacturer's product information and installation procedures at least two weeks prior to installation.

The minimum ambient air temperature in which the joint seal can be installed is 40° F (4.4° C) and rising, except for bonded preformed joint seals which shall not be installed when temperatures below 50 °F (10 °C) are predicted within a 48 hour period.

The joint surface shall be completely dry before installing the Joint Seal. For newly placed concrete, the concrete shall be fully cured and allowed to dry out a minimum of seven additional days prior to placement of the seal. Cold, wet, inclement weather will require an extended drying time.

The Joint Seal shall not be installed immediately after precipitation or if precipitation is forecasted for the day. Joint preparation and installation of Joint Seal shall be done during the same day.



Surface Preparation. Surface preparation shall be according to the joint seal manufacturer's written instructions.

After surface preparation is completed, the joint shall be cleaned of debris using compressed air with a minimum pressure of 90 psi (620 kPa). The air compressor shall be equipped with traps to prevent the inclusion of water and/or oil in the air line. The compressed air shall be according to the cleanliness requirements of ASTM D 4285.

When priming is required per the manufacturer's instruction, this operation shall immediately follow cleaning.

Joint Installation. The Joint installation shall be per the manufacturer's instructions; special attention shall be given to insure the joint seal is properly recessed below the top of the riding surface as recommended by the manufacturer.

For bonded joint seals the seal shall be inserted into the joint and held tightly against both sides of the joint until sufficient bond strength has been developed to resist the expected expansion forces.

Opening to traffic. As these joint systems are supposed to be recessed below the top of the riding surface, there should be no restriction, based on the joint seal installation, on when these joints can be reopened to traffic.

Method of Measurement. The installed prefabricated joint seal will not be measured for payment.

Basis of Payment. The prefabricated joint seal will not be paid for separately but shall be considered included in the cost of the adjacent concrete work involved.

**CROSSHOLE SONIC LOGGING TESTING OF DRILLED SHAFTS**

Effective: April 20, 2016

Revised: August 9, 2019

Description. This work shall consist of furnishing and installing materials and equipment necessary to install access ducts in all drilled shafts of structures identified on the plans, and to perform Crosshole Sonic Logging (CSL) testing of selected drilled shafts on these structures. This work shall be according to Illinois Modified ASTM D6760. This work also includes analysis of the CSL data, preparation of reports summarizing the CSL data, and investigating anomalies identified in the CSL data. This work shall also include grouting of all access ducts after testing and approval by the Engineer.

Materials. Materials shall be according to the following.

- (a) Nonshrink Grout (Note 1).....1024.02

Note 1. Grout shall attain a minimum strength equal to the required strength of the drilled shaft concrete at 14 days.

Qualifications. A consulting firm experienced in CSL testing shall conduct this work. The CSL consulting firm shall be a company independent from the Contractor with a minimum of 3 years of experience in performing CSL testing of drilled shafts. The individual employee of the CSL consulting firm performing analysis of the CSL data and preparing the report shall be an Illinois Licensed Professional Engineer and have experience on a minimum of 5 projects performing CSL testing of drilled shafts.

The name, contact information, and qualifications of the CSL consulting firm, including the names and experience of the individual employees performing and analyzing the test results and preparing the report, shall be submitted to the Engineer at least 30 days prior to drilled shaft construction.

Construction. Access ducts shall be placed in all drilled shafts for the structures indicated on the plans, attached to the reinforcement cage and situated symmetrically around the diameter of the shaft according to the Illinois Modified ASTM D6760. The Engineer will determine which drilled shafts shall have CSL testing performed after the concrete has been placed in the drilled shafts, and may direct additional tests, if necessary, due to problems encountered or observed during drilled shaft construction.

After permission is given by the Engineer, the access ducts shall be grouted. The grout shall be placed with a pump, starting at the bottom of each access duct.

Superimposed loads, either dead or live, shall not be applied to a drilled shaft until CSL testing is completed, CSL reports have been submitted, any necessary repairs have been completed, access ducts have been grouted, and permission has been granted by the Engineer.

Reports. Reports shall be according to Illinois Modified ASTM D6760. Each anomalous zone detected by the CSL testing shall be identified and discussed in the report. An anomalous zone shall be defined as areas where velocity reduction exceeds 20 percent of the average velocity of properly placed and cured shaft concrete at the time of testing.

Anomalies. If anomalies are identified, they shall be investigated by coring or other methods approved by the Engineer.

Correction of Drilled Shaft Defects. When testing determines that a defect is present, the Engineer will direct the Contractor to submit remedial measures for approval. No compensation will be made for remedial work, or losses, or damage, due to remedial work of drilled shafts found defective or not in accordance with the drilled shaft specifications or plans. Modifications to the drilled shaft design, or any load transfer mechanisms required by the remedial action, must be designed, detailed, and sealed by an Illinois Licensed Structural Engineer, and submitted for approval.

Method of Measurement. Installation and grouting of access ducts will be measured for payment per shaft by the linear foot of drilled shaft(s) with access ducts.

CSL testing, analysis, and reporting will be measured for payment by each drilled shaft foundation tested.

Investigation of anomalies will not be measured for payment.

Basis of Payment. Installation and grouting of access ducts will be paid for at the contract unit price per foot for CROSSHOLE SONIC LOGGING ACCESS DUCTS. CSL testing, analysis, and reporting will be paid for at the contract unit price per each for CROSSHOLE SONIC LOGGING TESTING.

ILLINOIS MODIFIED ASTM D6760  
 Effective Date: August 9, 2019  
 Standard Test Method for  
**Integrity Testing of Concrete Deep Foundations by Ultrasonic Crosshole Testing**  
 Reference ASTM D6760-14

ASTM SECTION	Illinois Modification										
3.1.1	Revise this section as follows: <i>access ducts, n</i> – preformed steel tubes or drilled boreholes, placed in the concrete to allow probe entry in pairs to measure pulse transmission in the concrete between the probes.										
6.1	Revise the second sentence of this section as follows: The tubes shall be mild steel. Delete the third, fourth, and fifth sentences of this section.										
7.1.1	<p>Revise this section as follows: The access ducts shall be installed during construction of the drilled shaft.</p> <p>For drilled shafts foundations, access ducts shall be provided according to the following table.</p> <table border="1" data-bbox="712 890 1414 1098"> <thead> <tr> <th data-bbox="719 894 1027 961">Reinforcing Cage Diameter (feet)</th> <th data-bbox="1034 894 1408 961">Number of access ducts</th> </tr> </thead> <tbody> <tr> <td data-bbox="719 963 1027 995">≤ 4.0</td> <td data-bbox="1034 963 1408 995">3</td> </tr> <tr> <td data-bbox="719 997 1027 1029">4.1 to 5.0</td> <td data-bbox="1034 997 1408 1029">4</td> </tr> <tr> <td data-bbox="719 1031 1027 1062">5.1 to 7.0</td> <td data-bbox="1034 1031 1408 1062">6</td> </tr> <tr> <td data-bbox="719 1064 1027 1096">&gt; 7.0</td> <td data-bbox="1034 1064 1408 1096">8</td> </tr> </tbody> </table> <p>Access ducts shall be spread equally around the perimeter and spaced at an equal distance from the axis.</p> <p>Delete Fig. 4.</p>	Reinforcing Cage Diameter (feet)	Number of access ducts	≤ 4.0	3	4.1 to 5.0	4	5.1 to 7.0	6	> 7.0	8
Reinforcing Cage Diameter (feet)	Number of access ducts										
≤ 4.0	3										
4.1 to 5.0	4										
5.1 to 7.0	6										
> 7.0	8										
7.1.2	Revise the second sentence of this section as follows: The exterior tube surface shall be free from contamination (for example, oil, dirt, loose rust, mill scale, etc.) to ensure a good bond between the tube surface and the surrounding concrete.										
7.1.3	Delete the third sentence of this section.										

ILLINOIS MODIFIED ASTM D6760  
 Effective Date: August 9, 2019  
 Standard Test Method for  
**Integrity Testing of Concrete Deep Foundations by Ultrasonic Crosshole Testing**  
 Reference ASTM D6760-14

7.2	<p>Revise the first sentence of this section as follows:          The access tubes shall be installed such that their bottom is within 4 inches of the bottom of the concrete deep foundation element so that the bottom condition can be tested.</p> <p>Revise the sixth sentence of this section as follows:          Access tubes shall be filled with water prior to concrete placement to assure good bonding of the concrete to the tube after the concrete cools. The access tubes shall be kept full of water until the tubes are grouted.</p>
7.3	<p>Revise the first sentence of this section as follows:          In cases where drilled shafts to be tested have access ducts that do not permit passage of the probes, do not retain water, are not plumb, are debonded from the concrete, or cannot be used for testing for other reasons, drilled boreholes shall be used to provide probe access.</p>
7.4.2	<p>Revise the second sentence of this section as follows:          The tests shall be performed no later than 21 days after concrete casting.</p>
7.6	<p>Delete this section.</p>
7.8.1	<p>Revise the first sentence of this section as follows:          If the ultrasonic profile indicates an anomaly, then the suspect anomaly zone shall be further investigated by special test procedures such as fan shaped tests, tests with the probes raised at a fixed offset distance, or other tomographical techniques (1, 2).</p>
7.8.2	<p>Delete Note 5 of this section.</p>

## BITUMINOUS MATERIALS COST ADJUSTMENTS (BDE)

Effective: November 2, 2006

Revised: August 1, 2017

**Description.** Bituminous material cost adjustments will be made to provide additional compensation to the Contractor, or credit to the Department, for fluctuations in the cost of bituminous materials when optioned by the Contractor. The bidder shall indicate with their bid whether or not this special provision will be part of the contract.

The adjustments shall apply to permanent and temporary hot-mix asphalt (HMA) mixtures, bituminous surface treatments (cover and seal coats), and preventative maintenance type surface treatments that are part of the original proposed construction, or added as extra work and paid for by agreed unit prices. The adjustments shall not apply to bituminous prime coats, tack coats, crack filling/sealing, joint filling/sealing, or extra work paid for at a lump sum price or by force account.

**Method of Adjustment.** Bituminous materials cost adjustments will be computed as follows.

$$CA = (BPI_P - BPI_L) \times (\%AC_V / 100) \times Q$$

- Where: CA = Cost Adjustment, \$.
- BPI<sub>P</sub> = Bituminous Price Index, as published by the Department for the month the work is performed, \$/ton (\$/metric ton).
- BPI<sub>L</sub> = Bituminous Price Index, as published by the Department for the month prior to the letting for work paid for at the contract price; or for the month the agreed unit price letter is submitted by the Contractor for extra work paid for by agreed unit price, \$/ton (\$/metric ton).
- %AC<sub>V</sub> = Percent of virgin Asphalt Cement in the Quantity being adjusted. For HMA mixtures, the % AC<sub>V</sub> will be determined from the adjusted job mix formula. For bituminous materials applied, a performance graded or cutback asphalt will be considered to be 100% AC<sub>V</sub> and undiluted emulsified asphalt will be considered to be 65% AC<sub>V</sub>.
- Q = Authorized construction Quantity, tons (metric tons) (see below).

For HMA mixtures measured in square yards:  $Q, \text{ tons} = A \times D \times (G_{mb} \times 46.8) / 2000$ . For HMA mixtures measured in square meters:  $Q, \text{ metric tons} = A \times D \times (G_{mb} \times 1) / 1000$ . When computing adjustments for full-depth HMA pavement, separate calculations will be made for the binder and surface courses to account for their different  $G_{mb}$  and % AC<sub>V</sub>.

For bituminous materials measured in gallons:  $Q, \text{ tons} = V \times 8.33 \text{ lb/gal} \times SG / 2000$   
For bituminous materials measured in liters:  $Q, \text{ metric tons} = V \times 1.0 \text{ kg/L} \times SG / 1000$

- Where: A = Area of the HMA mixture, sq yd (sq m).  
D = Depth of the HMA mixture, in. (mm).  
G<sub>mb</sub> = Average bulk specific gravity of the mixture, from the approved mix design.  
V = Volume of the bituminous material, gal (L).  
SG = Specific Gravity of bituminous material as shown on the bill of lading.

**Basis of Payment.** Bituminous materials cost adjustments may be positive or negative but will only be made when there is a difference between the  $BPI_L$  and  $BPI_P$  in excess of five percent, as calculated by:

$$\text{Percent Difference} = \{(BPI_L - BPI_P) \div BPI_L\} \times 100$$

Bituminous materials cost adjustments will be calculated for each calendar month in which applicable bituminous material is placed; and will be paid or deducted when all other contract requirements for the work placed during the month are satisfied. The adjustments shall not apply during contract time subject to liquidated damages for completion of the entire contract.

### **COMPENSABLE DELAY COSTS (BDE)**

Effective: June 2, 2017

Revised: April 1, 2019

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

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

- (1) Minor Delay. A minor delay occurs when the work in conflict with the utility in an unanticipated location is completely stopped for more than two hours, but not to exceed two weeks.
- (2) Major Delay. A major delay occurs when the work in conflict with the utility in an unanticipated location is completely stopped for more than two weeks.
- (3) Reduced Rate of Production Delay. A reduced rate of production delay occurs when the rate of production on the work in conflict with the utility in an unanticipated location decreases by more than 25 percent and lasts longer than seven calendar days.”

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

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

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

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

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

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

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

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



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

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

- (1) When adverse weather prevents work on the controlling item.
- (2) When job conditions due to recent weather prevent work on the controlling item.
- (3) When conduct or lack of conduct by the Department or its consultants, representatives, officers, agents, or employees; delay by the Department in making the site available; or delay in furnishing any items required to be furnished to the Contractor by the Department prevents work on the controlling item.
- (4) When delays caused by utility or railroad adjustments prevent work on the controlling item.
- (5) When strikes, lock-outs, extraordinary delays in transportation, or inability to procure critical materials prevent work on the controlling item, as long as these delays are not due to any fault of the Contractor.
- (6) When any condition over which the Contractor has no control prevents work on the controlling item.”

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

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

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

Add the following to Section 109 of the Standard Specifications.

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

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

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

- (a) Escalated Material and/or Labor Costs. When the delay causes work, which would have otherwise been completed, to be done after material and/or labor costs have increased, such increases will be paid. Payment for escalated material costs will be limited to the increased costs substantiated by documentation furnished by the Contractor. Payment for escalated labor costs will be limited to those items in Article 109.04(b)(1) and (2), except the 35 percent and 10 percent additives will not be permitted.
- (b) Extended Project Overhead. For the duration of the delay, payment for extended project overhead will be paid as follows.
  - (1) Direct Jobsite and Offsite Overhead. Payment for documented direct jobsite overhead and documented direct offsite overhead, including onsite supervisory and administrative personnel, will be allowed according to the following table.

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

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

(c) Extended Traffic Control. Traffic control required for an extended period of time due to the delay will be paid for according to Article 109.04.

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

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

**CONSTRUCTION AIR QUALITY – DIESEL RETROFIT (BDE)**

Effective: June 1, 2010

Revised: November 1, 2014

The reduction of emissions of particulate matter (PM) for off-road equipment shall be accomplished by installing retrofit emission control devices. The term “equipment” refers to diesel fuel powered devices rated at 50 hp and above, to be used on the jobsite in excess of seven calendar days over the course of the construction period on the jobsite (including rental equipment).

Contractor and subcontractor diesel powered off-road equipment assigned to the contract shall be retrofitted using the phased in approach shown below. Equipment that is of a model year older than the year given for that equipment’s respective horsepower range shall be retrofitted:

Effective Dates	Horsepower Range	Model Year
June 1, 2010 <sup>1/</sup>	600-749	2002
	750 and up	2006
June 1, 2011 <sup>2/</sup>	100-299	2003
	300-599	2001
	600-749	2002
	750 and up	2006
June 1, 2012 <sup>2/</sup>	50-99	2004
	100-299	2003
	300-599	2001
	600-749	2002
	750 and up	2006

1/ Effective dates apply to Contractor diesel powered off-road equipment assigned to the contract.

2/ Effective dates apply to Contractor and subcontractor diesel powered off-road equipment assigned to the contract.

The retrofit emission control devices shall achieve a minimum PM emission reduction of 50 percent and shall be:

- a) Included on the U.S. Environmental Protection Agency (USEPA) *Verified Retrofit Technology List* (<http://www.epa.gov/cleandiesel/verification/verif-list.htm>), or verified by the California Air Resources Board (CARB) (<http://www.arb.ca.gov/diesel/verdev/vt/cvt.htm>); or
- b) Retrofitted with a non-verified diesel retrofit emission control device if verified retrofit emission control devices are not available for equipment proposed to be used on the project, and if the Contractor has obtained a performance certification from the retrofit device manufacturer that the emission control device provides a minimum PM emission reduction of 50 percent.

Note: Large cranes (Crawler mounted cranes) which are responsible for critical lift operations are exempt from installing retrofit emission control devices if such devices adversely affect equipment operation.

Diesel powered off-road equipment with engine ratings of 50 hp and above, which are unable to be retrofitted with verified emission control devices or if performance certifications are not available which will achieve a minimum 50 percent PM reduction, may be granted a waiver by the Department if documentation is provided showing good faith efforts were made by the Contractor to retrofit the equipment.

Construction shall not proceed until the Contractor submits a certified list of the diesel powered off-road equipment that will be used, and as necessary, retrofitted with emission control devices. The list(s) shall include (1) the equipment number, type, make, Contractor/rental company name; and (2) the emission control devices make, model, USEPA or CARB verification number, or performance certification from the retrofit device manufacturer. Equipment reported as fitted with emissions control devices shall be made available to the Engineer for visual inspection of the device installation, prior to being used on the jobsite.

The Contractor shall submit an updated list of retrofitted off-road construction equipment as retrofitted equipment changes or comes on to the jobsite. The addition or deletion of any diesel powered equipment shall be included on the updated list.

If any diesel powered off-road equipment is found to be in non-compliance with any portion of this special provision, the Engineer will issue the Contractor a diesel retrofit deficiency deduction.

Any costs associated with retrofitting any diesel powered off-road equipment with emission control devices shall be considered as included in the contract unit prices bid for the various items of work involved and no additional compensation will be allowed. The Contractor's compliance with this notice and any associated regulations shall not be grounds for a claim.

### **Diesel Retrofit Deficiency Deduction**

When the Engineer determines that a diesel retrofit deficiency exists, a daily monetary deduction will be imposed for each calendar day or fraction thereof the deficiency continues to exist. The calendar day(s) will begin when the time period for correction is exceeded and end with the Engineer's written acceptance of the correction. The daily monetary deduction will be \$1,000.00 for each deficiency identified.

The deficiency will be based on lack of diesel retrofit emissions control.

If a Contractor accumulates three diesel retrofit deficiency deductions for the same piece of equipment in a contract period, the Contractor will be shutdown until the deficiency is corrected. Such a shutdown will not be grounds for any extension of the contract time, waiver of penalties, or be grounds for any claim.

### **CONTRAST PREFORMED PLASTIC PAVEMENT MARKING (BDE)**

Effective: November 1, 2017

Revise the first paragraph of Article 780.07(b) of the Standard Specifications to read:

“(b) Type B or C - Standard Application. Standard application of conventional preformed plastic pavement markings shall consist of applying the markings to the pavement surface or to the bottom of a groove recessed in the pavement surface as specified on the plans. Standard application of contrast preformed plastic pavement markings shall consist of applying the markings to the bottom of a groove recessed in the pavement surface. Both conventional and contrast preformed plastic pavement markings shall only be applied when the air temperature is at least 50 °F (10 °C) and rising and the pavement temperature is at least 70 °F (21 °C). However, application of the markings will not be allowed after October 15.”

Add the following paragraph after the fourth paragraph of Article 780.14 of the Standard Specifications:

“The applied line width specified for contrast pavement markings shall include both the white/yellow reflective portion and the black nonreflective portion of the marking.”

Revise the first paragraph of Article 1095.03 of the Standard Specifications to read:

**“1095.03 Preformed Plastic Pavement Markings.** The material shall consist of a white or yellow (as specified) weather resistant, reflective film meeting the requirements specified herein. Where contrast markings are specified, the white or yellow reflective film shall be bordered along both the left and right edges by a 1 1/2 in. (38 mm) wide black weather resistant, nonreflective film also meeting the requirements specified herein.”

Revise the table in Article 1095.03(a) of the Standard Specifications to read:

“Components	Minimum Percent By Weight	
	White or Yellow	Black
Resins and Plasticizers	20 %	20 %
Pigment and Fillers	30 %	30 %
Graded Glass Beads	25 %	- - “

Revise the first paragraph of Article 1095.03(h) of the Standard Specifications to read:

“Glass beads shall be uniformly distributed throughout the white or yellow portions of the material only. A top coating of beads shall be bonded to or directly embedded into the surface of the markings in order to produce immediate retroreflectivity.”

**DISADVANTAGED BUSINESS ENTERPRISE PARTICIPATION (DBE)**

Effective: September 1, 2000

Revised: March 2, 2019

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

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

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

The Contractor, subrecipient, or subcontractor shall not discriminate on the basis of race, color, national origin, or sex in the performance of this contract. The Contractor shall carry out applicable requirements of 49 CFR Part 26 in the award and administration of contracts funded in whole or in part with federal or state funds. Failure by the Contractor to carry out these requirements is a material breach of this contract, which may result in the termination of this contract or such other remedy as the recipient deems appropriate, which may include, but is not limited to:

- (a) Withholding progress payments;
- (b) Assessing sanctions;
- (c) Liquidated damages; and/or
- (d) Disqualifying the Contractor from future bidding as non-responsible.

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

CONTRACT GOAL TO BE ACHIEVED BY THE CONTRACTOR. This contract includes a specific DBE utilization goal established by the Department. The goal has been included because the Department has determined the work of this contract has subcontracting opportunities that may be suitable for performance by DBE companies. The determination is based on an assessment of the type of work, the location of the work, and the availability of DBE companies to do a part of the work. The assessment indicates, in the absence of unlawful discrimination and in an arena of fair and open competition, DBE companies can be expected to perform **13.00%** of the work. This percentage is set as the DBE participation goal for this contract. Consequently, in addition to the other award criteria established for this contract, the Department will only award this contract to a bidder who makes a good faith effort to meet this goal of DBE participation in the performance of the work. A bidder makes a good faith effort for award consideration if either of the following is done in accordance with the procedures set for in this Special Provision:

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

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

BIDDING PROCEDURES. Compliance with this Special Provision is a material bidding requirement and failure of the bidder to comply will render the bid not responsive.

The bidder shall submit a DBE Utilization Plan (form SBE 2026), and a DBE Participation Statement (form SBE 2025) for each DBE company proposed for the performance of work to achieve the contract goal, with the bid. If the Utilization Plan indicates the contract goal will not be met, documentation of good faith efforts shall also be submitted. The documentation of good faith efforts must include copies of each DBE and non-DBE subcontractor quote submitted to the bidder when a non-DBE subcontractor is selected over a DBE for work on the contract. The required forms and documentation must be submitted as a single .pdf file using the "Integrated Contractor Exchange (iCX)" application within the Department's "EBids System".



The Department will not accept a Utilization Plan if it does not meet the bidding procedures set forth herein and the bid will be declared not responsive. In the event the bid is declared not responsive, the Department may elect to cause the forfeiture of the penal sum of the bidder's proposal guaranty and may deny authorization to bid the project if re-advertised for bids.

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

- (a) The following is a list of types of action that the Department will consider as part of the evaluation of the bidder's good faith efforts to obtain participation. These listed factors are not intended to be a mandatory checklist and are not intended to be exhaustive. Other factors or efforts brought to the attention of the Department may be relevant in appropriate cases and will be considered by the Department.
  - (1) Soliciting through all reasonable and available means (e.g. attendance at pre-bid meetings, advertising and/or written notices) the interest of all certified DBE companies that have the capability to perform the work of the contract. The bidder must solicit this interest within sufficient time to allow the DBE companies to respond to the solicitation. The bidder must determine with certainty if the DBE companies are interested by taking appropriate steps to follow up initial solicitations.
  - (2) Selecting portions of the work to be performed by DBE companies in order to increase the likelihood that the DBE goals will be achieved. This includes, where appropriate, breaking out contract work items into economically feasible units to facilitate DBE participation, even when the Contractor might otherwise prefer to perform these work items with its own forces.
  - (3) Providing interested DBE companies with adequate information about the plans, specifications, and requirements of the contract in a timely manner to assist them in responding to a solicitation.

- (4) a. Negotiating in good faith with interested DBE companies. It is the bidder's responsibility to make a portion of the work available to DBE subcontractors and suppliers and to select those portions of the work or material needs consistent with the available DBE subcontractors and suppliers, so as to facilitate DBE participation. Evidence of such negotiation includes the names, addresses, and telephone numbers of DBE companies that were considered; a description of the information provided regarding the plans and specifications for the work selected for subcontracting; and evidence as to why additional agreements could not be reached for DBE companies to perform the work.
  - b. A bidder using good business judgment would consider a number of factors in negotiating with subcontractors, including DBE subcontractors, and would take a firm's price and capabilities as well as contract goals into consideration. However, the fact that there may be some additional costs involved in finding and using DBE companies is not in itself sufficient reason for a bidder's failure to meet the contract DBE goal, as long as such costs are reasonable. Also the ability or desire of a bidder to perform the work of a contract with its own organization does not relieve the bidder of the responsibility to make good faith efforts. Bidders are not, however, required to accept higher quotes from DBE companies if the price difference is excessive or unreasonable. In accordance with the above Bidding Procedures, the documentation of good faith efforts must include copies of each DBE and non-DBE subcontractor quote submitted to the bidder when a non-DBE subcontractor was selected over a DBE for work on the contract.
- (5) Not rejecting DBE companies as being unqualified without sound reasons based on a thorough investigation of their capabilities. The bidder's standing within its industry, membership in specific groups, organizations, or associations and political or social affiliations (for example union vs. non-union employee status) are not legitimate causes for the rejection or non-solicitation of bids in the bidder's efforts to meet the project goal.
  - (6) Making efforts to assist interested DBE companies in obtaining bonding, lines of credit, or insurance as required by the recipient or Contractor.
  - (7) Making efforts to assist interested DBE companies in obtaining necessary equipment, supplies, materials, or related assistance or services.
  - (8) Effectively using the services of available minority/women community organizations; minority/women contractors' groups; local, state, and federal minority/women business assistance offices; and other organizations as allowed on a case-by-case basis to provide assistance in the recruitment and placement of DBE companies.

- (b) If the Department determines the bidder has made a good faith effort to secure the work commitment of DBE companies to meet the contract goal, the Department will award the contract provided it is otherwise eligible for award. If the Department determines the bidder has failed to meet the requirements of this Special Provision or that a good faith effort has not been made, the Department will notify the responsible company official designated in the Utilization Plan that the bid is not responsive. The notification will also include a statement of reasons for the adverse determination. If the Utilization Plan is not approved because it is deficient as a technical matter, unless waived by the Department, the bidder will be notified and will be allowed no more than a five calendar day period to cure the deficiency.
- (c) The bidder may request administrative reconsideration of an adverse determination by emailing the Department at "[DOT.DBE.UP@illinois.gov](mailto:DOT.DBE.UP@illinois.gov)" within the five calendar days after the receipt of the notification of the determination. The determination shall become final if a request is not made on or before the fifth calendar day. A request may provide additional written documentation or argument concerning the issues raised in the determination statement of reasons, provided the documentation and arguments address efforts made prior to submitting the bid. The request will be reviewed by the Department's Reconsideration Officer. The Reconsideration Officer will extend an opportunity to the bidder to meet in person to consider all issues of documentation and whether the bidder made a good faith effort to meet the goal. After the review by the Reconsideration Officer, the bidder will be sent a written decision within ten working days after receipt of the request for reconsideration, explaining the basis for finding that the bidder did or did not meet the goal or make adequate good faith efforts to do so. A final decision by the Reconsideration Officer that a good faith effort was made shall approve the Utilization Plan submitted by the bidder and shall clear the contract for award. A final decision that a good faith effort was not made shall render the bid not responsive.

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

- (a) DBE as the Contractor: 100 percent goal credit for that portion of the work performed by the DBE's own forces, including the cost of materials and supplies. Work that a DBE subcontracts to a non-DBE does not count toward the DBE goals.
- (b) DBE as a joint venture Contractor: 100 percent goal credit for that portion of the total dollar value of the contract equal to the distinct, clearly defined portion of the work performed by the DBE's own forces.
- (c) DBE as a subcontractor: 100 percent goal credit for the work of the subcontract performed by the DBE's own forces, including the cost of materials and supplies, excluding the purchase of materials and supplies or the lease of equipment by the DBE subcontractor from the Contractor or its affiliates. Work that a DBE subcontractor in turn subcontracts to a non-DBE does not count toward the DBE goal.
- (d) DBE as a trucker: 100 percent goal credit for trucking participation provided the DBE is responsible for the management and supervision of the entire trucking operation for which it is responsible. At least one truck owned, operated, licensed, and insured by the DBE must be used on the contract. Credit will be given for the following:
  - (1) The DBE may lease trucks from another DBE firm, including an owner-operator who is certified as a DBE. The DBE who leases trucks from another DBE receives credit for the total value of the transportation services the lessee DBE provides on the contract.
  - (2) The DBE may also lease trucks from a non-DBE firm, including from an owner-operator. The DBE who leases trucks from a non-DBE is entitled to credit only for the fee or commission is receives as a result of the lease arrangement.

(e) DBE as a material supplier:

- (1) 60 percent goal credit for the cost of the materials or supplies purchased from a DBE regular dealer.
- (2) 100 percent goal credit for the cost of materials of supplies obtained from a DBE manufacturer.
- (3) 100 percent credit for the value of reasonable fees and commissions for the procurement of materials and supplies if not a DBE regular dealer or DBE manufacturer.

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

- (a) NO AMENDMENT. No amendment to the Utilization Plan may be made without prior written approval from the Department's Bureau of Small Business Enterprises. All requests for amendment to the Utilization Plan shall be emailed to the Department at [DOT.DBE.UP@illinois.gov](mailto:DOT.DBE.UP@illinois.gov).
- (b) CHANGES TO WORK. Any deviation from the DBE condition-of-award or contract plans, specifications, or special provisions must be approved, in writing, by the Department as provided elsewhere in the Contract. The Contractor shall notify affected DBEs in writing of any changes in the scope of work which result in a reduction in the dollar amount condition-of-award to the contract. Where the revision includes work committed to a new DBE subcontractor, not previously involved in the project, then a Request for Approval of Subcontractor, Department form BC 260A or AER 260A, must be signed and submitted. If the commitment of work is in the form of additional tasks assigned to an existing subcontract, a new Request for Approval of Subcontractor will not be required. However, the Contractor must document efforts to assure the existing DBE subcontractor is capable of performing the additional work and has agreed in writing to the change.

- (c) SUBCONTRACT. The Contractor must provide copies of DBE subcontracts to the Department upon request. Subcontractors shall ensure that all lower tier subcontracts or agreements with DBEs to supply labor or materials be performed in accordance with this Special Provision.
- (d) ALTERNATIVE WORK METHODS. In addition to the above requirements for reductions in the condition of award, additional requirements apply to the two cases of Contractor-initiated work substitution proposals. Where the contract allows alternate work methods which serve to delete or create underruns in condition of award DBE work, and the Contractor selects that alternate method or, where the Contractor proposes a substitute work method or material that serves to diminish or delete work committed to a DBE and replace it with other work, then the Contractor must demonstrate one of the following:
- (1) The replacement work will be performed by the same DBE (as long as the DBE is certified in the respective item of work) in a modification of the condition of award; or
  - (2) The DBE is aware its work will be deleted or will experience underruns and has agreed in writing to the change. If this occurs, the Contractor shall substitute other work of equivalent value to a certified DBE or provide documentation of good faith efforts to do so; or
  - (3) The DBE is not capable of performing the replacement work or has declined to perform the work at a reasonable competitive price. If this occurs, the Contractor shall substitute other work of equivalent value to a certified DBE or provide documentation of good faith efforts to do so.
- (e) TERMINATION AND REPLACEMENT PROCEDURES. The Contractor shall not terminate or replace a DBE listed on the approved Utilization Plan, or perform with other forces work designated for a listed DBE except as provided in this Special Provision. The Contractor shall utilize the specific DBEs listed to perform the work and supply the materials for which each is listed unless the Contractor obtains the Department's written consent as provided in subsection (a) of this part. Unless Department consent is provided for termination of a DBE subcontractor, the Contractor shall not be entitled to any payment for work or material unless it is performed or supplied by the DBE in the Utilization Plan.

As stated above, the Contractor shall not terminate or replace a DBE subcontractor listed in the approved Utilization Plan without prior written consent. This includes, but is not limited to, instances in which the Contractor seeks to perform work originally designated for a DBE subcontractor with its own forces or those of an affiliate, a non-DBE firm, or with another DBE firm. Written consent will be granted only if the Bureau of Small Business Enterprises agrees, for reasons stated in its concurrence document, that the Contractor has good cause to terminate or replace the DBE firm. Before transmitting to the Bureau of Small Business Enterprises any request to terminate and/or substitute a DBE subcontractor, the Contractor shall give notice in writing to the DBE subcontractor, with a copy to the Bureau, of its intent to request to terminate and/or substitute, and the reason for the request. The Contractor shall give the DBE five days to respond to the Contractor's notice. The DBE so notified shall advise the Bureau and the Contractor of the reasons, if any, why it objects to the proposed termination of its subcontract and why the Bureau should not approve the Contractor's action. If required in a particular case as a matter of public necessity, the Bureau may provide a response period shorter than five days.

For purposes of this paragraph, good cause includes the following circumstances:

- (1) The listed DBE subcontractor fails or refuses to execute a written contract;
- (2) The listed DBE subcontractor fails or refuses to perform the work of its subcontract in a way consistent with normal industry standards. Provided, however, that good cause does not exist if the failure or refusal of the DBE subcontractor to perform its work on the subcontract results from the bad faith or discriminatory action of the Contractor;
- (3) The listed DBE subcontractor fails or refuses to meet the Contractor's reasonable, nondiscriminatory bond requirements;
- (4) The listed DBE subcontractor becomes bankrupt, insolvent, or exhibits credit unworthiness;
- (5) The listed DBE subcontractor is ineligible to work on public works projects because of suspension and debarment proceedings pursuant 2 CFR Parts 180, 215 and 1200 or applicable state law.
- (6) The Contractor has determined the listed DBE subcontractor is not a responsible contractor;
- (7) The listed DBE subcontractor voluntarily withdraws from the projects and provides written notice to the Contractor of its withdrawal;
- (8) The listed DBE is ineligible to receive DBE credit for the type of work required;
- (9) A DBE owner dies or becomes disabled with the result that the listed DBE subcontractor is unable to complete its work on the contract;

- (10) Other documented good cause that compels the termination of the DBE subcontractor. Provided, that good cause does not exist if the Contractor seeks to terminate a DBE it relied upon to obtain the contract so that the Contractor can self-perform the work for which the DBE contractor was engaged or so that the Contractor can substitute another DBE or non-DBE contractor after contract award.

When a DBE is terminated or fails to complete its work on the Contract for any reason, the Contractor shall make a good faith effort to find another DBE to substitute for the original DBE to perform at least the same amount of work under the contract as the terminated DBE to the extent needed to meet the established Contract goal. The good faith efforts shall be documented by the Contractor. If the Department requests documentation under this provision, the Contractor shall submit the documentation within seven days, which may be extended for an additional seven days if necessary at the request of the Contractor. The Department will provide a written determination to the Contractor stating whether or not good faith efforts have been demonstrated.

- (f) FINAL PAYMENT. After the performance of the final item of work or delivery of material by a DBE and final payment therefore to the DBE by the Contractor, but not later than 30 calendar days after payment has been made by the Department to the Contractor for such work or material, the Contractor shall submit a DBE Payment Agreement on Department form SBE 2115 to the Resident Engineer. If full and final payment has not been made to the DBE, the DBE Payment Agreement shall indicate whether a disagreement as to the payment required exists between the Contractor and the DBE or if the Contractor believes the work has not been satisfactorily completed. If the Contractor does not have the full amount of work indicated in the Utilization Plan performed by the DBE companies indicated in the Utilization Plan and after good faith efforts are reviewed, the Department may deduct from contract payments to the Contractor the amount of the goal not achieved as liquidated and ascertained damages. The Contractor may request an administrative reconsideration of any amount deducted as damages pursuant to subsection (h) of this part.
- (g) ENFORCEMENT. The Department reserves the right to withhold payment to the Contractor to enforce the provisions of this Special Provision. Final payment shall not be made on the contract until such time as the Contractor submits sufficient documentation demonstrating achievement of the goal in accordance with this Special Provision or after liquidated damages have been determined and collected.
- (h) RECONSIDERATION. Notwithstanding any other provision of the contract, including but not limited to Article 109.09 of the Standard Specifications, the Contractor may request administrative reconsideration of a decision to deduct the amount of the goal not achieved as liquidated damages. A request to reconsider shall be delivered to the Contract Compliance Section and shall be handled and considered in the same manner as set forth in paragraph (c) of "Good Faith Effort Procedures" of this Special Provision, except a final decision that a good faith effort was not made during contract performance to achieve the goal agreed to in the Utilization Plan shall be the final administrative decision of the Department. The result of the reconsideration process is not administratively appealable to the U.S. Department of Transportation.



**DISPOSAL FEES (BDE)**

Effective: November 1, 2018

Replace Articles 109.04(b)(5) – 109.04(b)(8) of the Standard Specifications with the following:

- “(5) Disposal Fees. When the extra work performed includes paying for disposal fees at a clean construction and demolition debris facility, an uncontaminated soil fill operation or a landfill, the Contractor shall receive, as administrative costs, an amount equal to five percent of the first \$10,000 and one percent of any amount over \$10,000 of the total approved costs of such fees.
- (6) Miscellaneous. No additional allowance will be made for general superintendence, the use of small tools, or other costs for which no specific allowance is herein provided.
- (7) Statements. No payment will be made for work performed on a force account basis until the Contractor has furnished the Engineer with itemized statements of the cost of such force account work. Statements shall be accompanied and supported by invoices for all materials used and transportation charges. However, if materials used on the force account work are not specifically purchased for such work but are taken from the Contractor’s stock, then in lieu of the invoices, the Contractor shall furnish an affidavit certifying that such materials were taken from his/her stock, that the quantity claimed was actually used, and that the price and transportation claimed represent the actual cost to the Contractor.

Itemized statements at the cost of force account work shall be detailed as follows.

- a. Name, classification, date, daily hours, total hours, rate, and extension for each laborer and foreman. Payrolls shall be submitted to substantiate actual wages paid if so requested by the Engineer.
- b. Designation, dates, daily hours, total hours, rental rate, and extension for each unit of machinery and equipment.
- c. Quantities of materials, prices and extensions.
- d. Transportation of materials.
- e. Cost of property damage, liability and workmen’s compensation insurance premiums, unemployment insurance contributions, and social security tax.

- (8) Work Performed by an Approved Subcontractor. When extra work is performed by an approved subcontractor, the Contractor shall receive, as administrative costs, an amount equal to five percent of the total approved costs of such work with the minimum payment being \$100.
- (9) All statements of the cost of force account work shall be furnished to the Engineer not later than 60 days after receipt of the Central Bureau of Construction form "Extra Work Daily Report". If the statement is not received within the specified time frame, all demands for payment for the extra work are waived and the Department is released from any and all such demands. It is the responsibility of the Contractor to ensure that all statements are received within the specified time regardless of the manner or method of delivery."

**DOWEL BAR INSERTER (BDE)**

Effective: January 1, 2017 Revised: January 1, 2018

Add the following to Article 420.03 of the Standard Specifications.

"(l) Mechanical Dowel Bar Inserter .....1103.20"

Revise the first paragraph of Article 420.05(b)(1) of the Supplemental Specifications to read:

"Preformed or Drilled Holes. If applicable, the tie bars shall be installed after the dowel bars have been tested with the MIT Scan-2 device according to Article 420.05(c)(2)b.2. The tie bars shall be installed with a nonshrink grout or chemical adhesive providing a minimum pull-out strength as follows."

Revise Article 420.05(c) of the Standard Specifications to read:

"(c) Transverse Contraction Joints. Transverse contraction joints shall consist of planes of weakness created by sawing grooves in the surface of the pavement and shall include load transfer devices consisting of dowel bars. Transverse contraction joints shall be according to the following."

Revise Article 420.05(c)(2) of the Standard Specifications to read:

"(2) Dowel Bars. Dowel Bars shall be installed parallel to the centerline of the pavement and parallel to the proposed pavement surface. Installation shall be according to one of the following methods.

- a. Dowel Bar Assemblies. The assembly shall act as a rigid unit with each component securely held in position relative to the other members of the assembly. The entire assembly shall be held securely in place by means of nails which shall penetrate the stabilized subbase. At least ten nails shall be used for each 10, 11, or 12 ft (3, 3.3, or 3.6 m) section of assembly.

Metal stakes shall be used instead of nails, with soil or granular subbase. The stakes shall loop over or attach to the top parallel spacer bar of the assembly and penetrate the subgrade or subbase at least 12 in. (300 mm).

At the location of each dowel bar assembly, the subgrade or subbase shall be reshaped and re-tamped when necessary.

Prior to placing concrete, any deviation of the dowel bars from the correct horizontal or vertical alignment (horizontal skew or vertical tilt) greater than 3/8 in. in 12 in (9 mm in 300 mm) shall be corrected and a light coating of oil shall be uniformly applied to all dowel bars.

Care shall be exercised in depositing the concrete at the dowel bar assemblies so the horizontal and vertical alignment will be retained.

- b. Dowel Bar Insertion. The dowel bars may be placed in the pavement slab with a mechanical dowel bar inserter (DBI) attached to a formless paver for pavements  $\geq 7.0$  in. (175 mm) in thickness. A light coating of oil shall be uniformly applied to all dowel bars.

The DBI shall insert the dowel bars with vibration into the plastic concrete after the concrete has been struck off and consolidated without deformation of the slab. After the bars have been inserted, the concrete shall be refinished and no voids shall exist around the dowel bars. The forward movement of the paver shall not be interrupted by the inserting of the dowel bars.

The location of each row of dowel bars shall be marked in a manner to facilitate where to insert the bars, and where to saw the transverse joint.

1. Placement Tolerances for Dowel Bars. The DBI shall place the dowel bars in the concrete pavement within the following tolerances.

- (a.) Longitudinal Translation (Mislocation). Longitudinal translation (mislocation) shall be defined as the position of the center of the dowel bar along the longitudinal axis, in relation to the sawed joint.

The quality control tolerance for longitudinal translation shall not exceed 2.0 in (50 mm). If this tolerance is exceeded, adjustments shall be made to the paving operation.

Any joint having two or more dowel bars with an embedment length less than 4.0 in. (100 mm) within 12 in. (300 mm) of the same wheelpath will be considered unacceptable. The left and right wheelpaths shall be determined by excluding the middle 2.5 ft (0.8 m) of the pavement lane, and by excluding the outer 1.0 ft (0.3 m) measured from each pavement lane edge. Any joint having an average dowel bar embedment length less than 5.25 in. (130 mm) will also be considered unacceptable. Embedment length shall be defined as the length of dowel bar embedded on the short side of the sawed joint. An unacceptable joint shall be replaced with a minimum of 6 ft (1.8 m) of pavement centered over the joint according to Section 442 for Class B patches.

- (b.) Horizontal Translation (Mislocation). Horizontal translation (mislocation) shall be defined as the difference in the actual dowel bar location parallel to the longitudinal or edge joint from its theoretical position as shown on the plans.

The quality control tolerance for horizontal translation shall not exceed 2.0 in. (50 mm). If this tolerance is exceeded, adjustments shall be made to the paving operation.

Any joint having a dowel bar with a translation greater than 4.0 in. (100 mm) will be considered unacceptable, but may remain in place unless the Engineer determines the joint will not function. If the joint is unable to remain in place, the joint shall be replaced with a minimum of 6 ft (1.8 m) of pavement centered over the joint according to Section 442 for Class B patches.

- (c.) Vertical Translation (Mislocation). Vertical translation (mislocation) shall be defined as the difference in the vertical position of the dowel bar relative to the theoretical midpoint of the slab.

The quality control tolerance for vertical translation shall be as shown in the following table. If these tolerances are exceeded, adjustments shall be made to the paving operation.

Pavement Thickness	Dowel Bar Diameter	Vertical Translation Tolerance Above Midpoint	Vertical Translation Tolerance Below Midpoint
≥7 in. to <8 in. (≥175 mm to <200 mm)	1.25 in. (31 mm)	0.25 in. (6 mm)	0.5 in. (13 mm)
≥8 in. to <9 in. (≥200 mm to <225 mm)	1.50 in. (38 mm)	0.25 in. (6 mm)	0.5 in. (13 mm)
≥9 in. to <10 in. (≥225 mm to <250 mm)	1.50 in. (38 mm)	0.75 in. (19 mm)	0.75 in. (19 mm)
≥10 in. (≥250 mm)	1.50 in. (38 mm)	0.75 in. (19 mm)	1.0 in. (25 mm)

Any joint having a dowel bar with top concrete cover less than T/3, where T is slab thickness, will be considered unacceptable. Any joint having 2 or more dowel bars with bottom concrete cover less than 2.0 in. (50 mm) will also be considered unacceptable. An unacceptable joint shall be replaced with a minimum of 6 ft (1.8 m) of pavement according to Section 442 for Class B patches.

(d.) Vertical Tilt or Horizontal Skew (Misalignment). Vertical tilt or horizontal skew (misalignment) shall be defined as the difference in position of the dowel bar ends with respect to each other. Vertical tilt is measured in the vertical axis whereas horizontal skew is measured in the horizontal axis. Misalignment shall be measured in terms of a joint score. The joint score shall be defined as the degree of misalignment evaluated for a single transverse joint for each lane of pavement. The joint score shall be determined as follows:

$$Joint\ Score = \left( 1 + \left( \frac{x}{x-n} \right) \sum_{i=1}^{x-n} W_i \right)$$

where:

- $W_i$  = weighting factor (Table 1) for dowel  $i$
- $x$  = number of dowels in a single joint
- $n$  = number of dowels excluded from the joint score calculation due to measurement interference

*Single Dowel Misalignment* – The degree of misalignment applicable to a single dowel bar, calculated as:

$$Single\ Dowel\ Misalignment = \sqrt{(Horizontal\ Skew)^2 + (Vertical\ Tilt)^2}$$

Table 1. Weighting Factors in Joint Score Determination	
Single Dowel Bar Misalignment (SDM)	W, Weighting Factor
SDM ≤ 0.6 in. (15 mm)	0
0.6 in. (15 mm) < SDM ≤ 0.8 in. (20 mm)	2
0.8 in. (20 mm) < SDM ≤ 1 in. (25 mm)	4
1 in. (25 mm) < SDM ≤ 1.5 in. (38 mm)	5
1.5 in. (38 mm) < SDM	10

The quality control tolerance for vertical tilt or horizontal skew shall not exceed 0.6 in. (15 mm). If the tolerance is exceeded for either one, adjustments shall be made to the paving operation.

Any joint having a dowel bar with a vertical tilt or horizontal skew greater than 1.5 in. (38 mm) shall be cut. If more than one dowel bar is required to be cut in the joint, the joint will be considered unacceptable and shall be replaced with a minimum of 6 ft (1.8 m) of pavement centered over the joint according to Section 442 for Class B patches.

Single dowel bar misalignment shall be controlled to provide the joint scores shown in the following table.

Number of Dowel Bars in the Joint	Maximum Joint Score
< 5	4
≥ 5 but ≤ 9	8
> 9	12

A joint score greater than the specified maximum will be considered locked. Three consecutive joints with a score greater than the specified maximum total score will all be considered unacceptable.

Three consecutive locked joints shall be corrected by selecting one joint and cutting a dowel bar. Preference shall be given to cutting a dowel bar within the middle 2.5 ft (0.8 m) of the pavement lane to avoid the wheelpaths. If none of the three locked joints will have a joint score less than or equal to the specified maximum after selecting one dowel bar to cut, one of the joints shall be replaced with a minimum of 6 ft (1.8 m) of pavement centered over the joint according to Section 442 for Class B patches.

(e.) For unacceptable work, the Contractor may propose alternative repairs for consideration by the Engineer.

2. Testing of Dowel Bar Placement. The placement of the dowel bars shall be tested within 24 hours of paving with a calibrated MIT Scan-2 device according to "Use of Magnetic Tomography Technology to Evaluate Dowel Placement" (Publication No. FHWA-IF-06-006) by the Federal Highway Administration.

A trained operator shall perform the testing, and all testing shall be performed in the presence of the Engineer. The device shall be calibrated to the type and size dowel bar used in the work according to the manufacturer's instructions. Calibration documentation shall be provided to the Engineer prior to construction. The device shall be recalibrated and/or validate readings as required by the Engineer. The device may be utilized as a process control and make necessary adjustments to ensure the dowel bars are placed in the correct location.

(a.) Test Section. Prior to start of production paving, a test section consisting of 30 transverse joints shall be constructed. The test section may be performed on the actual pavement, but production paving shall not begin until an acceptable test section has been constructed. The test section will be considered acceptable when all of the following are met:

- (1.) 90 percent of the dowel bars meet the quality control tolerance for longitudinal, horizontal, or vertical translation (mislocation);

- (2.) 90 percent of the dowel bars meet the quality control tolerance for vertical tilt or horizontal skew deviation (misalignment); and
- (3.) none of the joints are considered unacceptable prior to a corrective measure for mislocation or misalignment.

If the test section fails, another test section consisting of 30 joints shall be constructed.

The test section requirement may be waived by the Engineer if the Contractor has constructed an acceptable test section and successfully used the DBI on a Department contract within the same calendar year.

- (b.) Production Paving. After the test section is approved, production paving may begin. The mislocation and misalignment of each dowel bar for the first ten joints constructed, and every tenth joint thereafter, shall be tested.

If two consecutive days of paving result in 5 percent or more of the joints on each day being unacceptable prior to a corrective measure, production paving shall be discontinued and a new test section shall be constructed.

If any joint is found to be unacceptable prior to a corrective measure, testing of additional joints on each side of the unacceptable joint shall be performed until acceptable joints are found.

- (c.) Test Report. Test reports shall be provided to the Engineer within two working days of completing each day's testing. The test report shall include the following.

- (1.) Contract number, placement date, county-route-section, direction of traffic, scan date, Contractor, and name of individual performing the tests.
- (2.) Provide the standard report generated from the on-board printer of the imaging technology used for every dowel and joint measured.
- (3.) For every dowel measured, provide the joint identification number, lane number and station, dowel bar number or x-location, direction of testing and reference joint location/edge location, longitudinal translation, horizontal translation, vertical translation, vertical tilt, and horizontal skew.
- (4.) Identify each dowel bar with a maximum longitudinal, horizontal, or vertical translation that has been exceeded. Identify each dowel bar with a maximum vertical tilt or horizontal skew deviation that has been exceeded.



- (5.) Joint Score Details: Provide the joint identification number, lane number, station, and calculated joint score for each joint.
  - (6.) Locked Joint Identification: Identify each joint where the maximum joint score is exceeded.
- (d.) Exclusions. Exclude the following from dowel bar mislocation and misalignment measurements.
- (1.) Transverse construction joints (headers).
  - (2.) Dowel bars within 24 in. (610 mm) of metallic manholes, inlets, metallic castings, or other nearby or underlying steel reinforced objects.
  - (3.) The outside dowel bar when tie bars are installed with mechanical equipment in fresh concrete. For tie bar installations involving preformed or drilled holes, installation of the tie bar shall be performed after testing with the MIT Scan-2 device.
  - (4.) Joints located directly under high voltage power lines.
  - (5.) Subject to the approval of the Engineer, any other contributors to magnetic interference.
- (e.) Deficiency Deduction. When the Contractor has cut 25 dowel bars to correct unacceptable joints, the Contractor shall be liable and shall pay to the Department a deficiency deduction of \$500.00 for the cost of the bars. Thereafter, an additional deficiency deduction of \$20.00 for each additional bar cut will be assessed.”

Add the following to Section 1103 of the Standard Specifications.

**“1103.20 Mechanical Dowel Bar Inserter.** The mechanical dowel bar inserter (DBI) shall be self-contained and supported on the formless paver with the ability to move separately from the paver. The DBI shall be equipped with insertion forks along with any other devices necessary for finishing the concrete the full width of the pavement. The insertion forks shall have the ability to vibrate at a minimum frequency of 3000 VPM.”

## **EMULSIFIED ASPHALTS (BDE)**

Effective: August 1, 2019

Revise Article 1032.06 of the Standard Specifications to read:

**“1032.06 Emulsified Asphalts.** Emulsified asphalts will be accepted according to the current Bureau of Materials Policy Memorandum, “Emulsified Asphalt Acceptance Procedure”. These materials shall be homogeneous and shall show no separation of asphalt after thorough mixing, within 30 days after delivery, provided separation has not been caused by freezing. They shall coat the aggregate being used in the work to the satisfaction of the Engineer and shall be according to the following requirements.

- (a) Anionic Emulsified Asphalt. Anionic emulsified asphalts RS-1, RS-2, HFRS-2, SS-1h, and SS-1 shall be according to AASHTO M 140, except as follows.
  - (1) The cement mixing test will be waived when the emulsion is being used as a tack coat.
  - (2) The Solubility in Trichloroethylene test according to AASHTO T 44 may be run in lieu of Ash Content and shall meet a minimum of 97.5 percent.
- (b) Cationic Emulsified Asphalt. Cationic emulsified asphalts CRS-1, CRS-2, CSS-1h, and CSS-1 shall be according to AASHTO M 208, except as follows.
  - (1) The cement mixing test will be waived when the emulsion is being used as a tack coat.
  - (2) The Solubility in Trichloroethylene test according to AASHTO T 44 may be run in lieu of Ash Content and shall meet a minimum of 97.5 percent.

- (c) High Float Emulsion. High float emulsions HFE-90, HFE-150, and HFE-300 are medium setting and shall be according to the following table.

Test	HFE-90	HFE-150	HFE-300
Viscosity, Saybolt Furol, at 122 °F (50 °C), (AASHTO T 59), SFS <sup>1/</sup>	50 min.	50 min.	50 min.
Sieve Test, No. 20 (850 µm), retained on sieve, (AASHTO T 59), %	0.10 max.	0.10 max.	0.10 max.
Storage Stability Test, 1 day, (AASHTO T 59), %	1 max.	1 max.	1 max.
Coating Test (All Grades), (AASHTO T 59), 3 minutes	stone coated thoroughly		
Distillation Test, (AASHTO T 59): Residue from distillation test to 500 °F (260 °C), % Oil distillate by volume, %	65 min. 7 max.	65 min. 7 max.	65 min. 7 max.
Characteristics of residue from distillation test to 500 °F (260 °C): Penetration at 77 °F (25 °C), (AASHTO T 49), 100 g, 5 sec, dmm	90-150	150-300	300 min.
Float Test at 140 °F (60 °C), (AASHTO T 50), sec.	1200 min.	1200 min.	1200 min.

1/ The emulsion shall be pumpable.

- (d) Penetrating Emulsified Prime. Penetrating Emulsified Prime (PEP) shall be according to AASHTO T 59, except as follows.

Test	Result
Viscosity, Saybolt Furol, at 77 °F (25 °C), SFS	75 max.
Sieve test, retained on No. 20 (850 µm) sieve, %	0.10 max.
Distillation to 500 °F (260 °C) residue, %	38 min.
Oil distillate by volume, %	4 max.

The PEP shall be tested according to the current Bureau of Materials Illinois Laboratory Test Procedure (ILTP), "Sand Penetration Test of Penetrating Emulsified Prime (PEP)". The time of penetration shall be equal to or less than that of MC-30. The depth of penetration shall be equal to or greater than that of MC-30.

- (e) Delete this subparagraph.

- (f) Polymer Modified Emulsified Asphalt. Polymer modified emulsified asphalts, e.g. SS-1hP, CSS-1hP, CRS-2P (formerly CRSP), CQS-1hP (formerly CSS-1h Latex Modified) and HFRS-2P (formerly HFP) shall be according to AASHTO M 316, except as follows.
- (1) The cement mixing test will be waived when the polymer modified emulsion is being used as a tack coat.
  - (2) CQS-1hP (formerly CSS-1h Latex Modified) emulsion for micro-surfacing treatments shall use latex as the modifier.
  - (3) Upon examination of the storage stability test cylinder after standing undisturbed for 24 hours, the surface shall show minimal to no white, milky colored substance and shall be a homogenous brown color throughout.
  - (4) The distillation for all polymer modified emulsions shall be performed according to AASHTO T 59, except the temperature shall be  $374 \pm 9$  °F ( $190 \pm 5$  °C) to be held for a period of 15 minutes and measured using an ASTM 16F (16C) thermometer.
  - (5) The specified temperature for the Elastic Recovery test for all polymer modified emulsions shall be  $50.0 \pm 1.0$  °F ( $10.0 \pm 0.5$  °C).
  - (6) The Solubility in Trichloroethylene test according to AASHTO T 44 may be run in lieu of Ash Content and shall meet a minimum of 97.5 percent.
- (g) Non-Tracking Emulsified Asphalt. Non-tracking emulsified asphalt NTEA (formerly SS-1vh) shall be according to the following.

Test	Requirement
Saybolt Viscosity at 77 °F (25 °C), (AASHTO T 59), SFS	20-100
Storage Stability Test, 24 hr, (AASHTO T 59), %	1 max.
Residue by Distillation, $500 \pm 10$ °F ( $260 \pm 5$ °C), or Residue by Evaporation, $325 \pm 5$ °F ( $163 \pm 3$ °C), (AASHTO T 59), %	50 min.
Sieve Test, No. 20 (850 μm), (AASHTO T 59), %	0.3 max.
Tests on Residue from Evaporation	
Penetration at 77 °F (25 °C), 100 g, 5 sec, (AASHTO T 49), dmm	40 max.
Softening Point, (AASHTO T 53), °F (°C)	135 (57) min.
Ash Content, (AASHTO T 111), % <sup>1/</sup>	1 max.

1/ The Solubility in Trichloroethylene test according to AASHTO T 44 may be run in lieu of Ash Content and shall meet a minimum of 97.5 percent

The different grades are, in general, used for the following.

Grade	Use
SS-1, SS-1h, RS-1, RS-2, CSS-1, CRS-1, CRS-2, CSS-1h, HFE-90, SS-1hP, CSS-1hP, NTEA (formerly SS-1vh)	Tack Coat
PEP	Prime Coat
RS-2, HFE-90, HFE-150, HFE-300, CRS-2P (formerly CRSP), HFRS-2P (formerly HFP), CRS-2, HFRS-2	Bituminous Surface Treatment
CQS-1hP (formerly CSS-1h Latex Modified)	Micro-Surfacing Slurry Sealing Cape Seal™

**EQUIPMENT PARKING AND STORAGE (BDE)**

Effective: November 1, 2017

Replace the first paragraph of Article 701.11 of the Standard Specifications with the following.

**“701.11 Equipment Parking and Storage.** During working hours, all vehicles and/or nonoperating equipment which are parked, two hours or less, shall be parked at least 8 ft (2.5 m) from the open traffic lane. For other periods of time during working and for all nonworking hours, all vehicles, materials, and equipment shall be parked or stored as follows.

- (a) When the project has adequate right-of-way, vehicles, materials, and equipment shall be located a minimum of 30 ft (9 m) from the pavement.
- (b) When adequate right-of-way does not exist, vehicles, materials, and equipment shall be located a minimum of 15 ft (4.5 m) from the edge of any pavement open to traffic.
- (c) Behind temporary concrete barrier, vehicles, materials, and equipment shall be located a minimum of 24 in. (600 mm) behind free standing barrier or a minimum of 6 in. (150 mm) behind barrier that is either pinned or restrained according to Article 704.04. The 24 in. or 6 in. measurement shall be from the base of the non-traffic side of the barrier.
- (d) Behind other man-made or natural barriers meeting the approval of the Engineer.”

## **FUEL COST ADJUSTMENT (BDE)**

Effective: April 1, 2009

Revised: August 1, 2017

**Description.** Fuel cost adjustments will be made to provide additional compensation to the Contractor, or a credit to the Department, for fluctuations in fuel prices when optioned by the Contractor. The bidder shall indicate with their bid whether or not this special provision will be part of the contract. Failure to indicate "Yes" for any category of work will make that category of work exempt from fuel cost adjustment.

**General.** The fuel cost adjustment shall apply to contract pay items as grouped by category. The adjustment shall only apply to those categories of work checked "Yes", and only when the cumulative plan quantities for a category exceed the required threshold. Adjustments to work items in a category, either up or down, and extra work paid for by agreed unit price will be subject to fuel cost adjustment only when the category representing the added work was subject to the fuel cost adjustment. Extra work paid for at a lump sum price or by force account will not be subject to fuel cost adjustment. Category descriptions and thresholds for application and the fuel usage factors which are applicable to each are as follows:

(a) Categories of Work.

- (1) Category A: Earthwork. Contract pay items performed under Sections 202, 204, and 206 including any modified standard or nonstandard items where the character of the work to be performed is considered earthwork. The cumulative total of all applicable item plan quantities shall exceed 25,000 cu yd (20,000 cu m). Included in the fuel usage factor is a weighted average 0.10 gal/cu yd (0.50 liters/cu m) factor for trucking.
- (2) Category B: Subbases and Aggregate Base Courses. Contract pay items constructed under Sections 311, 312 and 351 including any modified standard or nonstandard items where the character of the work to be performed is considered construction of a subbase or aggregate, stabilized or modified base course. The cumulative total of all applicable item plan quantities shall exceed 5000 tons (4500 metric tons). Included in the fuel usage factor is a 0.60 gal/ton (2.50 liters/metric ton) factor for trucking.
- (3) Category C: Hot-Mix Asphalt (HMA) Bases, Pavements and Shoulders. Contract pay items constructed under Sections 355, 406, 407 and 482 including any modified standard or nonstandard items where the character of the work to be performed is considered HMA bases, pavements and shoulders. The cumulative total of all applicable item plan quantities shall exceed 5000 tons (4500 metric tons). Included in the fuel usage factor is 0.60 gal/ton (2.50 liters/metric ton) factor for trucking.

- (4) Category D: Portland Cement Concrete (PCC) Bases, Pavements and Shoulders. Contract pay items constructed under Sections 353, 420, 421 and 483 including any modified standard or nonstandard items where the character of the work to be performed is considered PCC base, pavement or shoulder. The cumulative total of all applicable item plan quantities shall exceed 7500 sq yd (6000 sq m). Included in the fuel usage factor is 1.20 gal/cu yd (5.94 liters/cu m) factor for trucking.
- (5) Category E: Structures. Structure items having a cumulative bid price that exceeds \$250,000 for pay items constructed under Sections 502, 503, 504, 505, 512, 516 and 540 including any modified standard or nonstandard items where the character of the work to be performed is considered structure work when similar to that performed under these sections and not included in categories A through D.

(b) Fuel Usage Factors.

English Units		
Category	Factor	Units
A - Earthwork	0.34	gal / cu yd
B – Subbase and Aggregate Base courses	0.62	gal / ton
C – HMA Bases, Pavements and Shoulders	1.05	gal / ton
D – PCC Bases, Pavements and Shoulders	2.53	gal / cu yd
E – Structures	8.00	gal / \$1000

Metric Units		
Category	Factor	Units
A - Earthwork	1.68	liters / cu m
B – Subbase and Aggregate Base courses	2.58	liters / metric ton
C – HMA Bases, Pavements and Shoulders	4.37	liters / metric ton
D – PCC Bases, Pavements and Shoulders	12.52	liters / cu m
E – Structures	30.28	liters / \$1000

(c) Quantity Conversion Factors.

Category	Conversion	Factor
B	sq yd to ton	0.057 ton / sq yd / in depth
	sq m to metric ton	0.00243 metric ton / sq m / mm depth
C	sq yd to ton	0.056 ton / sq yd / in depth
	sq m to metric ton	0.00239 m ton / sq m / mm depth
D	sq yd to cu yd	0.028 cu yd / sq yd / in depth
	sq m to cu m	0.001 cu m / sq m / mm depth

**Method of Adjustment.** Fuel cost adjustments will be computed as follows.

$$CA = (FPI_P - FPI_L) \times FUF \times Q$$

Where: CA = Cost Adjustment, \$  
FPI<sub>P</sub> = Fuel Price Index, as published by the Department for the month the work is performed, \$/gal (\$/liter)  
FPI<sub>L</sub> = Fuel Price Index, as published by the Department for the month prior to the letting for work paid for at the contract price; or for the month the agreed unit price letter is submitted by the Contractor for extra work paid for by agreed unit price, \$/gal (\$/liter)  
FUF = Fuel Usage Factor in the pay item(s) being adjusted  
Q = Authorized construction Quantity, tons (metric tons) or cu yd (cu m)

The entire FUF indicated in paragraph (b) will be used regardless of use of trucking to perform the work.

**Basis of Payment.** Fuel cost adjustments may be positive or negative but will only be made when there is a difference between the FPI<sub>L</sub> and FPI<sub>P</sub> in excess of five percent, as calculated by:

$$\text{Percent Difference} = \{(FPI_L - FPI_P) \div FPI_L\} \times 100$$

Fuel cost adjustments will be calculated for each calendar month in which applicable work is performed; and will be paid or deducted when all other contract requirements for the items of work are satisfied. The adjustments shall not apply during contract time subject to liquidated damages for completion of the entire contract.



**GEOTECHNICAL FABRIC FOR PIPE UNDERDRAINS AND FRENCH DRAINS (BDE)**

Effective: November 1, 2019

Revise Article 1080.01(a) of the Standard Specifications to read:

- “ (a) Fabric Materials. Fabric materials shall be as follows.
- (1) Knitted Fabric. Knitted fabric envelope shall be Type A according to ASTM D 6707 and be a continuous one piece knitted polymeric material that fits over the pipe underdrain like a sleeve. It shall be free from any chemical treatment or coating that might significantly reduce porosity and permittivity.
  - (2) Woven or Nonwoven Fabric. The fabric shall be Class 3 according to AASHTO M 288 and consist of woven yarns or nonwoven filaments of polyolefins or polyesters. Woven slit film geotextiles (i.e. geotextiles made from yarns of a flat, tape like character) shall not be permitted. The yarns or filaments shall be dimensionally stable (i.e. maintain their relative position with respect to each other) and resistant to delamination. The yarns or filaments shall be free from any chemical treatment or coating that might significantly reduce porosity and permittivity.
  - (3) Physical Properties. The physical properties for knitted, woven, and nonwoven fabrics shall be according to the following.

PHYSICAL PROPERTIES			
	Knitted <sup>1/</sup>	Woven <sup>2/</sup>	Nonwoven <sup>2/</sup>
Grab Strength, lb (N) ASTM D 4632 <sup>3/</sup>	--	180 (800) min.	112 (500) min.
Elongation/Grab Strain, % ASTM D 4632 <sup>3/</sup>	--	49 max.	50 min.
Trapezoidal Tear Strength, lb (N) ASTM D 4533 <sup>3/</sup>	--	67 (300) min.	40 (180) min.
Puncture Strength, lb (N) ASTM D 6241 <sup>3/</sup>	180 (800) min.	370 (1650) min.	222 (990) min.
Apparent Opening Size, Sieve No. (mm) ASTM D 4751 <sup>4/</sup>	30 (0.60) max.	40 (0.425) max.	40 (0.425) max.
Permittivity, sec <sup>-1</sup> ASTM D 4491	1.0 min.		
Ultraviolet Stability, % retained strength after 500 hours of exposure ASTM D 4355	--	50 min.	50 min.

- 1/ Manufacturer's certification to meet test requirements.
- 2/ NTPEP results or manufacturer's certification to meet test requirements.
- 3/ Values represent the minimum average roll value (MARV) in the weaker principle direction [machine direction (MD) or cross-machine direction (XD)].
- 4/ Values represent the maximum average roll value."

Revise Article 1080.05 of the Standard Specifications to read:

**1080.05 Geotechnical Fabric for French Drains and Pipe Underdrains, Type 2.** Geotechnical fabric for french drains and pipe underdrains, Type 2 shall be Class 3 according to AASHTO M 288 and consist of woven yarns or nonwoven filaments of polyolefins or polyesters. Woven slit film geotextiles (i.e. geotextiles made from yarns of a flat, tape-like character) shall not be permitted. The yarns or filaments shall be dimensionally stable (i.e. maintain their relative position with respect to each other) and resistant to delamination. The yarns or filaments shall be free from any chemical treatment or coating that might significantly reduce porosity and permittivity.

The fabric shall be according to the following.

PHYSICAL PROPERTIES <sup>1/</sup>		
	Woven	Nonwoven
Grab Strength, lb (N) ASTM D 4632 <sup>2/</sup>	180 (800) min.	112 (500) min.
Elongation/Grab Strain, % ASTM D 4632 <sup>2/</sup>	49 max.	50 min.
Trapezoidal Tear Strength, lb (N) ASTM D 4533 <sup>2/</sup>	67 (300) min.	40 (180) min.
Puncture Strength, lb (N) ASTM D 6241 <sup>2/</sup>	370 (1650) min.	222 (990) min.
Apparent Opening Size, Sieve No. (mm) ASTM D 4751 <sup>3/</sup>	60 (0.25) max.	
Permittivity, sec <sup>-1</sup> ASTM D 4491	0.2 min.	
Ultraviolet Stability % retained strength after 500 hours of exposure - ASTM D 4355	50 min.	

- 1/ NTPEP results to meet test requirements. Manufacturer shall have public release status and current reports on laboratory results in Test Data of NTPEP's DataMine.
- 2/ Values represent the minimum average roll value (MARV) in the weaker principle direction [machine direction (MD) or cross-machine direction (XD)].
- 3/ Values represent the maximum average roll value."

## **GROOVING FOR RECESSED PAVEMENT MARKINGS (BDE)**

Effective: November 1, 2012

Revised: November 1, 2017

**Description.** This work shall consist of grooving the pavement surface in preparation for the application of recessed pavement markings.

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

- (a) **Preformed Plastic Pavement Marking Installations.** The grooving equipment shall have a free-floating saw blade cutting head equipped with gang-stacked diamond saw blades. The diamond saw blades shall be of uniform wear and shall produce a smooth textured surface. Any ridges in the groove shall have a maximum height of 15 mils (0.38 mm).
- (b) **Liquid and Thermoplastic Pavement Marking Installations.** The grooving equipment shall be equipped with either a free-floating saw blade cutting head or a free-floating grinder cutting head configuration with diamond or carbide tipped cutters and shall produce an irregular textured surface.

## **CONSTRUCTION REQUIREMENTS**

**General.** The Contractor shall supply the Engineer with a copy of the pavement marking material manufacturer's recommendations for constructing a groove.

**Pavement Grooving Methods.** The grooves for recessed pavement markings shall be constructed using the following methods.

- (a) **Wet Cutting Head Operation.** When water is required or used to cool the cutting head, the groove shall be flushed with high pressure water immediately following the cut to avoid build up and hardening of slurry in the groove. The pavement surface shall be allowed to dry for a minimum of 24 hours prior to the final cleaning of the groove and application of the pavement marking material.
- (b) **Dry Cutting Head Operation.** When used on HMA pavements, the groove shall be vacuumed or cleaned by blasting with high-pressure air to remove loose aggregate, debris, and dust generated during the cutting operation. When used on PCC pavements, the groove shall be flushed with high pressure water or shot blasted to remove any PCC particles that may have become destabilized during the grooving process. If high pressure water is used, the pavement surface shall be allowed to dry for a minimum of 24 hours prior to the final cleaning of the groove and application of the pavement marking material.

**Pavement Grooving.** Grooving shall not cause ravels, aggregate fractures, spalling or disturbance of the joints to the underlying surface of the pavement. Grooves shall be cut into the pavement prior to the application of the pavement marking material. Grooves shall be cut such that the width is 1 in. (25 mm) greater than the width of the pavement marking line as specified on the plans. Grooves for letters and symbols shall be cut in a square or rectangular shape so that the entire marking will fit within the limits of the grooved area. The position of the edge of the grooves shall be a minimum of 2 in. (50 mm) from the edge of all longitudinal joints. The depth of the groove shall not be less than the manufacturer's recommendations for the pavement marking material specified, but shall be installed to a minimum depth of 110 mils (2.79 mm) and a maximum depth of 200 mils (5.08 mm) for pavement marking tapes thermoplastic markings and a minimum depth of 40 mils (1.02 mm) and a maximum depth of 80 mils (2.03 mm) for liquid markings. The cutting head shall be operated at the appropriate speed in order to prevent undulation of the cutting head and grooving at an inconsistent depth.

At the start of grooving operations, a 50 ft (16.7 m) test section shall be installed and depth measurements shall be made at 10 ft (3.3 m) intervals within the test section. The individual depth measurements shall be within the allowable ranges according to this Article. If it is determined the test section has not been grooved at the appropriate depth or texture, adjustments shall be made to the cutting head and another 50 ft (16.7 m) test section shall be installed and checked. This process shall continue until the test section meets the requirements of this Article.

For new HMA pavements, grooves shall not be installed within 10 days of the placement of the final course of pavement.

**Final Cleaning.** Immediately prior to the application of the pavement marking material or primer sealer, the groove shall be cleaned with high-pressure air blast.

**Method of Measurement.** This work will be measured for payment in place, in feet (meter) for the groove width specified.

Grooving for letter, numbers and symbols will be measured in square feet (square meters).

**Basis of Payment.** This work will be paid for at the contract unit price per foot (meter) for GROOVING FOR RECESSED PAVEMENT MARKING of the groove width specified, and per square foot (square meter) for GROOVING FOR RECESSED PAVEMENT MARKING, LETTERS AND SYMBOLS.

The following shall only apply when preformed plastic pavement markings are to be recessed:

Add the following paragraph after the first paragraph of Article 780.07 of the Standard Specifications.

“The markings shall be capable of being applied in a grooved slot on new and existing portland cement concrete and HMA surfaces, by means of a pressure-sensitive, precoated adhesive, or liquid contact cement which shall be applied at the time of installation. A primer sealer shall be applied with a roller and shall cover and seal the entire bottom of the groove. The primer sealer shall be recommended by the manufacturer of the pavement marking material and shall be compatible with the material being used. The Contractor shall install the markings in the groove as soon as possible after the primer sealer cures according to the manufacturer’s recommendations. The markings placed in the groove shall be rolled and tamped into the groove with a roller or tamper cart cut to fit the groove and loaded with or weighing at least 200 lb (90kg). Vehicle tires shall not be used for tamping. The Contractor shall roll and tamp the material with a minimum of 6 passes to prevent easy removal or peeling.”

#### **LUMINAIRES, LED (BDE)**

Effective: April 1, 2019

**Description.** This work shall consist of furnishing and installing light emitting diode (LED) luminaires. Work shall be according to Sections 801, 821, and 1067 of the Standard Specifications, except as modified herein.

**Submittals.** In addition to the requirements listed in Article 801.05(a), submittals for LED luminaires shall include the following.

- Completed manufacturer’s luminaire ordering form with the full catalog number provided.
- Descriptive literature and catalog cuts for the luminaire, driver, and surge protective device.
- Lighting calculations generated with AGi32 software demonstrating compliance with the Luminaire Performance Table shown in the contract. These calculations shall be performed to the following criteria: photopic units shall be used; calculations shall be performed to an accuracy of two digits (x.xx cd/m<sup>2</sup>); point-by-point illuminance, luminance, and veiling luminance ratios demonstrating that the submitted luminaire meets the lighting metrics specified in the Luminaire Performance Table using IES RP-8 methods.

Upon request by the Engineer, submittals for LED Luminaires shall also include any or all the following.

- IES file associated with each submitted luminaire in IES LM-63 format.
- TM-21 calculator spreadsheet (XLSX or PDF format) and if available, TM-28 report for the specified luminaire or luminaire family. Both reports shall be for 50,000 hours at an ambient temperature of 77 °F (25 °C).
- LM-79 report with National Voluntary Laboratory Accreditation Program (NVLAP) current at the time of testing in PDF format inclusive of the following: isofootcandle diagram with half candela contour and maximum candela point; polar plots through maximum plane and maximum cone; coefficient of utilization graph; candela table; and spectral distribution graph and chromaticity diagram.
- LM-80 report for the specified LED package in PDF format and if available, LM-84 report for the specified luminaire or luminaire family in PDF format. Both reports shall be conducted by a laboratory with NVLAP certification current at the time of testing.
- In Situ Temperature Measurement Test (ISTMT) report for the specified luminaire or luminaire family in PDF format.
- Vibration test report in accordance with ANSI C136.31 in PDF format.
- ASTM B117/ASTM D1654 (neutral salt spray) test and sample evaluation report in PDF format.
- ASTM G154 (ASTM D523) gloss test report in PDF format.
- LED drive current, total luminaire input wattage, and current over the operating voltage range at an ambient temperature of 77 °F (25 °C).
- Power factor (pf) and total harmonic distortion (THD) at maximum and minimum supply and at nominal voltage for the dimmed states of 70%, 50%, and 30% full power.
- Ingress protection (IP) test reports, conducted according to ANSI C136.25 requirements, for the driver and optical assembly in PDF format.
- Installation, maintenance, and cleaning instructions in PDF format, including recommendations on periodic cleaning methods.
- Documentation in PDF format that the reporting laboratory is certified to perform the required tests.

**Warranty.** Replace the last sentence of Article 801.14(a) with the following.

“The warranty, including the maintained minimum luminance, for LED signal head modules, optically programmed LED signal head modules, and LED pedestrian signal head modules shall cover a minimum of 60 months from the date of delivery. The warranty for LED roadway luminaires, LED highmast luminaires, LED underpass luminaires, LED sign lighting luminaires, LED obstruction warning luminaires, and all of their components shall cover a minimum of ten years from the date of delivery.”

**Roadway Luminaires.** Revise Article 821.02(d) to read.

“(d) Light Source ..... 1067.06”

Revise the third paragraph of Article 821.03 to read.

“Each luminaire driver and/or driver arrangement shall be checked to assure compatibility with the project power supply. When the luminaire driver has a readily accessible electrical compartment, the driver shall be attached so as to be easily removed for maintenance.”

Replace the fifth paragraph of Article 821.03 with the following.

“No luminaire shall be installed before it is approved. When independent luminaire testing is required, full approval will not be given until complete test results which demonstrate compliance with the contract documents have been reviewed and accepted by the Engineer. Independent luminaire testing will be required, and shall be conducted, according to Article 1067.01(k)”.

Revise the last paragraph of Article 821.03 to read.

“When installing or adjusting the luminaire, care shall be taken to avoid touching the lenses or allowing contaminants to be deposited on any part of the optical assembly. Each lens shall be free of all dirt, smudges, etc. Should the luminaire require cleaning, the luminaire manufacturer’s cleaning instructions shall be strictly followed.”

Revise Article 821.08 to read.

**“821.08 Basis of Payment.** This work will be paid for at the contract unit price per each for LUMINAIRE, LED, ROADWAY, of the output designation specified; LUMINAIRE, LED, HIGHMAST, of the output designation specified; LUMINAIRE, LED, UNDERPASS, WALLMOUNT, of the output designation specified; LUMINAIRE, LED, UNDERPASS, SUSPENDED, of the output designation specified; LUMINAIRE, LED, SIGN LIGHTING, of the output designation specified.

When independent luminaire testing is required, the work will be paid for at the contract lump sum price for INDEPENDENT LUMINAIRE TESTING.”

**Luminaires.** Revise Articles 1067.01 through 1067.06 to read.

**“1067.01 General.** The luminaire shall be mechanically strong and easy to maintain. The size, weight, and shape of the luminaire shall be designed so as not to incite detrimental vibrations in its respective pole and it shall be compatible with the pole and arm. All electrical and electronic components of the luminaire shall comply with the requirements of Restriction of Hazardous Materials (RoHS) regulations. The luminaire shall be listed for wet locations by an NRTL and shall meet the requirements of UL 1598 and UL 8750.

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

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

- (b) Surge Protection. The luminaire shall comply the requirements of ANSI C136.2 for electrical transient immunity at the “Extreme” level (20KV/10KA) and shall be equipped with a surge protective device (SPD) that is UL1449 compliant with indicator light. An SPD failure shall open the circuit to protect the driver.
- (c) Optical Assembly. The optical assembly shall have an IP66 or higher rating in accordance with ANSI C136.25. The circuiting of the LED array shall be designed to minimize the effect of individual LED failures on the operation of other LEDs. All optical components shall be made of glass or a UV stabilized, non-yellowing material.



- (d) Housing. All external surfaces shall be cleaned in accordance with the manufacturer's recommendations and be constructed in such a way as to discourage the accumulation of water, ice, and debris.
- (e) Driver. The driver shall be integral to the luminaire and shall be capable of receiving indefinite open and short circuit output conditions without damage.

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

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

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

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

- (f) Photometric Performance. The luminaire shall be IES LM-79 tested by a laboratory holding accreditation from the NVLAP for IES LM-79 testing procedures. At a minimum the LM-79 report shall include a backlight/uplight/glare (BUG) rating and a luminaire classification system (LCS) graph showing lumen values and percent lumens by zone as described in IES RP-8. The uplight of the BUG rating shall be U=0.

The luminaire shall also meet the requirements of the Luminaire Performance Table shown in the contract.

- (g) Finish. The luminaire shall have a baked acrylic enamel finish. The color of the finish shall be gray, bronze, or black to match the pole or tower on which the luminaire is mounted.

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

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

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

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

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

- (i) Vibration Testing. All luminaires shall be subjected to and pass vibration testing requirements at “3G” minimum zero to peak acceleration in accordance with ANSI C136.31 requirements using the same luminaire. To be accepted, the luminaire housing, hardware, and each individual component shall pass this test with no noticeable damage and the luminaire must remain fully operational after testing.
- (j) Wiring. All wiring in the luminaire shall be rated for operation at 600V, 221 °F (105 °C).

- (k) Independent Luminaire Testing. When a contract has 30 or more luminaires of the same manufacturer's catalog number, that luminaire shall be independently tested to verify it will meet the contract requirements. The quantity of luminaires requiring testing shall be one luminaire for the first 30 plus one additional luminaire for each additional 50 luminaires of that catalog number. Testing is not required for temporary lighting luminaires.

Prior to testing the Contractor shall propose a properly accredited laboratory and a qualified independent witness, submitting their qualifications to the Engineer for approval. After approval, the Contractor shall coordinate the testing and pay all associated costs, including travel expenses, for the independent witness.

- (1) Independent Witness. The independent witness shall select from the project luminaires at the manufacturer's facility the luminaires for testing. In all cases, the selection of luminaires shall be a random selection from the entire completed lot of luminaires required for the contract. Selections from partial lots will not be allowed. The independent witness shall mark each sample luminaire's shipping carton with the IDOT contract number and a unique sample identifier.

At the time of random selection, the independent witness shall inspect the luminaire(s) for compliance with all physical, mechanical, and labeling requirements for luminaires according to Sections 821 and 1067. If deficiencies are found during the physical inspection, the Contractor shall have all luminaires of that manufacturer's catalog number inspected for the identified deficiencies and shall correct the problem(s) where found. Random luminaire selection and physical inspection must then be repeated. When the physical inspection is successfully completed, the independent witness shall mark the project number and sample identifier on the interior housing and driver of the luminaires and have them shipped to the laboratory.

The independent witness shall be present when testing is approved to be performed by the luminaire manufacturer. If the tests are performed by a laboratory independent of the luminaire manufacturer, distributor, and Contractor, the independent witness need not be present during the testing.

- (2) Laboratory Testing. Luminaires shall be tested at an NVLAP accredited laboratory approved for each of the required tests. The testing shall include photometric, colorimetric, and electrical testing according to IES LM-79. Colorimetric values shall be determined from total spectral radiant flux measurements using a spectroradiometer. Photometric testing shall be according to IES recommendations and as a minimum, shall yield an isofootcandle chart, with max candela point and half candela trace indicated, an isocandela diagram, maximum plane and maximum cone plots of candela, a candlepower table (house and street side), a coefficient of utilization chart, a luminous flux distribution table, BUG rating report, and complete calculations based on specified requirements and test results.

All testing shall cover the full spherical light output at a maximum of 5 degree intervals at the vertical angles. The vertical angles shall run from 0 to 180 degrees. There shall be a minimum of 40 lateral test planes listed in Fig. 1 of IES LM-31 plus the two planes containing the maximum candela on the left and right sides of the luminaire axis. Before testing, the luminaire when mounted on the goniometer shall be scanned for vertical and horizontal angles of maximum candela and these planes included in the test. The luminaire shall be checked for a bi-symmetric light distribution. Individual tests must be conducted for each hemisphere, quadrant, and left/right sides.

The results for each photometric and colorimetric test performed shall be presented in a standard IES LM-79 report that includes the contract number, sample identifier, and the outputs listed above. The calculated results for each sample luminaire shall meet or exceed the contract specified levels in the luminaire performance table(s). The laboratory shall mark its test identification number on the interior of each sample luminaire.

Electrical testing shall be in according to IES LM-79 as well as NEMA and ANSI standards. The report shall list luminaire characteristics including input amperes, watts, power factor, total harmonic distortion, and LED driver current for full and partial power.

- (3) Summary Test Report. The summary test report shall consist of a narrative documenting the test process, highlight any deficiencies and corrective actions, and clearly state which luminaires have met or exceeded the test requirements and may be released for delivery to the jobsite. Photographs shall also be used as applicable to document luminaire deficiencies and shall be included in the test report. The summary test report shall include the Luminaire Physical Inspection Checklist (form BDE 5650), photometric and electrical test reports, and point-by-point photometric calculations performed in AGi32 sorted by luminaire manufacturers catalog number. All test reports shall be certified by the independent test laboratory's authorized representative or the independent witness, as applicable, by a dated signature on the first page of each report. The summary test reports shall be delivered to the Engineer and the Contractor as an electronic submittal. Hard copy reports shall be delivered to the Engineer for record retention.
- (4) Approval of Independent Testing Results. Should any of the tested luminaires fail to satisfy the specifications and perform according to approved submittal information, all luminaires of that manufacturers catalog number shall be deemed unacceptable and shall be replaced by alternate equipment meeting the specifications. The submittal and testing process shall then be repeated in its entirety. The Contractor may request in writing that unacceptable luminaires be corrected in lieu of replacement. The request shall identify the corrections to be made and upon approval of the request, the Contractor shall apply the corrections to the entire lot of unacceptable luminaires. Once the corrections are completed, the testing process shall be repeated, including selection of a new set of sample luminaires. The number of luminaires to be tested shall be the same quantity as originally tested.

The process of retesting, correcting, or replacing luminaires shall be repeated until luminaires for each manufacturers catalog number are approved for the project. Corrections and re-testing shall not be grounds for additional compensation or extension of time. No luminaires shall be shipped from the manufacturer to the jobsite until all luminaire testing is completed and approved in writing.

Submittal information shall include a statement of intent to provide the testing as well as a request for approval of the chosen independent witness and laboratory. All summary test reports, written reports, and the qualifications of the independent witness and laboratory shall be submitted for approval to the Engineer with a copy to the Bureau of Design and Environment, 2300 S Dirksen Parkway, Room 330 Springfield, IL 62764.

**1067.02 Roadway Luminaires.** Roadway luminaires shall be according to Article 1067.01 and the following.

The luminaire shall be horizontally mounted and shall be designed to slip-fit on a 2-3/8 in. (60 mm) outside diameter pipe arm with a stop to limit the amount of insertion to 7 in. (180 mm). It shall not be necessary to remove or open more than the access door to mount the luminaire.

The effective projected area (EPA) of the luminaire shall not exceed 1.6 sq ft (0.149 sq m) and the weight, including accessories, shall not exceed 40 lb (18.14 kg). If the weight of the luminaire is less than 20 lb (9.07 kg), weight shall be added to the mounting arm or a supplemental vibration damper installed as approved by the Engineer.

The luminaire shall be equipped with both internal and external leveling indicators. The external leveling indicator shall be clearly visible in daylight to an observer directly under the luminaire at a mounting height of 50 ft (15.2 m).

The luminaire shall be fully prewired to accept a seven-pin, twist-lock receptacle that is compliant with ANSI C136.41. All receptacle pins shall be connected according to TALQ Consortium protocol.

The luminaire shall be provided with an installed shorting cap that is compliant with ANSI C136.10.

**1067.03 Highmast Luminaires.** Highmast luminaires shall be according to Article 1067.01 and the following.

The luminaire shall be horizontally mounted and shall be designed and manufactured for highmast tower use. The EPA of the luminaire shall not exceed 3.0 sq ft (0.279 sq m) and the weight, including accessories, shall not exceed 85 lb (38.6 kg).

The optical assembly shall be capable of being rotated 360 degrees. A vernier scale shall be furnished on the axis of rotation for aiming the luminaire in relation to its mounting tenon arm. The scale shall be graduated in 5 degree increments or less. The luminaire shall be clearly marked at the vernier as to 'house-side' and 'street-side' to allow proper luminaire orientation.

**1067.04 Underpass Luminaires.** Underpass luminaries shall be according to Article 1067.01 and the following.

The underpass luminaire shall be complete with all supports, hardware, and appurtenant mounting accessories. The underpass luminaire shall be suitable for lighting a roadway underpass at an approximate mounting height of 15 ft (4.5 m) from a position suspended directly above the roadway edge of pavement or attached to a wall or pier. The underpass luminaire shall meet the requirements of ANSI C136.27.

It shall not be necessary to remove more than the cover, reflector and lens to mount the luminaire. The unit shall be heavy duty, suitable for highway use and shall have no indentations or crevices in which dirt, salt, or other corrosives may collect.

- (a) Housing. The housing and lens frame shall be made of heavy duty die cast aluminum or 16 gauge (1.5 mm) minimum thickness Type 304 stainless steel. All seams in the housing enclosure shall be welded by continuous welds.

The housing shall have an opening for installation of a 3/4 in. (19 mm) diameter conduit.

- (b) Lens and Lens Frame. The frame shall not overlap the housing when closed. The luminaire shall have a flat glass lens to protect the LEDs from dirt accumulation or be designed to prevent dirt accumulation. The optic assembly shall be rated IP 66 or higher.

**1067.05 Sign Lighting Luminaires.** Sign lighting luminaries shall be suitable for lighting overhead freeway and expressway guide signs; and shall be according to Article 1067.01.

**1067.06 Light Sources.** The light sources in all luminaires shall be LED according to Article 1067.01 and the following.

- (a) The light source shall be according to ANSI C136.37 for solid state light sources used in roadway and area lighting.
- (b) The light source shall have a minimum color rendering index (CRI) of 70 and a nominal correlated color temperature (CCT) of 4000 K.
- (c) The rated initial luminous flux (lumen output) of the light source, as installed in the luminaire, shall be according to the following table for each specified output designation.

<b>Output Designations and Initial Luminous Flux</b>		<i>(for information only)</i>
<b>Output Designation</b>	<b>Initial Luminous Flux (lm)</b>	Approximate High Pressure Sodium (HPS) Equivalent Wattage
A	2,200	35 (Low Output)
B	3,150	50 (Low Output)
C	4,400	70 (Low Output)
D	6,300	100 (Low Output)
E	9,450	150 (Low Output)
F	12,500	200 (Med Output)
G	15,500	250 (Med Output)
H	25,200	400 (Med Output)
I	47,250	750 (High Output)
J	63,300	1,000 (High Output)
K	80,000+	1,000+ (High Output)

Luminaires with an initial luminous flux less than the values listed in the above table may be acceptable if they meet the requirements given in the Luminaire Performance Table shown in the contract.”



**MANHOLES, VALVE VAULTS, AND FLAT SLAB TOPS (BDE)**

Effective: January 1, 2018

Revised: March 1, 2019

**Description.** In addition to those manufactured according to the current standards included in this contract, manholes, valve vaults, and flat slab tops manufactured prior to March 1, 2019, according to the previous Highway Standards listed below will be accepted on this contract:

Product	Previous Standards		
Precast Manhole Type A, 4' (1.22 m) Diameter	602401-05	602401-04	602401-03
Precast Manhole Type A, 5' (1.52 m) Diameter	602402-01	602402	602401-03
Precast Manhole Type A, 6' (1.83 m) Diameter	602406-09	602406-08	602406-07
Precast Manhole Type A, 7' (2.13 m) Diameter	602411-07	602411-06	602411-05
Precast Manhole Type A, 8' (2.44 m) Diameter	602416-07	602416-06	602416-05
Precast Manhole Type A, 9' (2.74 m) Diameter	602421-07	602421-06	602421-05
Precast Manhole Type A, 10' (3.05 m) Diameter	602426-01	602426	
Precast Valve Vault Type A, 4' (1.22 m) Diameter	602501-04	602501-03	602501-02
Precast Valve Vault Type A, 5' (1.52 m) Diameter	602506-01	602506	602501-02
Precast Reinforced Concrete Flat Slab Top	602601-05	602601-04	

The following revisions to the Standard Specifications shall apply to manholes, valve vaults, and flat slab tops manufactured according to the current standards included in this contract:

Revise Article 602.02(g) of the Standard Specifications to read:

“(g) Structural Steel (Note 4) ..... 1006.04

Note 4. All components of the manhole joint splice shall be galvanized according to the requirements of AASHTO M 111 or M 232 as applicable.”

Add the following to Article 602.02 of the Standard Specifications:

“(s) Anchor Bolts and Rods (Note 5) ..... 1006.09

Note 5. The threaded rods for the manhole joint splice shall be according to the requirements of ASTM F 1554, Grade 55, (Grade 380).”

Revise the second paragraph of Article 1042.10 of the Standard Specifications to read:

“Catch basin Types A, B, C, and D; Manhole Type A; Inlet Types A and B; Drainage Structures Types 1, 2, 3, 4, 5, and 6; Valve Vault Type A; and reinforced concrete flat slab top (Highway Standard 602601) shall be manufactured according to AASHTO M 199 (M 199M), except as shown on the plans. Additionally, catch basins, inlets, and drainage structures shall have a minimum concrete compressive strength of 4500 psi (31,000 kPa) at 28 days and manholes, valve vaults, and reinforced concrete flat slab tops shall have a minimum concrete compressive strength of 5000 psi (34,500 kPa) at 28 days.”

**MOBILIZATION (BDE)**

Effective: April 1, 2020

Replace Articles 671.02(a), (b), and (c) of the Standard Specifications with the following:

- “(a) Upon execution of the contract, 90 percent of the pay item will be paid.
- (b) When 90 percent of the adjusted contract value is earned, the remaining ten percent of the pay item will be paid along with any amount bid in excess of six percent of the original contract amount.”

**PAVEMENT MARKING REMOVAL (BDE)**

Effective: July 1, 2016

Revise Article 783.02 of the Standard Specifications to read:

“**783.02 Equipment.** Equipment shall be according to the following.

Item	Article/Section
(a) Grinders (Note 1)	
(b) Water Blaster with Vacuum Recovery .....	1101.12

Note 1. Grinding equipment shall be approved by the Engineer.”

Revise the first paragraph of Article 783.03 of the Standard Specifications to read:

“**783.03 Removal of Conflicting Markings.** Existing pavement markings that conflict with revised traffic patterns shall be removed. If darkness or inclement weather prohibits the removal operations, such operations shall be resumed the next morning or when weather permits. In the event of removal equipment failure, such equipment shall be repaired, replaced, or leased so removal operations can be resumed within 24 hours.”

Revise the first and second sentences of the first paragraph of Article 783.03(a) of the Standard Specifications to read:

“The existing pavement markings shall be removed by the method specified and in a manner that does not materially damage the surface or texture of the pavement or surfacing. Small particles of tightly adhering existing markings may remain in place, if in the opinion of the Engineer, complete removal of the small particles will result in pavement surface damage.”

Revise the first paragraph of Article 783.04 of the Standard Specifications to read:

**“783.04 Cleaning.** The roadway surface shall be cleaned of debris or any other deleterious material by the use of compressed air or water blast.”

Revise the first paragraph of Article 783.06 of the Standard Specifications to read:

**“783.06 Basis of Payment.** This work will be paid for at the contract unit price per each for RAISED REFLECTIVE PAVEMENT MARKER REMOVAL, or at the contract unit price per square foot (square meter) for PAVEMENT MARKING REMOVAL – GRINDING and/or PAVEMENT MARKING REMOVAL – WATER BLASTING.”

Delete Article 1101.13 from the Standard Specifications.

**PORTLAND CEMENT CONCRETE (BDE)**

Effective: November 1, 2017

Revise the Air Content % of Class PP Concrete in Table 1 Classes of Concrete and Mix Design Criteria in Article 1020.04 of the Standard Specifications to read:

"TABLE 1. CLASSES OF CONCRETE AND MIX DESIGN CRITERIA		
Class of Conc.	Use	Air Content %
PP	Pavement Patching	4.0 - 8.0"
	Bridge Deck Patching (10)	
	PP-1	
	PP-2	
	PP-3	
	PP-4	
	PP-5	

Revise Note (4) at the end of Table 1 Classes of Concrete and Mix Design Criteria in Article 1020.04 of the Standard Specifications to read:

“(4) For all classes of concrete, the maximum slump may be increased to 7 in (175 mm) when a high range water-reducing admixture is used. For Class SC, the maximum slump may be increased to 8 in. (200 mm). For Class PS, the maximum slump may be increased to 8 1/2 in. (215 mm) if the high range water-reducing admixture is the polycarboxylate type.”

**PORTLAND CEMENT CONCRETE BRIDGE DECK CURING (BDE)**

Effective: April 1, 2015

Revised: November 1, 2019

Revise the following three entries and add the following footnote to the Index Table of Curing and Protection of Concrete Construction in Article 1020.13 of the Standard Specifications:

"INDEX TABLE OF CURING AND PROTECTION OF CONCRETE CONSTRUCTION"			
TYPE OF CONSTRUCTION	CURING METHODS	CURING PERIOD DAYS	LOW AIR TEMPERATURE PROTECTION METHODS
Superstructure (except deck)	1020.13(a)(1)(2)(3)(5)(6) <sup>8/19/</sup>	7	1020.13(d)(1)(2)
Superstructure (Approach Slab)	1020.13(a)(5)(6) <sup>19/</sup>	3	1020.13(d)(1)(2) <sup>17/</sup>
Deck	1020.13(a)(5)(6) <sup>19/</sup>	7	1020.13(d)(1)(2) <sup>17/</sup>

19/ The cellulose polyethylene or synthetic fiber with polymer polyethylene blanket method shall not be used on latex modified concrete, or vertical concrete surfaces greater than 1 ft (300 mm), e.g. parapets."

Add the following to Article 1020.13(a) of the Standard Specifications.

"(6)Cellulose Polyethylene Blanket Method and Synthetic Fiber with Polymer Polyethylene Blanket Method. After the surface of concrete has been textured or finished, it shall be covered immediately with a wetted cellulose polyethylene blanket or wetted synthetic fiber with polymer polyethylene blanket. The blankets shall be installed with the white perforated polyethylene side facing up. The blanket's fiber side shall be wetted immediately prior to placement or as the blanket is being placed, and the polyethylene side shall be thoroughly soaked with a gentle spray of water immediately after placement. For bridge decks, a foot bridge shall be used to place and wet the blankets.

Adjoining blankets shall overlap a minimum of 8 in. (200 mm). Bubbles and wrinkles shall be removed with a broom, squeegee, or as recommended by the manufacturer.

The blankets shall be maintained in a wetted condition until the concrete has hardened sufficiently to place soaker hoses without indentations to the concrete surface. The soaker hoses shall be placed on top of the blankets at a maximum 4 ft (1.2 m) spacing. The blankets shall be kept wet with a continuous supply of water for the remainder of the curing period. Other continuous wetting systems may be used if approved by the Engineer.

For areas inaccessible to the blankets, curing shall be according to Article 1020.13(a)(3)."

Revise the first paragraph of Article 1022.03 of the Standard Specifications to read:

**“1022.03 Waterproof Paper Blankets, White Polyethylene Sheeting, Burlap-Polyethylene Blankets, Cellulose Polyethylene Blankets, and Synthetic Fiber with Polymer Polyethylene Blankets.** These materials shall be white and according to ASTM C 171.

The cellulose polyethylene blanket shall consist of a perforated white polyethylene sheeting with cellulose fiber backing and shall be limited to single use only. The cellulose polyethylene blankets shall be delivered to the jobsite unused and in the manufacturer's unopened packaging until ready for installation. Each roll shall be clearly labeled on the product with product name, manufacturer, and manufacturer's certification of compliance with ASTM C 171.

The synthetic fiber with polymer polyethylene blanket shall consist of a perforated white polyethylene sheeting with absorbent synthetic fibers and super absorbent polymer backing, and shall be limited to single use only. The synthetic fiber with polymer polyethylene blankets shall be delivered to the jobsite unused and in the manufacturer's unopened packaging until ready for installation. Each roll shall be clearly labeled on the product with product name, manufacturer, and manufacturer's certification of compliance with ASTM C 171.”

**PREFORMED PLASTIC PAVEMENT MARKING TYPE D - INLAID (BDE)**

Effective: April 1, 2012

Revised: April 1, 2016

Revise subparagraph (c) and add subparagraph (i) to Article 780.02 of the Standard Specifications:

- “(c) Preformed Plastic Pavement Markings, Type B and Type C..... 1095.03
- (i) Preformed Plastic Pavement Marking, Type D ..... 1095.10”

Revise the first paragraph of Article 780.07(a) of the Standard Specifications to read:

- “(a) Type B or D - Inlaid Application. On freshly placed HMA, the inlaid markings shall be applied before final compaction and when the pavement temperature has cooled to approximately 150 °F (65 °C) and when, in the opinion of the Engineer, the pavement is acceptable for vehicular traffic.”

Revise the first paragraph of Article 780.12 of the Standard Specifications to read:

**“780.12 Inspection.** The epoxy, thermoplastic, preformed thermoplastic, preformed plastic Type B, C, or D, and polyurea pavement markings will be inspected following installation, but no later than October 15 for preformed plastic markings, November 1 for thermoplastic and preformed thermoplastic markings, and December 15 for epoxy and polyurea markings. In addition, they will be inspected following a winter performance period that extends 180 days from November 1.”

Revise the ninth paragraph of Article 780.12 of the Standard Specifications to read:

“This performance inspection and performance acceptance of the epoxy, thermoplastic, preformed thermoplastic, preformed plastic Type B, C, or D, and polyurea markings shall not delay acceptance of the entire project and final payment due if the Contractor requires and receives from the subcontractor a third party "performance" bond naming the Department as obligee in the full amount of all pavement marking quantities listed in the contract, multiplied by the contract unit price. The bond shall be executed prior to acceptance and final payment of the non-pavement marking items and shall be in full force and effect until final performance inspection and performance acceptance of the epoxy, thermoplastic, preformed thermoplastic, preformed plastic, and polyurea pavement markings. Execution of the third party bond shall be the option of the Contractor.”

Revise the first paragraph of Article 780.14 of the Standard Specifications to read:

“**780.14 Basis of Payment.** This work will be paid for at the contract unit prices per foot (meter) of applied line width, as specified, for THERMOPLASTIC PAVEMENT MARKING - LINE; PAINT PAVEMENT MARKING - LINE; EPOXY PAVEMENT MARKING - LINE; PREFORMED PLASTIC PAVEMENT MARKING - LINE - TYPE B, C, B – INLAID, or D - INLAID; PREFORMED THERMOPLASTIC PAVEMENT MARKING – LINE, POLYUREA PAVEMENT MARKING TYPE I – LINE, POLYUREA PAVEMENT MARKING TYPE II - LINE; and/or per square foot (square meter) for THERMOPLASTIC PAVEMENT MARKING - LETTERS AND SYMBOLS; PAINT PAVEMENT MARKING - LETTERS AND SYMBOLS; EPOXY PAVEMENT MARKING - LETTERS AND SYMBOLS; PREFORMED PLASTIC PAVEMENT MARKING - TYPE B, C, B – INLAID, or D - INLAID - LETTERS AND SYMBOLS; PREFORMED THERMOPLASTIC PAVEMENT MARKING - LETTERS AND SYMBOLS.”

Add the following to Section 1095 of the Standard Specifications:

**“1095.10 Preformed Plastic Pavement Marking, Type D.** The preformed patterned markings shall consist of a white or yellow tape with wet retroreflective media incorporated to provide immediate and continuing retroreflection during both wet and dry conditions. The pavement marking shall be manufactured without the use of heavy metals including lead chromate pigments or other similar, lead-containing chemicals.

The white and yellow preformed plastic pavement markings shall meet the Type B requirements of Article 1095.03(b), (c), (d), (e), (i), (l), (m), (n) and the following.

- (a) Composition. The pliant polymer pavement markings shall consist of a mixture of high-quality polymeric materials, pigments and glass beads distributed throughout its base cross-sectional area, with a layer of wet retroreflective media bonded to a durable polyurethane topcoat surface. The patterned surface shall have approximately 40% ± 10% of the surface area raised and presenting a near vertical face to traffic from any direction. The channels between the raised areas shall be substantially free of exposed beads or particles.
- (b) Retroreflectance. The white and yellow markings shall meet the following for initial dry and wet retroreflectance.
  - (1) Dry Retroreflectance. Dry retroreflectance shall be measured under dry conditions according to ASTM D4061 and meet the values described in Article 1095.03(l) for Type B.
  - (2) Wet Retroreflectance. Wet retroreflectance shall be measured under wet conditions according to ASTM E2177 and meet the values shown in the following table.

<b>Wet Retroreflectance, Initial <math>R_L</math></b>	
<b>Color</b>	<b><math>R_L</math> 1.05/88.76</b>
White	300
Yellow	200

- (c) Color. The material shall meet the following requirements for daylight reflectance and color, when tested, using a color spectrophotometer with 45 degrees circumferential/zero degree geometry, illuminant D65, and a two degree observer angle. The color instrument shall measure the visible spectrum from 380 to 720 nm with a wavelength measurement interval and spectral bandpass of 10 nm.

Color	Daylight Reflectance %Y
White	65 minimum
*Yellow	36-59

\*Shall match Federal 595 Color No. 33538 and the chromaticity limits as follows.

x	0.490	0.475	0.485	0.530
y	0.470	0.438	0.425	0.456

- (d) Sampling, Testing, Acceptance, and Certification. Prior to approval and use of the preformed pavement marking materials, the manufacturer shall submit a notarized certification from an independent laboratory, together with the results of all tests, stating that the material meets the requirements as set forth herein. The certification test report shall state the lot tested, manufacturer's name, and date of manufacture.

After approval by the Department, samples and certification by the manufacturer shall be submitted for each batch used. The manufacturer shall submit a certification stating that the material meets the requirements as set forth herein and is essentially identical to the material sent for qualification. The certification shall state the lot tested, manufacturer's name, and date of manufacture."



**REMOVAL AND DISPOSAL OF REGULATED SUBSTANCES (BDE)**

Effective: January 1, 2019

Revised: January 1, 2020

Revise Section 669 of the Standard Specifications to read:

**“SECTION 669. REMOVAL AND DISPOSAL OF REGULATED SUBSTANCES**

**669.01 Description.** This work shall consist of the transportation and proper disposal of regulated substances. This work shall also consist of the removal, transportation, and proper disposal of underground storage tanks (UST), their contents and associated underground piping to the point where the piping is above the ground, including determining the content types and estimated quantities.

**669.02 Equipment.** The Contractor shall notify the Engineer of the delivery of all excavation, storage, and transportation equipment to a work area location. The equipment shall comply with OSHA and American Petroleum Institute (API) guidelines and shall be furnished in a clean condition. Clean condition means the equipment does not contain any residual material classified as a non-special waste, non-hazardous special waste, or hazardous waste. Residual materials include, but are not limited to, petroleum products, chemical products, sludges, or any other material present in or on equipment.

Before beginning any associated soil or groundwater management activity, the Contractor shall provide the Engineer with the opportunity to visually inspect and approve the equipment. If the equipment contains any contaminated residual material, decontamination shall be performed on the equipment as appropriate to the regulated substance and degree of contamination present according to OSHA and API guidelines. All cleaning fluids used shall be treated as the contaminant unless laboratory testing proves otherwise.

**669.03 Pre-Construction Submittals and Qualifications.** Prior to beginning this work, or working in areas with regulated substances, the Contractor shall submit a "Regulated Substances Pre-Construction Plan (RSPCP)" to the Engineer for review and approval using form BDE 2730. The form shall be signed by an Illinois licensed Professional Engineer or Professional Geologist.

As part of the RSPCP, the Contractor(s) or firm(s) performing the work shall meet the following qualifications.

- (a) **Regulated Substances Monitoring.** Qualification for environmental observation and field screening of regulated substances work and environmental observation of UST removal shall require either pre-qualification in Hazardous Waste by the Department or demonstration of acceptable project experience in remediation and operations for contaminated sites in accordance with applicable Federal, State, or local regulatory requirements using BDE 2730.

Qualification for each individual performing regulated substances monitoring shall require a minimum of one-year of experience in similar activities as those required for the project.

- (b) **Underground Storage Tank Removal.** Qualification for underground storage tank (UST) removal work shall require licensing and certification with the Office of the State Fire Marshall (OSFM) and possession of all permits required to perform the work. A copy of the permit shall be provided to the Engineer prior to tank removal.

The qualified Contractor(s) or firm(s) shall also document it does not have any current or former ties with any of the properties contained within, adjoining, or potentially affecting the work.

The Engineer will require up to 21 calendar days for review of the RSPCP. The review may involve rejection or revision and resubmittal; in which case, an additional 21 days will be required for each subsequent review. Work shall not commence until the RSPCP has been approved by the Engineer. After approval, the RSPCP shall be revised as necessary to reflect changed conditions in the field and documented using BDE 2730A "Regulated Substances Pre-Construction Plan (RSPCP) Addendum" and submitted to the Engineer for approval.

## CONSTRUCTION REQUIREMENTS

**669.04 Regulated Substances Monitoring.** Regulated substances monitoring includes environmental observation and field screening during regulated substances management activities at the contract specific work areas. As part of the regulated substances monitoring, the monitoring personnel shall perform and document the applicable duties listed on form BDE 2732 "Regulated Substances Monitoring Daily Record (RSMDR)".

- (a) Environmental Observation. Prior to beginning excavation, the Contractor shall mark the limits of the contract specific work areas. Once work begins, the monitoring personnel shall be present on-site continuously during the excavation and loading of material.
- (b) Field Screening. Field screening shall be performed during the excavation and loading of material from the contract specific work areas, except for material classified according to Article 669.05(b)(1) or 669.05(c) where field screening is not required.

Field screening shall be performed with either a photoionization detector (PID) (minimum 10.6eV lamp) or a flame ionization detector (FID), and other equipment as appropriate, to monitor for potential contaminants associated with regulated substances. The PID or FID shall be calibrated on-site, and background level readings taken and recorded daily, and as field and weather conditions change. Field screen readings on the PID or FID in excess of background levels indicates the potential presence of regulated substances requiring handling as a non-special waste, special waste, or hazardous waste. PID or FID readings may be used as the basis of increasing the limits of removal with the approval of the Engineer but shall in no case be used to decrease the limits.

**669.05 Regulated Substances Management and Disposal.** The management and disposal of soil and/or groundwater containing regulated substances shall be according to the following:

- (a) Soil Analytical Results Exceed Most Stringent MAC. When the soil analytical results indicate detected levels exceed the most stringent maximum allowable concentration (MAC) for chemical constituents in soil established pursuant to Subpart F of 35 Ill. Adm. Code 1100.605, the soil shall be managed as follows:
- (1) When analytical results indicate inorganic chemical constituents exceed the most stringent MAC, but still considered within area background levels by the Engineer, the excavated soil can be utilized within the right-of-way as embankment or fill, when suitable. If the soils cannot be utilized within the right-of-way, they shall be managed and disposed of at a landfill as a non-special waste.
  - (2) When analytical results indicate inorganic chemical constituents exceed the most stringent MAC but do not exceed the MAC for a Metropolitan Statistical Area (MSA) County identified in 35 Ill. Admin. Code 742 Appendix A. Table G, the excavated soil can be utilized within the right-of-way as embankment or fill, when suitable, or managed and disposed of at a clean construction and demolition debris (CCDD) facility or an uncontaminated soil fill operation (USFO) within an MSA County provided the pH of the soil is within the range of 6.25 - 9.0, inclusive.
  - (3) When analytical results indicate chemical constituents exceed the most stringent MAC but do not exceed the MAC for an MSA County excluding Chicago, or the MAC within the Chicago corporate limits, the excavated soil can be utilized within the right-of-way as embankment or fill, when suitable, or managed and disposed of off-site at a CCDD facility or an USFO within an MSA County excluding Chicago or within the Chicago corporate limits provided the pH of the soil is within the range of 6.25 - 9.0, inclusive.
  - (4) When analytical results indicate chemical constituents exceed the most stringent MAC but do not exceed the MAC for an MSA County excluding Chicago, the excavated soil can be utilized within the right-of-way as embankment or fill, when suitable, or managed and disposed of off-site at a CCDD facility or an USFO within an MSA County excluding Chicago provided the pH of the soil is within the range of 6.25 - 9.0, inclusive.
  - (5) When the Engineer determines soil cannot be managed according to Articles 669.05(a)(1) through (a)(4) above and the materials do not contain special waste or hazardous waste, as determined by the Engineer, the soil shall be managed and disposed of at a landfill as a non-special waste.
  - (6) When analytical results indicate soil is hazardous by characteristic or listing pursuant to 35 Ill. Admin. Code 721, contains radiological constituents, or the Engineer otherwise determines the soil cannot be managed according to Articles 669.05(a)(1) through (a)(5) above, the soil shall be managed and disposed of off-site as a special waste or hazardous waste as applicable.

- (b) Soil Analytical Results Do Not Exceed Most Stringent MAC. When the soil analytical results indicate that detected levels do not exceed the most stringent MAC, the excavated soil can be utilized within the right-of-way as embankment or fill, when suitable, or managed and disposed of off-site according to Article 202.03. However, the excavated soil cannot be taken to a CCDD facility or an USFO for any of the following reasons.
- (1) The pH of the soil is less than 6.25 or greater than 9.0.
  - (2) The soil exhibited PID or FID readings in excess of background levels.
- (c) Soil Analytical Results Exceed Most Stringent MAC but Do Not Exceed Tiered Approach to Corrective Action Objectives (TACO) Residential. When the soil analytical results indicate that detected levels exceed the most stringent MAC but do not exceed TACO Tier 1 Soil Remediation Objectives for Residential Properties pursuant to 35 Ill. Admin. Code 742 Appendix B Table A, the excavated soil can be utilized within the right-of-way as embankment or fill, when suitable, or managed and disposed of off-site according to Article 202.03. However, the excavated soil cannot be taken to a CCDD facility or an USFO.
- (d) Groundwater. When groundwater analytical results indicate the detected levels are above Appendix B, Table E of 35 Ill. Admin. Code 742, the most stringent Tier 1 Groundwater Remediation Objectives for Groundwater Component of the Groundwater Ingestion Route for Class 1 groundwater, the groundwater shall be managed off-site as a special waste or hazardous waste as applicable. Special waste groundwater shall be containerized and trucked to an off-site treatment facility, or may be discharged to a sanitary sewer or combined sewer when permitted by the local sewer authority. Groundwater discharged to a sanitary sewer or combined sewer shall be pre-treated to remove particulates and measured with a calibrated flow meter to comply with applicable discharge limits. A copy of the permit shall be provided to the Engineer prior to discharging groundwater to the sanitary sewer or combined sewer.

Groundwater encountered within trenches may be managed within the trench and allowed to infiltrate back into the ground. If the groundwater cannot be managed within the trench, it may be discharged to a sanitary sewer or combined sewer when permitted by the local sewer authority, or it shall be containerized and trucked to an off-site treatment facility as a special waste or hazardous waste. The Contractor is prohibited from discharging groundwater within the trench through a storm sewer. The Contractor shall install backfill plugs within the area of groundwater contamination.

One backfill plug shall be placed down gradient to the area of groundwater contamination. Backfill plugs shall be installed at intervals not to exceed 50 ft (15 m). Backfill plugs are to be 4 ft (1.2 m) long, measured parallel to the trench, full trench width and depth. Backfill plugs shall not have any fine aggregate bedding or backfill, but shall be entirely cohesive soil or any class of concrete. The Contractor shall provide test data that the material has a permeability of less than  $10^{-7}$  cm/sec according to ASTM D 5084, Method A or per another test method approved by the Engineer.

The Contractor shall use due care when transferring contaminated material from the area of origin to the transporter. Should releases of contaminated material to the environment occur (i.e., spillage onto the ground, etc.), the Contractor shall clean-up spilled material and place in the appropriate storage containers as previously specified. Clean-up shall include, but not be limited to, sampling beneath the material staging area to determine complete removal of the spilled material.

The Contractor shall provide engineered barriers, when required, and shall include materials sufficient to completely line excavation surfaces, including sloped surfaces, bottoms, and sidewall faces, within the areas designated for protection.

The Contractor shall obtain all documentation including any permits and/or licenses required to transport the material containing regulated substances to the disposal facility. The Contractor shall coordinate with the Engineer on the completion of all documentation. The Contractor shall make all arrangements for collection and analysis of landfill acceptance testing. The Contractor shall coordinate waste disposal approvals with the disposal facility.

The Contractor shall provide the Engineer with all transport-related documentation within two days of transport or receipt of said document(s). For management of special or hazardous waste, the Contractor shall provide the Engineer with documentation that the Contractor is operating with a valid Illinois special waste transporter permit at least two weeks before transporting the first load of contaminated material.

Transportation and disposal of material classified according to Article 669.05(a)(5) or 669.05(a)(6) shall be completed each day so that none of the material remains on-site by the close of business, except when temporary staging has been approved.

Any waste generated as a special or hazardous waste from a non-fixed facility shall be manifested off-site using the Department's county generator number provided by the Bureau of Design and Environment. An authorized representative of the Department shall sign all manifests for the disposal of the contaminated material and confirm the Contractor's transported volume. Any waste generated as a non-special waste may be managed off-site without a manifest, a special waste transporter, or a generator number.

The Contractor shall select a landfill permitted for disposal of the contaminant within the State of Illinois. The Department will review and approve or reject the facility proposed by the Contractor to use as a landfill. The Contractor shall verify whether the selected disposal facility is compliant with those applicable standards as mandated by their permit and whether the disposal facility is presently, has previously been, or has never been, on the United States Environmental Protection Agency (U.S. EPA) National Priorities List or the Resource Conservation and Recovery Act (RCRA) List of Violating Facilities. The use of a Contractor selected landfill shall in no manner delay the construction schedule or alter the Contractor's responsibilities as set forth.

**669.06 Non-Special Waste Certification.** An authorized representative of the Department shall sign and date all non-special waste certifications. The Contractor shall be responsible for providing the Engineer with the required information that will allow the Engineer to certify the waste is not a special waste.

- (a) Definition. A waste is considered a non-special waste as long as it is not:
- (1) a potentially infectious medical waste;
  - (2) a hazardous waste as defined in 35 Ill. Admin. Code 721;
  - (3) an industrial process waste or pollution control waste that contains liquids, as determined using the paint filter test set forth in subdivision (3)(A) of subsection (m) of 35 Ill. Admin. Code 811.107;
  - (4) a regulated asbestos-containing waste material, as defined under the National Emission Standards for Hazardous Air Pollutants in 40 CFR Part 61.141;
  - (5) a material containing polychlorinated biphenyls (PCB's) regulated pursuant to 40 CFR Part 761;
  - (6) a material subject to the waste analysis and recordkeeping requirements of 35 Ill. Admin. Code 728.107 under land disposal restrictions of 35 Ill. Admin. Code 728;
  - (7) a waste material generated by processing recyclable metals by shredding and required to be managed as a special waste under Section 22.29 of the Environmental Protection Act; or
  - (8) an empty portable device or container in which a special or hazardous waste has been stored, transported, treated, disposed of, or otherwise handled.
- (b) Certification Information. All information used to determine the waste is not a special waste shall be attached to the certification. The information shall include but not be limited to:
- (1) the means by which the generator has determined the waste is not a hazardous waste;
  - (2) the means by which the generator has determined the waste is not a liquid;
  - (3) if the waste undergoes testing, the analytic results obtained from testing, signed and dated by the person responsible for completing the analysis;
  - (4) if the waste does not undergo testing, an explanation as to why no testing is needed;
  - (5) a description of the process generating the waste; and
  - (6) relevant material safety data sheets.

**669.07 Temporary Staging.** Soil classified according to Articles 669.05(a)(2), (b)(1), or (c) may be temporarily staged at the Contractor's option. Soil classified according to Articles 669.05(a)(1), (a)(3), (a)(4), (a)(5), (a)(6), or (b)(2) shall be managed and disposed of without temporary staging to the greatest extent practicable. If circumstances beyond the Contractor's control require temporary staging of these latter materials, the Contractor shall request approval from the Engineer in writing.

Temporary staging shall be accomplished within the right-of-way and the Contractor's means and methods shall be described in the approved or amended RSPCP. Staging areas shall not be located within 200 feet (61 m) of a public or private water supply well; nor within 100 feet (30 m) of sensitive environmental receptor areas, including wetlands, rivers, streams, lakes, or designated habitat zones.

The method of staging shall consist of containerization or stockpiling as applicable for the type, classification, and physical state (i.e., liquid, solid, semisolid) of the material. Materials of different classifications shall be staged separately with no mixing or co-mingling.

When containers are used, the containers and their contents shall remain intact and inaccessible to unauthorized persons until the manner of disposal is determined. The Contractor shall be responsible for all activities associated with the storage containers including, but not limited to, the procurement, transport, and labeling of the containers. The Contractor shall not use a storage container if visual inspection of the container reveals the presence of free liquids or other substances that could cause the waste to be reclassified as a hazardous or special waste.

When stockpiles are used, they shall be covered with a minimum 20-mil plastic sheeting or tarps secured using weights or tie-downs. Perimeter berms or diversionary trenches shall be provided to contain and collect for disposal any water that drains from the soil. Stockpiles shall be managed to prevent or reduce potential dust generation.



When staging non-special waste, special waste, or hazardous waste, the following additional requirements shall apply:

- (a) Non-Special Waste. When stockpiling soil classified according to Article 669.05(a)(1) or 669.05(a)(5), an impermeable surface barrier between the materials and the ground surface shall be installed. The impermeable barrier shall consist of a minimum 20-mil plastic liner material and the surface of the stockpile area shall be clean and free of debris prior to placement of the liner. Measures shall also be taken to limit or discourage access to the staging area.
- (b) Special Waste and Hazardous Waste. Soil classified according to Article 669.05(a)(6) shall not be stockpiled but shall be containerized immediately upon generation in containers, tanks or containment buildings as defined by RCRA, Toxic Substances Control Act (TSCA), and other applicable State or local regulations and requirements, including 35 Ill. Admin. Code Part 722, Standards Applicable to Generators of Hazardous Waste.

The staging area(s) shall be enclosed (by a fence or other structure) to restrict direct access to the area, and all required regulatory identification signs applicable to a staging area containing special waste or hazardous waste shall be deployed.

Storage containers shall be placed on an all-weather gravel-packed, asphalt, or concrete surface. Containers shall be in good condition and free of leaks, large dents, or severe rusting, which may compromise containment integrity. Containers must be constructed of, or lined with, materials that will not react or be otherwise incompatible with the hazardous or special waste contents. Containers used to store liquids shall not be filled more than 80 percent of the rated capacity. Incompatible wastes shall not be placed in the same container or comingled.

All containers shall be legibly labeled and marked using pre-printed labels and permanent marker in accordance with applicable regulations, clearly showing the date of waste generation, location and/or area of waste generation, and type of waste. The Contractor shall place these identifying markings on an exterior side surface of the container.

Storage containers shall be kept closed, and storage pads covered, except when access is needed by authorized personnel.

Special waste and hazardous waste shall be transported and disposed within 90 days from the date of generation.

**669.08 Underground Storage Tank Removal.** For the purposes of this section, an underground storage tank (UST) includes the underground storage tank, piping, electrical controls, pump island, vent pipes and appurtenances.

Prior to removing an UST, the Engineer shall determine whether the Department is considered an "owner" or "operator" of the UST as defined by the UST regulations (41 Ill. Adm. Code Part 176). Ownership of the UST refers to the Department's owning title to the UST during storage, use or dispensing of regulated substances. The Department may be considered an "operator" of the UST if it has control of, or has responsibility for, the daily operation of the UST. The Department may however voluntarily undertake actions to remove an UST from the ground without being deemed an "operator" of the UST.

In the event the Department is deemed not to be the "owner" or "operator" of the UST, the OSFM removal permit shall reflect who was the past "owner" or "operator" of the UST. If the "owner" or "operator" cannot be determined from past UST registration documents from OSFM, then the OSFM removal permit will state the "owner" or "operator" of the UST is the Department. The Department's Office of Chief Counsel (OCC) will review all UST removal permits prior to submitting any removal permit to the OSFM. If the Department is not the "owner" or "operator" of the UST then it will not register the UST or pay any registration fee.

The Contractor shall be responsible for obtaining permits required for removing the UST, notification to the OSFM, using an OSFM certified tank contractor, removal and disposal of the UST and its contents, and preparation and submittal of the OSFM Site Assessment Report in accordance with 41 Ill. Admin. Code Part 176.330.

The Contractor shall contact the Engineer and the OSFM's office at least 72 hours prior to removal to confirm the OSFM inspector's presence during the UST removal. Removal, transport, and disposal of the UST shall be according to the applicable portions of the latest revision of the "American Petroleum Institute (API) Recommended Practice 1604".

The Contractor shall collect and analyze tank content (sludge) for disposal purposes. The Contractor shall remove as much of the regulated substance from the UST system as necessary to prevent further release into the environment. All contents within the tank shall be removed, transported and disposed of, or recycled. The tank shall be removed and rendered empty according to IEPA definition.

The Contractor shall collect soil samples from the bottom and sidewalls of the excavated area in accordance with 35 Ill. Admin. Code Part 734.210(h) after the required backfill has been removed during the initial response action, to determine the level of contamination remaining in the ground, regardless if a release is confirmed or not by the OSFM on-site inspector.

In the event the UST is designated a leaking underground storage tank (LUST) by the OSFM's inspector, or confirmation by analytical results, the Contractor shall notify the Engineer and the District Environmental Studies Unit (DESU). Upon confirmation of a release of contaminants and notifications to the Engineer and DESU, the Contractor shall report the release to the Illinois Emergency Management Agency (IEMA) (e.g., by telephone or electronic mail) and provide them with whatever information is available ("owner" or "operator" shall be stated as the past registered "owner" or "operator", or the IDOT District in which the tank is located and the DESU Manager).

The Contractor shall perform the following initial response actions if a release is indicated by the OSFM inspector:

- (a) Take immediate action to prevent any further release of the regulated substance to the environment, which may include removing, at the Engineer's discretion, and disposing of up to 4 ft (1.2 m) of the contaminated material, as measured from the outside dimension of the tank;
- (b) Identify and mitigate fire, explosion and vapor hazards;
- (c) Visually inspect any above ground releases or exposed below ground releases and prevent further migration of the released substance into surrounding soils and groundwater; and
- (d) Continue to monitor and mitigate any additional fire and safety hazards posed by vapors and free product that have migrated from the tank excavation zone and entered into subsurface structures (such as sewers or basements).

The tank excavation shall be backfilled according to applicable portions of Sections 205, 208, and 550 with a material that will compact and develop stability. All uncontaminated concrete and soil removed during tank extraction may be used to backfill the excavation, at the discretion of the Engineer.

After backfilling the excavation, the site shall be graded and cleaned.

**669.09 Regulated Substances Final Construction Report.** Not later than 90 days after completing this work, the Contractor shall submit a "Regulated Substances Final Construction Report (RSFCR)" to the Engineer using form BDE 2733 and required attachments. The form shall be signed by an Illinois licensed Professional Engineer or Professional Geologist.

**669.10 Method of Measurement.** Non-special waste, special waste, and hazardous waste soil will be measured for payment according to Article 202.07(b) when performing earth excavation, Article 502.12(b) when excavating for structures, or by computing the volume of the trench using the maximum trench width permitted and the actual depth of the trench.

Groundwater containerized and transported off-site for management, storage, and disposal will be measured for payment in gallons (liters).

Backfill plugs will be measured in cubic yards (cubic meters) in place, except the quantity for which payment will be made shall not exceed the volume of the trench, as computed by using the maximum width of trench permitted by the Specifications and the actual depth of the trench, with a deduction for the volume of the pipe.

Engineered Barriers will be measured for payment in square yards (square meters).

**669.11 Basis of Payment.** The work of preparing, submitting and administering a Regulated Substances Pre-Construction Plan will be paid for at the contract lump sum price for REGULATED SUBSTANCES PRE-CONSTRUCTION PLAN.

Regulated substances monitoring, including completion of form BDE 2732 for each day of work, will be paid for at the contract unit price per calendar day, or fraction thereof to the nearest 0.5 calendar day, for REGULATED SUBSTANCES MONITORING.

The installation of engineered barriers will be paid for at the contract unit price per square yard (square meter) for ENGINEERED BARRIER.

The work of UST removal, soil excavation, soil and content sampling, the management of excavated soil and UST content, and UST disposal, will be paid for at the contract unit price per each for UNDERGROUND STORAGE TANK REMOVAL.

The transportation and disposal of soil and other materials from an excavation determined to be contaminated will be paid for at the contract unit price per cubic yard (cubic meter) for NON-SPECIAL WASTE DISPOSAL, SPECIAL WASTE DISPOSAL, or HAZARDOUS WASTE DISPOSAL.

The transportation and disposal of groundwater from an excavation determined to be contaminated will be paid for at the contract unit price per gallon (liter) for SPECIAL WASTE GROUNDWATER DISPOSAL or HAZARDOUS WASTE GROUNDWATER DISPOSAL. When groundwater is discharged to a sanitary or combined sewer by permit, the cost will be paid for according to Article 109.05.

Backfill plugs will be paid for at the contract unit price per cubic yard (cubic meter) for BACKFILL PLUGS.

Payment for temporary staging of soil classified according to Articles 669.05(a)(1), (a)(3), (a)(4), (a)(5), (a)(6), or (b)(2) will be paid for according to Article 109.04. The Department will not be responsible for any additional costs incurred, if mismanagement of the staging area, storage containers, or their contents by the Contractor results in excess cost expenditure for disposal or other material management requirements.

Payment for accumulated stormwater removal and disposal will be according to Article 109.04. Payment will only be allowed if appropriate stormwater and erosion control methods were used.

Payment for decontamination, labor, material, and equipment for monitoring areas beyond the specified areas, with the Engineer's prior written approval, will be according to Article 109.04.

When the waste material for disposal requires sampling for landfill disposal acceptance, the samples shall be analyzed for TCLP VOCs, SVOCs, RCRA metals, pH, ignitability, and paint filter test. The analysis will be paid for at the contract unit price per each for SOIL DISPOSAL ANALYSIS using EPA Methods 1311 (extraction), 8260B for VOCs, 8270C for SVOCs, 6010B and 7470A for RCRA metals, 9045C for pH, 1030 for ignitability, and 9095A for paint filter.

The work of preparing, submitting and administering a Regulated Substances Final Construction Report will be paid for at the contract lump sum price REGULATED SUBSTANCES FINAL CONSTRUCTION REPORT.”

**SILT FENCE, INLET FILTERS, GROUND STABILIZATION AND RIPRAP FILTER FABRIC (BDE)**

Effective: November 1, 2019

Revised: April 1, 2020

Revise Article 280.02(m) and add Article 280.02(n) so the Standard Specifications read:

“ (m)Above Grade Inlet Filter (Fitted)  
1081.15(j)  
(n) Above Grade Inlet Filter (Non-Fitted).....1081.15(k)”

Revise the last sentence of the first paragraph in Article 280.04(c) of the Standard Specifications to read:

“ The protection shall be constructed with hay or straw bales, silt filter fence, above grade inlet filters (fitted and non-fitted), or inlet filters.

Revise the first sentence of the second paragraph in Article 280.04(c) of the Standard Specifications to read:

“When above grade inlet filters (fitted and non-fitted) are specified, they shall be of sufficient size to completely span and enclose the inlet structure.”

Revise Article 1080.02 of the Standard Specifications to read:

“ **1080.02 Geotextile Fabric.** The fabric for silt filter fence shall consist of woven fabric meeting the requirements of AASHTO M 288 for unsupported silt fence.

The fabric for ground stabilization shall consist of woven yarns or nonwoven filaments of polyolefins or polyesters. Woven fabrics shall be Class 2 and nonwoven fabrics shall be Class 1 according to AASHTO M 288.

The physical properties for silt fence and ground stabilization fabrics shall be according to the following.

PHYSICAL PROPERTIES			
	Silt Fence Woven <sup>1/</sup>	Ground Stabilization Woven <sup>2/</sup>	Ground Stabilization Nonwoven <sup>2/</sup>
Grab Strength, lb (N) <sup>3/</sup> ASTM D 4632	123 (550) MD 101 (450) XD	247 (1100) min. <sup>4/</sup>	202 (900) min. <sup>4/</sup>
Elongation/Grab Strain, % ASTM D 4632 <sup>4/</sup>	49 max.	49 max.	50 min.
Trapezoidal Tear Strength, lb (N) ASTM D 4533 <sup>4/</sup>	--	90 (400) min.	79 (350) min.
Puncture Strength, lb (N) ASTM D 6241 <sup>4/</sup>	--	494 (2200) min.	433 (1925) min.
Apparent Opening Size, Sieve No. (mm) ASTM D 4751 <sup>5/</sup>	30 (0.60) max.	40 (0.43) max.	40 (0.43) max.
Permittivity, sec <sup>-1</sup> ASTM D 4491	0.05 min.		
Ultraviolet Stability, % retained strength after 500 hours of exposure ASTM D 4355	70 min.	50 min.	50 min.

- 1/ NTPEP results or manufacturer’s certification to meet test requirements.
- 2/ NTPEP results to meet test requirements. Manufacturer shall have public release status and current reports on laboratory results in Test Data of NTPEP’s DataMine.
- 3/ MD = Machine direction. XD = Cross-machine direction.
- 4/ Values represent the minimum average roll value (MARV) in the weaker principle direction, MD or XD.
- 5/ Values represent the maximum average roll value.”

Revise Article 1080.03 of the Standard Specifications to read:

“ **1080.03 Filter Fabric.** The filter fabric shall consist of woven yarns or nonwoven filaments of polyolefins or polyesters. Woven fabrics shall be Class 3 for riprap gradations RR 4 and RR 5, and Class 2 for RR 6 and RR 7 according to AASHTO M 288. Woven slit film geotextiles (i.e. geotextiles made from yarns of a flat, tape-like character) shall not be permitted. Nonwoven fabrics shall be Class 2 for riprap gradations RR 4 and RR 5, and Class 1 for RR 6 and RR 7 according to AASHTO M 288. After forming, the fabric shall be processed so that the yarns or filaments retain their relative positions with respect to each other. The fabric shall be new and undamaged.

The filter fabric shall be manufactured in widths of not less than 6 ft (2 m). Sheets of fabric may be sewn together with thread of a material meeting the chemical requirements given for the yarns or filaments to form fabric widths as required. The sheets of filter fabric shall be sewn together at the point of manufacture or another approved location.

The filter fabric shall be according to the following.

PHYSICAL PROPERTIES <sup>1/</sup>				
	Gradation Nos. RR 4 & RR 5		Gradation Nos. RR 6 & RR 7	
	Woven	Nonwoven	Woven	Nonwoven
Grab Strength, lb (N) ASTM D 4632 <sup>2/</sup>	180 (800) min.	157 (700) min.	247 (1100) min.	202 (900) min.
Elongation/Grab Strain, % ASTM D 4632 <sup>2/</sup>	49 max.	50 min.	49 max.	50 min.
Trapezoidal Tear Strength, lb (N) ASTM D 4533 <sup>2/</sup>	67 (300) min.	56 (250) min.	90 (400) min.	79 (350) min.
Puncture Strength, lb (N) ASTM D 6241 <sup>2/</sup>	370 (1650) min.	309 (1375) min.	494 (2200) min.	433 (1925) min.
Ultraviolet Stability, % retained strength after 500 hours of exposure - ASTM D 4355	50 min.			

1/ NTPEP results to meet test requirements. Manufacturer shall have public release status and current reports on laboratory results in Test Data of NTPEP's DataMine.

2/ Values represent the minimum average roll value (MARV) in the weaker principle direction [machine direction (MD) or cross-machine direction (XD)].

As determined by the Engineer, the filter fabric shall meet the requirements noted in the following after an onsite investigation of the soil to be protected.

Soil by Weight (Mass) Passing the No. 200 sieve (75 µm), %	Apparent Opening Size, Sieve No. (mm) - ASTM D 4751 <sup>1/</sup>	Permittivity, sec <sup>-1</sup> ASTM D 4491
49 max.	60 (0.25) max.	0.2 min.
50 min.	70 (0.22) max.	0.1 min.

1/ Values represent the maximum average roll value.”

Revise Article 1081.15(h)(3)a of the Standard Specifications to read:

- “a. Inner Filter Fabric Bag. The inner filter fabric bag shall be constructed of woven yarns or nonwoven filaments made of polyolefins or polyesters with a minimum silt and debris capacity of 2.0 cu ft (0.06 cu m). Woven fabric shall be Class 3 and nonwoven fabric shall be Class 2 according to AASHTO M 288. The fabric bag shall be according to the following.

PHYSICAL PROPERTIES		
	Woven	Nonwoven
Grab Strength, lb (N) ASTM D 4632 <sup>1/</sup>	180 (800) min.	157 (700) min.
Elongation/Grab Strain, % ASTM D 4632 <sup>1/</sup>	49 max.	50 min.
Trapezoidal Tear Strength, lb (N) ASTM D 4533 <sup>1/</sup>	67 (300) min.	56 (250) min.
Puncture Strength, lb (N) ASTM D 6241 <sup>1/</sup>	370 (1650) min.	309 (1375) min.
Apparent Opening Size, Sieve No. (mm) ASTM D 4751 <sup>2/</sup>	60 (0.25) max.	
Permittivity, sec <sup>-1</sup> ASTM D 4491	2.0 min.	
Ultraviolet Stability, % retained strength after 500 hours of exposure – ASTM D 4355	70 min.	

1/ Values represent the minimum average roll value (MARV) in the weaker principle direction [machine direction (MD) or cross-machine direction (XD)].

2/ Values represent the maximum average roll value.”



Revise Article 1081.15(i)(1) of the Standard Specifications to read:

“(i) Urethane Foam/Geotextile. Urethane foam/geotextile shall be triangular shaped having a minimum height of 10 in. (250 mm) in the center with equal sides and a minimum 20 in. (500 mm) base. The triangular shaped inner material shall be a low density urethane foam. The outer geotextile fabric cover shall consist of woven yarns or nonwoven filaments made of polyolefins or polyesters placed around the inner material and shall extend beyond both sides of the triangle a minimum of 18 in. (450 mm). Woven filter fabric shall be Class 3 and nonwoven filter fabric shall be Class 2 according to AASHTO M 288.

(1) The geotextile shall meet the following properties.

PHYSICAL PROPERTIES		
	Woven	Nonwoven
Grab Strength, lb (N) ASTM D 4632 <sup>1/</sup>	180 (800) min.	157 (700) min.
Elongation/Grab Strain, % ASTM D 4632 <sup>1/</sup>	49 max.	50 min.
Trapezoidal Tear Strength, lb (N) ASTM D 4533 <sup>1/</sup>	67 (300) min.	56 (250) min.
Puncture Strength, lb (N) ASTM D 6241 <sup>1/</sup>	370 (1650) min.	309 (1375) min.
Apparent Opening Size, Sieve No. (mm) ASTM D 4751 <sup>2/</sup>	30 (0.60) max.	
Permittivity, sec <sup>-1</sup> ASTM D 4491	2.0 min.	
Ultraviolet Stability, % retained strength after 500 hours of exposure – ASTM D 4355	70 min.	

1/ Values represent the minimum average roll value (MARV) in the weaker principle direction [machine direction (MD) or cross-machine direction (XD)].

2/ Values represent the maximum average roll value.”

Add the following to Article 1081.15(i) of the Standard Specifications.

“(3) Certification. The manufacturer shall furnish a certificate with each shipment of urethane foam/geotextile assemblies stating the amount of product furnished and that the material complies with these requirements.”

Revise the title and first sentence of Article 1081.15(j) of the Standards Specifications to read:

“(j) Above Grade Inlet Filters (Fitted). Above grade inlet filters (fitted) shall consist of a rigid polyethylene frame covered with a fitted geotextile filter fabric.”

Revise Article 1081.15(j)(2) of the Standard Specifications to read:

- (2) Fitted Geotextile Filter Fabric. The fitted geotextile filter fabric shall consist of woven yarns or nonwoven filaments made of polyolefins or polyesters. Woven filter fabric shall be Class 3 and nonwoven filter fabric shall be Class 2 according to AASHTO M 288. The filter shall be fabricated to provide a direct fit to the frame. The top of the filter shall integrate a coarse screen with a minimum apparent opening size of 1/2 in. (13 mm) to allow large volumes of water to pass through in the event of heavy flows. The filter shall have integrated anti-buoyancy pockets capable of holding a minimum of 3.0 cu ft (0.08 cu m) of stabilization material. Each filter shall have a label with the following information sewn to or otherwise permanently adhered to the outside: manufacturer's name, product name, and lot, model, or serial number. The fitted geotextile filter fabric shall be according to the table in Article 1081.15(h)(3)a above."

Add Article 1081.15(k) to the Standard Specifications to read:

"(k) Above Grade Inlet Filters (Non-Fitted). Above grade inlet filters (non-fitted) shall consist of a geotextile fabric surrounding a metal frame. The frame shall consist of either a) a circular cage formed of welded wire mesh, or b) a collapsible aluminum frame, as described below.

(1) Frame Construction.

- a) Welded Wire Mesh Frame. The frame shall consist of 6 in. x 6 in. (150 mm x 150 mm) welded wire mesh formed of #10 gauge (3.42 mm) steel conforming to ASTM A 185. The mesh shall be 30 in. (750 mm) tall and formed into a 42 in. (1.05 m) minimum diameter cylinder.
  - b) Collapsible Aluminum Frame. The collapsible aluminum frame shall consist of grade 6036 aluminum. The frame shall have anchor lugs that attach it to the inlet grate, which shall resist movement from water and debris. The collapsible joints of the frame shall have a locking device to secure the vertical members in place, which shall prevent the frame from collapsing while under load from water and debris.
- (2) Geotextile Fabric. The geotextile fabric shall consist of woven yarns or nonwoven filaments made of polyolefins or polyesters. The woven filter fabric shall be a Class 3 and the nonwoven filter fabric shall be a Class 2 according to AASHTO M 288. The geotextile fabric shall be according to the table in Article 1081.15(h)(3)a above.

- (3) Geotechnical Fabric Attachment to the Frame.
- a) Welded Wire Mesh Frame. The woven or nonwoven geotextile fabric shall be wrapped 3 in. (75 mm) over the top member of a 6 in. x 6 in. (150 mm x 150 mm) welded wire mesh frame and secured with fastening rings constructed of wire conforming to ASTM A 641, A 809, A 370, and A 938 at 6 in. (150 mm) on center. The fastening rings shall penetrate both layers of geotextile and securely close around the steel mesh. The geotextile shall be secured to the sides of the welded wire mesh with fastening rings at a spacing of 1 per sq ft (11 per sq m) and securely close around a steel member.
  - b) Collapsible Aluminum Frame. The woven or nonwoven fabric shall be secured to the aluminum frame along the top and bottom of the frame perimeter with strips of aluminum secured to the perimeter member, such that the anchoring system provides a uniformly distributed stress throughout the geotechnical fabric.
- (4) Certification. The manufacturer shall furnish a certificate with each shipment of above grade inlet filter assemblies stating the amount of product furnished and that the material complies with these requirements.”

#### **STEEL COST ADJUSTMENT (BDE)**

Effective: April 2, 2004      Revised: August 1, 2017

**Description.** Steel cost adjustments will be made to provide additional compensation to the Contractor, or a credit to the Department, for fluctuations in steel prices when optioned by the Contractor. The bidder shall indicate with their bid whether or not this special provision will be part of the contract. Failure to indicate “Yes” for any item of work will make that item of steel exempt from steel cost adjustment.

**Types of Steel Products.** An adjustment will be made for fluctuations in the cost of steel used in the manufacture of the following items:

- Metal Piling (excluding temporary sheet piling)
- Structural Steel
- Reinforcing Steel

Other steel materials such as dowel bars, tie bars, mesh reinforcement, guardrail, steel traffic signal and light poles, towers and mast arms, metal railings (excluding wire fence), and frames and grates will be subject to a steel cost adjustment when the pay items they are used in have a contract value of \$10,000 or greater.

The adjustments shall apply to the above items when they are part of the original proposed construction, or added as extra work and paid for by agreed unit prices. The adjustments shall not apply when the item is added as extra work and paid for at a lump sum price or by force account.

**Documentation.** Sufficient documentation shall be furnished to the Engineer to verify the following:

- (a) The dates and quantity of steel, in lb (kg), shipped from the mill to the fabricator.
- (b) The quantity of steel, in lb (kg), incorporated into the various items of work covered by this special provision. The Department reserves the right to verify submitted quantities.

**Method of Adjustment.** Steel cost adjustments will be computed as follows:

$$SCA = Q \times D$$

Where: SCA = steel cost adjustment, in dollars  
Q = quantity of steel incorporated into the work, in lb (kg)  
D = price factor, in dollars per lb (kg)

$$D = MPI_M - MPI_L$$

Where:  $MPI_M$  = The Materials Cost Index for steel as published by the Engineering News-Record for the month the steel is shipped from the mill. The indices will be converted from dollars per 100 lb to dollars per lb (kg).

$MPI_L$  = The Materials Cost Index for steel as published by the Engineering News-Record for the month prior to the letting for work paid for at the contract price; or for the month the agreed unit price letter is submitted by the Contractor for extra work paid for by agreed unit price,. The indices will be converted from dollars per 100 lb to dollars per lb (kg).

The unit weights (masses) of steel that will be used to calculate the steel cost adjustment for the various items are shown in the attached table.

No steel cost adjustment will be made for any products manufactured from steel having a mill shipping date prior to the letting date.

If the Contractor fails to provide the required documentation, the method of adjustment will be calculated as described above; however, the  $MPI_M$  will be based on the date the steel arrives at the job site. In this case, an adjustment will only be made when there is a decrease in steel costs.

**Basis of Payment.** Steel cost adjustments may be positive or negative but will only be made when there is a difference between the  $MPI_L$  and  $MPI_M$  in excess of five percent, as calculated by:

$$\text{Percent Difference} = \{(MPI_L - MPI_M) \div MPI_L\} \times 100$$

Steel cost adjustments will be calculated by the Engineer and will be paid or deducted when all other contract requirements for the items of work are satisfied. Adjustments will only be made for fluctuations in the cost of the steel as described herein. No adjustment will be made for changes in the cost of manufacturing, fabrication, shipping, storage, etc.

The adjustments shall not apply during contract time subject to liquidated damages for completion of the entire contract.

**Attachment**

Item	Unit Mass (Weight)
Metal Piling (excluding temporary sheet piling) Furnishing Metal Pile Shells 12 in. (305 mm), 0.179 in. (3.80 mm) wall thickness Furnishing Metal Pile Shells 12 in. (305 mm), 0.250 in. (6.35 mm) wall thickness Furnishing Metal Pile Shells 14 in. (356 mm), 0.250 in. (6.35 mm) wall thickness Other piling	23 lb/ft (34 kg/m) 32 lb/ft (48 kg/m) 37 lb/ft (55 kg/m) See plans
Structural Steel	See plans for weights (masses)
Reinforcing Steel	See plans for weights (masses)
Dowel Bars and Tie Bars	6 lb (3 kg) each
Mesh Reinforcement	63 lb/100 sq ft (310 kg/sq m)
Guardrail Steel Plate Beam Guardrail, Type A w/steel posts Steel Plate Beam Guardrail, Type B w/steel posts Steel Plate Beam Guardrail, Types A and B w/wood posts Steel Plate Beam Guardrail, Type 2 Steel Plate Beam Guardrail, Type 6 Traffic Barrier Terminal, Type 1 Special (Tangent) Traffic Barrier Terminal, Type 1 Special (Flared)	20 lb/ft (30 kg/m) 30 lb/ft (45 kg/m) 8 lb/ft (12 kg/m) 305 lb (140 kg) each 1260 lb (570 kg) each 730 lb (330 kg) each 410 lb (185 kg) each
Steel Traffic Signal and Light Poles, Towers and Mast Arms Traffic Signal Post Light Pole, Tenon Mount and Twin Mount, 30 - 40 ft (9 - 12 m) Light Pole, Tenon Mount and Twin Mount, 45 - 55 ft (13.5 - 16.5 m) Light Pole w/Mast Arm, 30 - 50 ft (9 - 15.2 m) Light Pole w/Mast Arm, 55 - 60 ft (16.5 - 18 m) Light Tower w/Luminaire Mount, 80 - 110 ft (24 - 33.5 m) Light Tower w/Luminaire Mount, 120 - 140 ft (36.5 - 42.5 m) Light Tower w/Luminaire Mount, 150 - 160 ft (45.5 - 48.5 m)	11 lb/ft (16 kg/m) 14 lb/ft (21 kg/m) 21 lb/ft (31 kg/m) 13 lb/ft (19 kg/m) 19 lb/ft (28 kg/m) 31 lb/ft (46 kg/m) 65 lb/ft (97 kg/m) 80 lb/ft (119 kg/m)
Metal Railings (excluding wire fence) Steel Railing, Type SM Steel Railing, Type S-1 Steel Railing, Type T-1 Steel Bridge Rail	64 lb/ft (95 kg/m) 39 lb/ft (58 kg/m) 53 lb/ft (79 kg/m) 52 lb/ft (77 kg/m)
Frames and Grates Frame Lids and Grates	250 lb (115 kg) 150 lb (70 kg)

**SUBCONTRACTOR AND DBE PAYMENT REPORTING (BDE)**

Effective: April 2, 2018

Add the following to Section 109 of the Standard Specifications.

**“109.14 Subcontractor and Disadvantaged Business Enterprise Payment Reporting.**  
 The Contractor shall report all payments made to the following parties:

- (a) first tier subcontractors;
- (b) lower tier subcontractors affecting disadvantaged business enterprise (DBE) goal credit;
- (c) material suppliers or trucking firms that are part of the Contractor’s submitted DBE utilization plan.

The report shall be made through the Department’s on-line subcontractor payment reporting system within 21 days of making the payment.”

**SUBCONTRACTOR MOBILIZATION PAYMENTS (BDE)**

Effective: November 2, 2017

Revised: April 1, 2019

Replace the second paragraph of Article 109.12 of the Standard Specifications with the following:

“This mobilization payment shall be made at least seven days prior to the subcontractor starting work. The amount paid shall be at the following percentage of the amount of the subcontract reported on form BC 260A submitted for the approval of the subcontractor’s work.

Value of Subcontract Reported on Form BC 260A	Mobilization Percentage
Less than \$10,000	25%
\$10,000 to less than \$20,000	20%
\$20,000 to less than \$40,000	18%
\$40,000 to less than \$60,000	16%
\$60,000 to less than \$80,000	14%
\$80,000 to less than \$100,000	12%
\$100,000 to less than \$250,000	10%
\$250,000 to less than \$500,000	9%
\$500,000 to \$750,000	8%
Over \$750,000	7%”

**SURFACE TESTING OF HOT-MIX ASPHALT OVERLAYS (BDE)**

Effective: January 1, 2013

Revised: August 1, 2019

Revise Article 406.03(h) of the Standard Specifications to read:

“(h) Pavement Surface Test Equipment ..... 1101.10”

Revise Article 406.11 of the Standard Specifications to read:

“**406.11 Surface Tests.** The finished surface of the pavement shall be tested for smoothness according to Article 407.09, except as follows:

One wheel track shall be tested per lane. Testing shall be performed 3 ft (1 m) from and parallel to the edge of the lane away from traffic.

SMOOTHNESS ASSESSMENT SCHEDULE (HMA Overlays)		
High-Speed Mainline Pavement Profile Index in./mile (mm/km)	Low-Speed Mainline Pavement Profile Index in./mile (mm/km)	Assessment per subplot
6.0 (95) or less	15.0 (240) or less	+\$150.00
>6.0 (95) to 10.0 (160)	>15.0 (240) to 25.0 (400)	+\$80.00
>10.0 (160) to 30.0 (475)	>25.0 (400) to 45.0 (710)	+\$0.00
>30.0 (475) to 40.0 (635)	>45.0 (710) to 65.0 (1025)	+\$0.00
Greater than 40.0 (635)	Greater than 65.0 (1025)	-\$300.00”

**TEMPORARY PAVEMENT MARKING (BDE)**

Effective: April 1, 2012

Revised: April 1, 2017

Revise Article 703.02 of the Standard Specifications to read:

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

- (a) Pavement Marking Tape, Type I and Type III ..... 1095.06
- (b) Paint Pavement Markings ..... 1095.02
- (c) Pavement Marking Tape, Type IV ..... 1095.11”

Revise the second paragraph of Article 703.05 of the Standard Specifications to read:

“Type I marking tape or paint shall be used at the option of the Contractor, except paint shall not be applied to the final wearing surface unless authorized by the Engineer for late season applications where tape adhesion would be a problem. Type III or Type IV marking tape shall be used on the final wearing surface when the temporary pavement marking will conflict with the permanent pavement marking such as on tapers, crossovers and lane shifts.”

Revise Article 703.07 of the Standard Specifications to read:

**“703.07 Basis of Payment.** This work will be paid for as follows.

- a) Short Term Pavement Marking. Short term pavement marking will be paid for at the contract unit price per foot (meter) for SHORT TERM PAVEMENT MARKING. Removal of short term pavement markings will be paid for at the contract unit price per square foot (square meter) for SHORT TERM PAVEMENT MARKING REMOVAL.
- b) Temporary Pavement Marking. Where the Contractor has the option of material type, temporary pavement marking will be paid for at the contract unit price per foot (meter) for TEMPORARY PAVEMENT MARKING of the line width specified, and at the contract unit price per square foot (square meter) for TEMPORARY PAVEMENT MARKING LETTERS AND SYMBOLS.

Where the Department specifies the use of pavement marking tape, the Type III or Type IV temporary pavement marking will be paid for at the contract unit price per foot (meter) for PAVEMENT MARKING TAPE, TYPE III or PAVEMENT MARKING TAPE, TYPE IV of the line width specified and at the contract unit price per square feet (square meter) for PAVEMENT MARKING TAPE, TYPE III - LETTERS AND SYMBOLS or PAVEMENT MARKING TAPE, TYPE IV – LETTERS AND SYMBOLS.

Removal of temporary pavement markings will be paid for at the contract unit price per square foot (square meter) for TEMPORARY PAVEMENT MARKING REMOVAL.

When temporary pavement marking is shown on the Standard, the cost of the temporary pavement marking and its removal will be included in the cost of the Standard.”



Add the following to Section 1095 of the Standard Specifications:

**“1095.11 Pavement Marking Tape, Type IV.** The temporary, preformed, patterned markings shall consist of a white or yellow tape with wet retroreflective media incorporated to provide immediate and continuing retroreflection during both wet and dry conditions. The tape shall be manufactured without the use of heavy metals including lead chromate pigments or other similar, lead-containing chemicals.

The white and yellow Type IV marking tape shall meet the Type III requirements of Article 1095.06 and the following.

- (a) Composition. The retroreflective pliant polymer pavement markings shall consist of a mixture of high-quality polymeric materials, pigments and glass beads distributed throughout its base cross-sectional area, with a layer of wet retroreflective media bonded to a durable polyurethane topcoat surface. The patterned surface shall have approximately 40% ± 10% of the surface area raised and presenting a near vertical face to traffic from any direction. The channels between the raised areas shall be substantially free of exposed beads or particles.
- (b) Retroreflectance. The white and yellow markings shall meet the following for initial dry and wet retroreflectance.
  - (1) Dry Retroreflectance. Dry retroreflectance shall be measured under dry conditions according to ASTM D 4061 and meet the values described in Article 1095.06 for Type III tape.
  - (2) Wet Retroreflectance. Wet retroreflectance shall be measured under wet conditions according to ASTM E 2177 and meet the values shown in the following table.

<b>Wet Retroreflectance, Initial <math>R_L</math></b>	
<b>Color</b>	<b><math>R_L</math> 1.05/88.76</b>
White	300
Yellow	200

- (c) Color. The material shall meet the following requirements for daylight reflectance and color, when tested, using a color spectrophotometer with 45 degrees circumferential/zero degree geometry, illuminant D65, and a two degree observer angle. The color instrument shall measure the visible spectrum from 380 to 720 nm with a wavelength measurement interval and spectral bandpass of 10 nm.

Color	Daylight Reflectance %Y
White	65 minimum
*Yellow	36-59

\*Shall match Federal 595 Color No. 33538 and the chromaticity limits as follows.

x	0.490	0.475	0.485	0.530
y	0.470	0.438	0.425	0.456

- (d) Skid Resistance. The surface of the markings shall provide an average minimum skid resistance of 50 BPN when tested according to ASTM E 303.
- (e) Sampling, Testing, Acceptance, and Certification. Prior to approval and use of the wet reflective, temporary, removable pavement marking tape, the manufacturer shall submit a notarized certification from an independent laboratory, together with the results of all tests, stating that the material meets the requirements as set forth herein. The certification test report shall state the lot tested, manufacturer's name, and date of manufacture.

After approval by the Department, samples and certification by the manufacturer shall be submitted for each batch used. The manufacturer shall submit a certification stating that the material meets the requirements as set forth herein and is essentially identical to the material sent for qualification. The certification shall state the lot tested, manufacturer's name, and date of manufacture.

All costs of testing (other than tests conducted by the Department) shall be borne by the manufacturer."

**TRAFFIC CONTROL DEVICES - CONES (BDE)**

Effective: January 1, 2019

Revise Article 701.15(a) of the Standard Specifications to read:

“(a) Cones. Cones are used to channelize traffic. Cones used to channelize traffic at night shall be reflectorized; however, cones shall not be used in nighttime lane closure tapers or nighttime lane shifts.”

Revise Article 1106.02(b) of the Standard Specifications to read:

“(b) Cones. Cones shall be predominantly orange. Cones used at night that are 28 to 36 in. (700 to 900 mm) in height shall have two white circumferential stripes. If non-reflective spaces are left between the stripes, the spaces shall be no more than 2 in. (50mm) in width. Cones used at night that are taller than 36 in. (900 mm) shall have a minimum of two white and two fluorescent orange alternating, circumferential stripes with the top stripe being fluorescent orange. If non-reflective spaces are left between the stripes, the spaces shall be no more than 3 in. (75 mm) in width.

The minimum weights for the various cone heights shall be 4 lb for 18 in. (2 kg for 450 mm), 7 lb for 28 in. (3 kg for 700 mm), and 10 lb for 36 in. (5 kg for 900 mm) with a minimum of 60 percent of the total weight in the base. Cones taller than 36 in. shall be weighted per the manufacturer’s specifications such that they are not moved by wind or passing traffic.”

**TRAFFIC SPOTTERS (BDE)**

Effective: January 1, 2019

Revise Article 701.13 of the Standard Specifications to read:

**“701.13 Flaggers and Spotters.** Flaggers shall be certified by an agency approved by the Department. While on the job site, each flagger shall have in his/her possession a current driver’s license and a current flagger certification I.D. card. For non-drivers, the Illinois Identification Card issued by the Secretary of State will meet the requirement for a current driver’s license. This certification requirement may be waived by the Engineer for emergency situations that arise due to actions beyond the Contractor’s control where flagging is needed to maintain safe traffic control on a temporary basis. Spotters are defined as certified flaggers that provide support to workers by monitoring traffic.

Flaggers and spotters shall be stationed to the satisfaction of the Engineer and be equipped with a fluorescent orange, fluorescent yellow/green, or a combination of fluorescent orange and fluorescent yellow/green vest meeting the requirements of ANSI/ISEA 107-2004 or ANSI/ISEA 107-2010 for Conspicuity Class 2 garments. Flaggers shall be equipped with a stop/slow traffic control sign. Spotters shall be equipped with a loud warning device. The warning sound shall be identifiable by workers so they can take evasive action when necessary. Other types of garments may be substituted for the vest as long as the garments have a manufacturer’s tag identifying them as meeting the ANSI Class 2 requirement. The longitudinal placement of the flagger may be increased up to 100 ft (30 m) from that shown on the plans to improve the visibility of the flagger. Flaggers shall not encroach on the open lane of traffic unless traffic has been stopped. Spotters shall not encroach on the open lane of traffic, nor interact with or control the flow of traffic.

For nighttime flagging, flaggers shall be illuminated by an overhead light source providing a minimum vertical illuminance of 10 fc (108 lux) measured 1 ft (300 mm) out from the flagger's chest. The bottom of any luminaire shall be a minimum of 10 ft (3 m) above the pavement. Luminaire(s) shall be shielded to minimize glare to approaching traffic and trespass light to adjoining properties. Nighttime flaggers shall be equipped with fluorescent orange or fluorescent orange and fluorescent yellow/green apparel meeting the requirements of ANSI/ISEA 107-2004 or ANSI/ISEA 107-2010 for Conspicuity Class 3 garments.

Flaggers and spotters shall be provided per the traffic control plan and as follows.

- (a) Two-Lane Highways. Two flaggers will be required for each separate operation where two-way traffic is maintained over one lane of pavement. Work operations controlled by flaggers shall be no more than 1 mile (1600 m) in length. Flaggers shall be in sight of each other or in direct communication at all times. Direct communication shall be obtained by using portable two-way radios or walkie-talkies.

The Engineer will determine when a side road or entrance shall be closed to traffic. A flagger will be required at each side road or entrance remaining open to traffic within the operation where two-way traffic is maintained on one lane of pavement. The flagger shall be positioned as shown on the plans or as directed by the Engineer.

- (b) Multi-Lane Highways. At all times where traffic is restricted to less than the normal number of lanes on a multilane pavement with a posted speed limit greater than 40 mph and the workers are present, but not separated from the traffic by physical barriers, a flagger or spotter shall be furnished as shown on the plans. Flaggers shall warn and direct traffic. Spotters shall monitor traffic conditions and warn workers of errant approaching vehicles or other hazardous conditions as they occur. One flagger will be required for each separate activity of an operation that requires frequent encroachment in a lane open to traffic. One spotter will be required for each separate activity with workers near the edge of the open lane or with their backs facing traffic.

Flaggers will not be required when no work is being performed, unless there is a lane closure on two-lane, two-way pavement.”

**TRAINING SPECIAL PROVISIONS (BDE)**

Effective: October 15, 1975

This Training Special Provision supersedes Section 7b of the Special Provision entitled "Specific Equal Employment Opportunity Responsibilities," and is in implementation of 23 U.S.C. 140(a).

As part of the Contractor's equal employment opportunity affirmative action program, training shall be provided as follows:

The Contractor shall provide on-the-job training aimed at developing full journeyman in the type of trade or job classification involved. The number of trainees to be trained under this contract will be 4. In the event the Contractor subcontracts a portion of the contract work, he shall determine how many, if any, of the trainees are to be trained by the subcontractor, provided however, that the Contractor shall retain the primary responsibility for meeting the training requirements imposed by this special provision. The Contractor shall also insure that this Training Special Provision is made applicable to such subcontract. Where feasible, 25 percent of apprentices or trainees in each occupation shall be in their first year of apprenticeship or training.

The number of trainees shall be distributed among the work classifications on the basis of the Contractor's needs and the availability of journeymen in the various classifications within the reasonable area of recruitment. Prior to commencing construction, the Contractor shall submit to the Illinois Department of Transportation for approval the number of trainees to be trained in each selected classification and training program to be used. Furthermore, the Contractor shall specify the starting time for training in each of the classifications. The Contractor will be credited for each trainee employed by him on the contract work who is currently enrolled or becomes enrolled in an approved program and will be reimbursed for such trainees as provided hereinafter.

Training and upgrading of minorities and women toward journeyman status is a primary objective of this Training Special Provision. Accordingly, the Contractor shall make every effort to enroll minority trainees and women (e.g. by conducting systematic and direct recruitment through public and private sources likely to yield minority and women trainees) to the extent such persons are available within a reasonable area of recruitment. The Contractor will be responsible for demonstrating the steps that he has taken in pursuance thereof, prior to a determination as to whether the Contractor is in compliance with this Training Special Provision. This training commitment is not intended, and shall not be used, to discriminate against any applicant for training, whether a member of a minority group or not.

No employee shall be employed as a trainee in any classification in which he has successfully completed a training course leading to journeyman status or in which he has been employed as a journeyman. The Contractor should satisfy this requirement by including appropriate questions in the employee application or by other suitable means. Regardless of the method used, the Contractor's records should document the findings in each case.

The minimum length and type of training for each classification will be as established in the training program selected by the Contractor and approved by the Illinois Department of Transportation and the Federal Highway Administration. The Illinois Department of Transportation and the Federal Highway Administration shall approve a program, if it is reasonably calculated to meet the equal employment opportunity obligations of the Contractor and to qualify the average trainee for journeyman status in the classification concerned by the end of the training period. Furthermore, apprenticeship programs registered with the U.S. Department of Labor, Bureau of Apprenticeship and Training, or with a State apprenticeship agency recognized by the Bureau and training programs approved by not necessarily sponsored by the U.S. Department of Labor, Manpower Administration, Bureau of Apprenticeship and Training shall also be considered acceptable provided it is being administered in a manner consistent with the equal employment obligations of Federal-aid highway construction contracts. Approval or acceptance of a training program shall be obtained from the State prior to commencing work on the classification covered by the program. It is the intention of these provisions that training is to be provided in the construction crafts rather than clerk-typists or secretarial-type positions. Training is permissible in lower level management positions such as office engineers, estimators, timekeepers, etc., where the training is oriented toward construction applications. Training in the laborer classification may be permitted provided that significant and meaningful training is provided and approved by the Illinois Department of Transportation and the Federal Highway Administration. Some offsite training is permissible as long as the training is an integral part of an approved training program and does not comprise a significant part of the overall training.

Except as otherwise noted below, the Contractor will be reimbursed 80 cents per hour of training given an employee on this contract in accordance with an approved training program. As approved by the Engineer, reimbursement will be made for training of persons in excess of the number specified herein. This reimbursement will be made even though the Contractor receives additional training program funds from other sources, provided such other source does not specifically prohibit the Contractor from receiving other reimbursement. Reimbursement for offsite training indicated above may only be made to the Contractor where he does one or more of the following and the trainees are concurrently employed on a Federal-aid project; contributes to the cost of the training, provides the instruction to the trainee or pays the trainee's wages during the offsite training period.

No payment shall be made to the Contractor if either the failure to provide the required training, or the failure to hire the trainee as a journeyman, is caused by the Contractor and evidences a lack of good faith on the part of the Contractor in meeting the requirement of this Training Special Provision. It is normally expected that a trainee will begin his training on the project as soon as feasible after start of work utilizing the skill involved and remain on the project as long as training opportunities exist in his work classification or until he has completed his training program.

It is not required that all trainees be on board for the entire length of the contract. A Contractor will have fulfilled his responsibilities under this Training Special Provision if he has provided acceptable training to the number of trainees specified. The number trained shall be determined on the basis of the total number enrolled on the contract for a significant period.

Trainees will be paid at least 60 percent of the appropriate minimum journeyman's rate specified in the contract for the first half of the training period, 75 percent for the third quarter of the training period, and 90 percent for the last quarter of the training period, unless apprentices or trainees in an approved existing program are enrolled as trainees on this project. In that case, the appropriate rates approved by the Departments of Labor or Transportation in connection with the existing program shall apply to all trainees being trained for the same classification who are covered by this Training Special Provision.

The Contractor shall furnish the trainee a copy of the program he will follow in providing the training. The Contractor shall provide each trainee with a certification showing the type and length of training satisfactorily complete.

The Contractor shall provide for the maintenance of records and furnish periodic reports documenting his performance under this Training Special Provision.

Method of Measurement. The unit of measurement is in hours.

Basis of Payment. This work will be paid for at the contract unit price of 80 cents per hour for TRAINEES. The estimated total number of hours, unit price, and total price have been included in the schedule of prices.



**IDOT TRAINING PROGRAM GRADUATE ON-THE-JOB TRAINING SPECIAL PROVISION**

Effective: August 1, 2012

Revised: February 2, 2017

In addition to the Contractor's equal employment opportunity (EEO) affirmative action efforts undertaken as required by this Contract, the Contractor is encouraged to participate in the incentive program described below to provide additional on-the-job training to certified graduates of the IDOT pre-apprenticeship training program, as outlined in this Special Provision.

IDOT funds, and various Illinois community colleges operate, pre-apprenticeship training programs throughout the State to provide training and skill-improvement opportunities to promote the increased employment of minority groups, disadvantaged persons and women in all aspects of the highway construction industry. The intent of this IDOT Pre-Apprenticeship Training Program Graduate (TPG) special provision (Special Provision) is to place these certified program graduates on the project site for this Contract in order to provide the graduates with meaningful on-the-job training. Pursuant to this Special Provision, the Contractor must make every reasonable effort to recruit and employ certified TPG trainees to the extent such individuals are available within a practicable distance of the project site.

Specifically, participation of the Contractor or its subcontractor in the Program entitles the participant to reimbursement for graduates' hourly wages at \$15.00 per hour per utilized TPG trainee, subject to the terms of this Special Provision. Reimbursement payment will be made even though the Contractor or subcontractor may also receive additional training program funds from other non-IDOT sources for other non-TPG trainees on the Contract, provided such other source does not specifically prohibit the Contractor or subcontractor from receiving reimbursement from another entity through another program, such as IDOT through the TPG program. With regard to any IDOT funded construction training program other than TPG, however, additional reimbursement for other IDOT programs will not be made beyond the TPG Program described in this Special Provision when the TPG Program is utilized.

No payment will be made to the Contractor if the Contractor or subcontractor fails to provide the required on-site training to TPG trainees, as solely determined by IDOT. A TPG trainee must begin training on the project as soon as the start of work that utilizes the relevant trade skill and the TPG trainee must remain on the project site through completion of the Contract, so long as training opportunities continue to exist in the relevant work classification. Should a TPG trainee's employment end in advance of the completion of the Contract, the Contractor must promptly notify the IDOT District EEO Officer for the Contract that the TPG's involvement in the Contract has ended. The Contractor must supply a written report for the reason the TPG trainee involvement terminated, the hours completed by the TPG trainee on the Contract, and the number of hours for which the incentive payment provided under this Special Provision will be, or has been claimed for the separated TPG trainee.

Finally, the Contractor must maintain all records it creates as a result of participation in the Program on the Contract, and furnish periodic written reports to the IDOT District EEO Officer that document its contractual performance under and compliance with this Special Provision. Finally, through participation in the Program and reimbursement of wages, the Contractor is not relieved of, and IDOT has not waived, the requirements of any federal or state labor or employment law applicable to TPG workers, including compliance with the Illinois Prevailing Wage Act.

**Method of Measurement:** The unit of measurement is in hours.

**Basis of Payment:** This work will be paid for at the contract unit price of \$15.00 per hour for each utilized certified TPG Program trainee (TRAINEES TRAINING PROGRAM GRADUATE). The estimated total number of hours, unit price, and total price must be included in the schedule of prices for the Contract submitted by Contractor prior to beginning work. The initial number of TPG trainees for which the incentive is available for this contract is 4.

The Department has contracted with several educational institutions to provide screening, tutoring and pre-training to individuals interested in working as a TPG trainee in various areas of common construction trade work. Only individuals who have successfully completed a Pre-Apprenticeship Training Program at these IDOT approved institutions are eligible to be TPG trainees. To obtain a list of institutions that can connect the Contractor with eligible TPG trainees, the Contractor may contact: HCCTP TPG Program Coordinator, Office of Business and Workforce Diversity (IDOT OBWD), Room 319, Illinois Department of Transportation, 2300 S. Dirksen Parkway, Springfield, Illinois 62764. Prior to commencing construction with the utilization of a TPG trainee, the Contractor must submit documentation to the IDOT District EEO Officer for the Contract that provides the names and contact information of the TPG trainee(s) to be trained in each selected work classification, proof that that the TPG trainee(s) has successfully completed a Pre-Apprenticeship Training Program, proof that the TPG is in an Apprenticeship Training Program approved by the U.S. Department of Labor Bureau of Apprenticeship Training, and the start date for training in each of the applicable work classifications.

To receive payment, the Contractor must provide training opportunities aimed at developing a full journeyworker in the type of trade or job classification involved. During the course of performance of the Contract, the Contractor may seek approval from the IDOT District EEO Officer to employ additional eligible TPG trainees. In the event the Contractor subcontracts a portion of the contracted work, it must determine how many, if any, of the TPGs will be trained by the subcontractor. Though a subcontractor may conduct training, the Contractor retains the responsibility for meeting all requirements imposed by this Special Provision. The Contractor must also include this Special Provision in any subcontract where payment for contracted work performed by a TPG trainee will be passed on to a subcontractor.

Training through the Program is intended to move TPGs toward journeyman status, which is the primary objective of this Special Provision. Accordingly, the Contractor must make every effort to enroll TPG trainees by recruitment through the Program participant educational institutions to the extent eligible TPGs are available within a reasonable geographic area of the project. The Contractor is responsible for demonstrating, through documentation, the recruitment efforts it has undertaken prior to the determination by IDOT whether the Contractor is in compliance with this Special Provision, and therefore, entitled to the Training Program Graduate reimbursement of \$15.00 per hour.

Notwithstanding the on-the-job training requirement of this TPG Special Provision, some minimal off-site training is permissible as long as the offsite training is an integral part of the work of the contract, and does not compromise or conflict with the required on-site training that is central to the purpose of the Program. No individual may be employed as a TPG trainee in any work classification in which he/she has previously successfully completed a training program leading to journeyman status in any trade, or in which he/she has worked at a journeyman level or higher.

**WARM MIX ASPHALT (BDE)**

Effective: January 1, 2012

Revised: April 1, 2016

**Description.** This work shall consist of designing, producing and constructing Warm Mix Asphalt (WMA) in lieu of Hot Mix Asphalt (HMA) at the Contractor's option. Work shall be according to Sections 406, 407, 408, 1030, and 1102 of the Standard Specifications, except as modified herein. In addition, any references to HMA in the Standard Specifications, or the special provisions shall be construed to include WMA.

WMA is an asphalt mixture which can be produced at temperatures lower than allowed for HMA utilizing approved WMA technologies. WMA technologies are defined as the use of additives or processes which allow a reduction in the temperatures at which HMA mixes are produced and placed. WMA is produced by the use of additives, a water foaming process, or combination of both. Additives include minerals, chemicals or organics incorporated into the asphalt binder stream in a dedicated delivery system. The process of foaming injects water into the asphalt binder stream, just prior to incorporation of the asphalt binder with the aggregate.

Approved WMA technologies may also be used in HMA provided all the requirements specified herein, with the exception of temperature, are met. However, asphalt mixtures produced at temperatures in excess of 275 °F (135 °C) will not be considered WMA when determining the grade reduction of the virgin asphalt binder grade.

**Equipment.**

Revise the first paragraph of Article 1102.01 of the Standard Specifications to read:

**"1102.01 Hot-Mix Asphalt Plant.** The hot-mix asphalt (HMA) plant shall be the batch-type, continuous-type, or dryer drum plant. The plants shall be evaluated for prequalification rating and approval to produce HMA according to the current Bureau of Materials and Physical Research Policy Memorandum, "Approval of Hot-Mix Asphalt Plants and Equipment". Once approved, the Contractor shall notify the Bureau of Materials and Physical Research to obtain approval of all plant modifications. The plants shall not be used to produce mixtures concurrently for more than one project or for private work unless permission is granted in writing by the Engineer. The plant units shall be so designed, coordinated and operated that they will function properly and produce HMA having uniform temperatures and compositions within the tolerances specified. The plant units shall meet the following requirements."

Add the following to Article 1102.01(a) of the Standard Specifications.

"(11) Equipment for Warm Mix Technologies.

- a. Foaming. Metering equipment for foamed asphalt shall have an accuracy of  $\pm 2$  percent of the actual water metered. The foaming control system shall be electronically interfaced with the asphalt binder meter.
- b. Additives. Additives shall be introduced into the plant according to the supplier's recommendations and shall be approved by the Engineer. The system for introducing the WMA additive shall be interlocked with the aggregate feed or weigh system to maintain correct proportions for all rates of production and batch sizes."

**Mix Design Verification.**

Add the following to Article 1030.04 of the Standard Specifications.

“(e) Warm Mix Technologies.

- (1) Foaming. WMA mix design verification will not be required when foaming technology is used alone (without WMA additives). However, the foaming technology shall only be used on HMA designs previously approved by the Department.
- (2) Additives. WMA mix designs utilizing additives shall be submitted to the Engineer for mix design verification.”

**Construction Requirements.**

Revise the second paragraph of Article 406.06(b)(1) of the Standard Specifications to read:

“The HMA shall be delivered at a temperature of 250 to 350 °F (120 to 175 °C). WMA shall be delivered at a minimum temperature of 215 °F (102 °C).”

**Basis of Payment.**

This work will be paid at the contract unit price bid for the HMA pay items involved. Anti-strip will not be paid for separately, but shall be considered as included in the cost of the work.

**WEEKLY DBE TRUCKING REPORTS (BDE)**

Effective: June 2, 2012

Revised: April 2, 2015

The Contractor shall submit a weekly report of Disadvantaged Business Enterprise (DBE) trucks hired by the Contractor or subcontractors (i.e. not owned by the Contractor or subcontractors) that are used for DBE goal credit.

The report shall be submitted to the Engineer on Department form “SBE 723” within ten business days following the reporting period. The reporting period shall be Monday through Sunday for each week reportable trucking activities occur.

Any costs associated with providing weekly DBE trucking reports shall be considered as included in the contract unit prices bid for the various items of work involved and no additional compensation will be allowed.

**WORK ZONE TRAFFIC CONTROL DEVICES (BDE)**

Effective: March 2, 2020

Add the following to Article 701.03 of the Standard Specifications:

“(q) Temporary Sign Supports ..... 1106.02”

Revise the third paragraph of Article 701.14 of the Standard Specifications to read:

“For temporary sign supports, the Contractor shall provide a FHWA eligibility letter for each device used on the contract. The letter shall provide information for the set-up and use of the device as well as a detailed drawing of the device. The signs shall be supported within 20 degrees of vertical. Weights used to stabilize signs shall be attached to the sign support per the manufacturer’s specifications.”

Revise the first paragraph of Article 701.15 of the Standard Specifications to read:

“ **701.15 Traffic Control Devices.** For devices that must meet crashworthiness standards, the Contractor shall provide a manufacturer’s self-certification or a FHWA eligibility letter for each Category 1 device and a FHWA eligibility letter for each Category 2 and Category 3 device used on the contract. The self-certification or letter shall provide information for the set-up and use of the device as well as a detailed drawing of the device.”

Revise the first six paragraphs of Article 1106.02 of the Standard Specifications to read:

“ **1106.02 Devices.** Work zone traffic control devices and combinations of devices shall meet crashworthiness standards for their respective categories. The categories are as follows.

Category 1 includes small, lightweight, channelizing and delineating devices that have been in common use for many years and are known to be crashworthy by crash testing of similar devices or years of demonstrable safe performance. These include cones, tubular markers, plastic drums, and delineators, with no attachments (e.g. lights). Category 1 devices manufactured after December 31, 2019 shall be MASH-16 compliant. Category 1 devices manufactured on or before December 31, 2019, and compliant with NCHRP 350 or MASH 2009, may be used on contracts let before December 31, 2024.

Category 2 includes devices that are not expected to produce significant vehicular velocity change but may otherwise be hazardous. These include vertical panels with lights, barricades, temporary sign supports, and Category 1 devices with attachments (e.g. drums with lights). Category 2 devices manufactured after December 31, 2019 shall be MASH-16 compliant. Category 2 devices manufactured on or before December 31, 2019, and compliant with NCHRP 350 or MASH 2009, may be used on contracts let before December 31, 2024.

Category 3 includes devices that are expected to cause significant velocity changes or other potentially harmful reactions to impacting vehicles. These include crash cushions (impact attenuators), truck mounted attenuators, and other devices not meeting the definitions of Category 1 or 2. Category 3 devices manufactured after December 31, 2019 shall be MASH-16 compliant. Category 3 devices manufactured on or before December 31, 2019, and compliant with NCHRP 350 or MASH 2009, may be used on contracts let before December 31, 2029. Category 3 devices shall be crash tested for Test Level 3 or the test level specified.

Category 4 includes portable or trailer-mounted devices such as arrow boards, changeable message signs, temporary traffic signals, and area lighting supports. It is preferable for Category 4 devices manufactured after December 31, 2019 to be MASH-16 compliant; however, there are currently no crash tested devices in this category, so it remains exempt from the NCHRP 350 or MASH compliance requirement.

For each type of device, when no more than one MASH-16 compliant is available, an NCHRP 350 or MASH-2009 compliant device may be used, even if manufactured after December 31, 2019.”

Revise Articles 1106.02(g), 1106.02(k), and 1106.02(l) to read:

“(g) Truck Mounted/Trailer Mounted Attenuators. The attenuator shall be approved for use at Test Level 3. Test Level 2 may be used for normal posted speeds less than or equal to 45 mph.

(k) Temporary Water Filled Barrier. The water filled barrier shall be a lightweight plastic shell designed to accept water ballast and be on the Department’s qualified product list.

Shop drawings shall be furnished by the manufacturer and shall indicate the deflection of the barrier as determined by acceptance testing; the configuration of the barrier in that test; and the vehicle weight, velocity, and angle of impact of the deflection test. The Engineer shall be provided one copy of the shop drawings.

(l) Movable Traffic Barrier. The movable traffic barrier shall be on the Department’s qualified product list.

Shop drawings shall be furnished by the manufacturer and shall indicate the deflection of the barrier as determined by acceptance testing; the configuration of the barrier in that test; and the vehicle weight, velocity, and angle of impact of the deflection test. The Engineer shall be provided one copy of the shop drawings. The barrier shall be capable of being moved on and off the roadway on a daily basis.”

## **MENTOR-PROTÉGÉ PROGRAM**

Effective: June 1, 2007      Revised: February 1, 2013

**Eligibility.** This contract is eligible for the Department's Mentor-Protégé Program for those bidders with an approved Mentor-Protégé Development Plan.

In order for a Mentor-Protégé relationship to be recognized as part of this contract, the Protégé shall be used as a subcontractor and a Mentor-Protégé Agreement for Contract Assistance and Training shall be fully executed and approved. The Mentor-Protégé Agreement for Contract Assistance and Training shall be completed on the form provided by the Department and submitted with the DBE Utilization Plan for approval by the Department. If approved, the Mentor-Protégé Agreement for Contract Assistance and Training shall become part of the contract. In the event the Mentor-Protégé Agreement for Contract Assistance and Training is not approved, the contract shall be performed in accordance with the DBE Utilization Plan exclusive of the Agreement.

**DBE Goal Reduction.** The DBE participation goal set for this contract may, at the discretion of the Department, be reduced according to the Mentor-Protégé Program Guidelines when the Protégé is used as a subcontractor. When submitting the DBE Utilization Plan, the bidder shall indicate whether the Protégé will be used as a subcontractor and to what extent.

**Quarterly Reports.** The Mentor shall submit quarterly progress reports as outlined in the Mentor-Protégé Program Implementation document. The reports shall indicate the progress toward each of the Plan's stated goals. The reports shall be signed by an authorized principal of each firm and submitted to the Engineer of Construction.

Failure to timely submit reports, or submission of incomplete reports may result in dissolution of relationship.

**Reimbursement of Mentor Expenses.** The direct and indirect expenses of the Mentor, as detailed in the approved Mentor-Protégé Agreement for Contract Assistance and Training will be reimbursed by the Department.

## REQUIRED CONTRACT PROVISIONS FEDERAL-AID CONSTRUCTION CONTRACTS

- I. General
- II. Nondiscrimination
- III. Nonsegregated Facilities
- IV. Davis-Bacon and Related Act Provisions
- V. Contract Work Hours and Safety Standards Act Provisions
- VI. Subletting or Assigning the Contract
- VII. Safety: Accident Prevention
- VIII. False Statements Concerning Highway Projects
- IX. Implementation of Clean Air Act and Federal Water Pollution Control Act
- X. Compliance with Governmentwide Suspension and Debarment Requirements
- XI. Certification Regarding Use of Contract Funds for Lobbying

### ATTACHMENTS

A. Employment and Materials Preference for Appalachian Development Highway System or Appalachian Local Access Road Contracts (included in Appalachian contracts only)

### I. GENERAL

1. Form FHWA-1273 must be physically incorporated in each construction contract funded under Title 23 (excluding emergency contracts solely intended for debris removal). The contractor (or subcontractor) must insert this form in each subcontract and further require its inclusion in all lower tier subcontracts (excluding purchase orders, rental agreements and other agreements for supplies or services).

The applicable requirements of Form FHWA-1273 are incorporated by reference for work done under any purchase order, rental agreement or agreement for other services. The prime contractor shall be responsible for compliance by any subcontractor, lower-tier subcontractor or service provider.

Form FHWA-1273 must be included in all Federal-aid design-build contracts, in all subcontracts and in lower tier subcontracts (excluding subcontracts for design services, purchase orders, rental agreements and other agreements for supplies or services). The design-builder shall be responsible for compliance by any subcontractor, lower-tier subcontractor or service provider.

Contracting agencies may reference Form FHWA-1273 in bid proposal or request for proposal documents, however, the Form FHWA-1273 must be physically incorporated (not referenced) in all contracts, subcontracts and lower-tier subcontracts (excluding purchase orders, rental agreements and other agreements for supplies or services related to a construction contract).

2. Subject to the applicability criteria noted in the following sections, these contract provisions shall apply to all work performed on the contract by the contractor's own organization and with the assistance of workers under the contractor's immediate superintendence and to all work performed on the contract by piecework, station work, or by subcontract.

3. A breach of any of the stipulations contained in these Required Contract Provisions may be sufficient grounds for withholding of progress payments, withholding of final payment, termination of the contract, suspension / debarment or any other action determined to be appropriate by the contracting agency and FHWA.

4. Selection of Labor: During the performance of this contract, the contractor shall not use convict labor for any purpose within the limits of a construction project on a Federal-aid highway unless it is labor

performed by convicts who are on parole, supervised release, or probation. The term Federal-aid highway does not include roadways functionally classified as local roads or rural minor collectors.

### II. NONDISCRIMINATION

The provisions of this section related to 23 CFR Part 230 are applicable to all Federal-aid construction contracts and to all related construction subcontracts of \$10,000 or more. The provisions of 23 CFR Part 230 are not applicable to material supply, engineering, or architectural service contracts.

In addition, the contractor and all subcontractors must comply with the following policies: Executive Order 11246, 41 CFR 60, 29 CFR 1625-1627, Title 23 USC Section 140, the Rehabilitation Act of 1973, as amended (29 USC 794), Title VI of the Civil Rights Act of 1964, as amended, and related regulations including 49 CFR Parts 21, 26 and 27; and 23 CFR Parts 200, 230, and 633.

The contractor and all subcontractors must comply with: the requirements of the Equal Opportunity Clause in 41 CFR 60-1.4(b) and, for all construction contracts exceeding \$10,000, the Standard Federal Equal Employment Opportunity Construction Contract Specifications in 41 CFR 60-4.3.

Note: The U.S. Department of Labor has exclusive authority to determine compliance with Executive Order 11246 and the policies of the Secretary of Labor including 41 CFR 60, and 29 CFR 1625-1627. The contracting agency and the FHWA have the authority and the responsibility to ensure compliance with Title 23 USC Section 140, the Rehabilitation Act of 1973, as amended (29 USC 794), and Title VI of the Civil Rights Act of 1964, as amended, and related regulations including 49 CFR Parts 21, 26 and 27; and 23 CFR Parts 200, 230, and 633.

The following provision is adopted from 23 CFR 230, Appendix A, with appropriate revisions to conform to the U.S. Department of Labor (US DOL) and FHWA requirements.

**1. Equal Employment Opportunity:** Equal employment opportunity (EEO) requirements not to discriminate and to take affirmative action to assure equal opportunity as set forth under laws, executive orders, rules, regulations (28 CFR 35, 29 CFR 1630, 29 CFR 1625-1627, 41 CFR 60 and 49 CFR 27) and orders of the Secretary of Labor as modified by the provisions prescribed herein, and imposed pursuant to 23 U.S.C. 140 shall constitute the EEO and specific affirmative action standards for the contractor's project activities under this contract. The provisions of the Americans with Disabilities Act of 1990 (42 U.S.C. 12101 et seq.) set forth under 28 CFR 35 and 29 CFR 1630 are incorporated by reference in this contract. In the execution of this contract, the contractor agrees to comply with the following minimum specific requirement activities of EEO:

a. The contractor will work with the contracting agency and the Federal Government to ensure that it has made every good faith effort to provide equal opportunity with respect to all of its terms and conditions of employment and in their review of activities under the contract.

b. The contractor will accept as its operating policy the following statement:

"It is the policy of this Company to assure that applicants are employed, and that employees are treated during employment, without regard to their race, religion, sex, color, national origin, age or disability. Such action shall include: employment, upgrading, demotion, or transfer; recruitment or recruitment advertising; layoff or termination; rates of pay or other forms of compensation; and selection



for training, including apprenticeship, pre-apprenticeship, and/or on-the-job training."

**2. EEO Officer:** The contractor will designate and make known to the contracting officers an EEO Officer who will have the responsibility for and must be capable of effectively administering and promoting an active EEO program and who must be assigned adequate authority and responsibility to do so.

**3. Dissemination of Policy:** All members of the contractor's staff who are authorized to hire, supervise, promote, and discharge employees, or who recommend such action, or who are substantially involved in such action, will be made fully cognizant of, and will implement, the contractor's EEO policy and contractual responsibilities to provide EEO in each grade and classification of employment. To ensure that the above agreement will be met, the following actions will be taken as a minimum:

a. Periodic meetings of supervisory and personnel office employees will be conducted before the start of work and then not less often than once every six months, at which time the contractor's EEO policy and its implementation will be reviewed and explained. The meetings will be conducted by the EEO Officer.

b. All new supervisory or personnel office employees will be given a thorough indoctrination by the EEO Officer, covering all major aspects of the contractor's EEO obligations within thirty days following their reporting for duty with the contractor.

c. All personnel who are engaged in direct recruitment for the project will be instructed by the EEO Officer in the contractor's procedures for locating and hiring minorities and women.

d. Notices and posters setting forth the contractor's EEO policy will be placed in areas readily accessible to employees, applicants for employment and potential employees.

e. The contractor's EEO policy and the procedures to implement such policy will be brought to the attention of employees by means of meetings, employee handbooks, or other appropriate means.

**4. Recruitment:** When advertising for employees, the contractor will include in all advertisements for employees the notation: "An Equal Opportunity Employer." All such advertisements will be placed in publications having a large circulation among minorities and women in the area from which the project work force would normally be derived.

a. The contractor will, unless precluded by a valid bargaining agreement, conduct systematic and direct recruitment through public and private employee referral sources likely to yield qualified minorities and women. To meet this requirement, the contractor will identify sources of potential minority group employees, and establish with such identified sources procedures whereby minority and women applicants may be referred to the contractor for employment consideration.

b. In the event the contractor has a valid bargaining agreement providing for exclusive hiring hall referrals, the contractor is expected to observe the provisions of that agreement to the extent that the system meets the contractor's compliance with EEO contract provisions. Where implementation of such an agreement has the effect of discriminating against minorities or women, or obligates the contractor to do the same, such implementation violates Federal nondiscrimination provisions.

c. The contractor will encourage its present employees to refer minorities and women as applicants for employment. Information and procedures with regard to referring such applicants will be discussed with employees.

**5. Personnel Actions:** Wages, working conditions, and employee benefits shall be established and administered, and personnel actions of every type, including hiring, upgrading, promotion, transfer, demotion, layoff, and termination, shall be taken without regard to race, color, religion, sex, national origin, age or disability. The following procedures shall be followed:

a. The contractor will conduct periodic inspections of project sites to insure that working conditions and employee facilities do not indicate discriminatory treatment of project site personnel.

b. The contractor will periodically evaluate the spread of wages paid within each classification to determine any evidence of discriminatory wage practices.

c. The contractor will periodically review selected personnel actions in depth to determine whether there is evidence of discrimination. Where evidence is found, the contractor will promptly take corrective action. If the review indicates that the discrimination may extend beyond the actions reviewed, such corrective action shall include all affected persons.

d. The contractor will promptly investigate all complaints of alleged discrimination made to the contractor in connection with its obligations under this contract, will attempt to resolve such complaints, and will take appropriate corrective action within a reasonable time. If the investigation indicates that the discrimination may affect persons other than the complainant, such corrective action shall include such other persons. Upon completion of each investigation, the contractor will inform every complainant of all of their avenues of appeal.

## **6. Training and Promotion:**

a. The contractor will assist in locating, qualifying, and increasing the skills of minorities and women who are applicants for employment or current employees. Such efforts should be aimed at developing full journey level status employees in the type of trade or job classification involved.

b. Consistent with the contractor's work force requirements and as permissible under Federal and State regulations, the contractor shall make full use of training programs, i.e., apprenticeship, and on-the-job training programs for the geographical area of contract performance. In the event a special provision for training is provided under this contract, this subparagraph will be superseded as indicated in the special provision. The contracting agency may reserve training positions for persons who receive welfare assistance in accordance with 23 U.S.C. 140(a).

c. The contractor will advise employees and applicants for employment of available training programs and entrance requirements for each.

d. The contractor will periodically review the training and promotion potential of employees who are minorities and women and will encourage eligible employees to apply for such training and promotion.

**7. Unions:** If the contractor relies in whole or in part upon unions as a source of employees, the contractor will use good faith efforts to obtain the cooperation of such unions to increase opportunities for minorities and women. Actions by the contractor, either directly or through a contractor's association acting as agent, will include the procedures set forth below:

a. The contractor will use good faith efforts to develop, in cooperation with the unions, joint training programs aimed toward qualifying more minorities and women for membership in the unions and increasing the skills of minorities and women so that they may qualify for higher paying employment.

b. The contractor will use good faith efforts to incorporate an EEO clause into each union agreement to the end that such union will be contractually bound to refer applicants without regard to their race, color, religion, sex, national origin, age or disability.

c. The contractor is to obtain information as to the referral practices and policies of the labor union except that to the extent such information is within the exclusive possession of the labor union and such labor union refuses to furnish such information to the contractor, the contractor shall so certify to the contracting agency and shall set forth what efforts have been made to obtain such information.

d. In the event the union is unable to provide the contractor with a reasonable flow of referrals within the time limit set forth in the collective bargaining agreement, the contractor will, through independent recruitment efforts, fill the employment vacancies without regard to race, color, religion, sex, national origin, age or disability; making full efforts to obtain qualified and/or qualifiable minorities and women. The failure of a union to provide sufficient referrals (even though it is obligated to provide exclusive referrals under the terms of a collective bargaining agreement) does not relieve the contractor from the requirements of this paragraph. In the event the union referral practice prevents the contractor from meeting the obligations pursuant to Executive Order 11246, as amended, and these special provisions, such contractor shall immediately notify the contracting agency.

**8. Reasonable Accommodation for Applicants / Employees with Disabilities:** The contractor must be familiar with the requirements for and comply with the Americans with Disabilities Act and all rules and regulations established there under. Employers must provide reasonable accommodation in all employment activities unless to do so would cause an undue hardship.

**9. Selection of Subcontractors, Procurement of Materials and Leasing of Equipment:** The contractor shall not discriminate on the grounds of race, color, religion, sex, national origin, age or disability in the selection and retention of subcontractors, including procurement of materials and leases of equipment. The contractor shall take all necessary and reasonable steps to ensure nondiscrimination in the administration of this contract.

a. The contractor shall notify all potential subcontractors and suppliers and lessors of their EEO obligations under this contract.

b. The contractor will use good faith efforts to ensure subcontractor compliance with their EEO obligations.

#### **10. Assurance Required by 49 CFR 26.13(b):**

a. The requirements of 49 CFR Part 26 and the State DOT's U.S. DOT-approved DBE program are incorporated by reference.

b. The contractor or subcontractor shall not discriminate on the basis of race, color, national origin, or sex in the performance of this contract. The contractor shall carry out applicable requirements of 49 CFR Part 26 in the award and administration of DOT-assisted contracts. Failure by the contractor to carry out these requirements is a material breach of this contract, which may result in the termination of this contract or such other remedy as the contracting agency deems appropriate.

**11. Records and Reports:** The contractor shall keep such records as necessary to document compliance with the EEO requirements. Such records shall be retained for a period of three years following the date of the final payment to the contractor for all contract work and shall be available at reasonable times and places for inspection by authorized representatives of the contracting agency and the FHWA.

a. The records kept by the contractor shall document the following:

(1) The number and work hours of minority and non-minority group members and women employed in each work classification on the project;

(2) The progress and efforts being made in cooperation with unions, when applicable, to increase employment opportunities for minorities and women; and

(3) The progress and efforts being made in locating, hiring, training, qualifying, and upgrading minorities and women;

b. The contractors and subcontractors will submit an annual report to the contracting agency each July for the duration of the project, indicating the number of minority, women, and non-minority group employees currently engaged in each work classification required by the contract work. This information is to be reported on [Form FHWA-1391](#).

The staffing data should represent the project work force on board in all or any part of the last payroll period preceding the end of July. If on-the-job training is being required by special provision, the contractor will be required to collect and report training data. The employment data should reflect the work force on board during all or any part of the last payroll period preceding the end of July.

### **III. NONSEGREGATED FACILITIES**

This provision is applicable to all Federal-aid construction contracts and to all related construction subcontracts of \$10,000 or more.

The contractor must ensure that facilities provided for employees are provided in such a manner that segregation on the basis of race, color, religion, sex, or national origin cannot result. The contractor may neither require such segregated use by written or oral policies nor tolerate such use by employee custom. The contractor's obligation extends further to ensure that its employees are not assigned to perform their services at any location, under the contractor's control, where the facilities are segregated. The term "facilities" includes waiting rooms, work areas, restaurants and other eating areas, time clocks, restrooms, washrooms, locker rooms, and other storage or dressing areas, parking lots, drinking fountains, recreation or entertainment areas, transportation, and housing provided for employees. The contractor shall provide separate or single-user restrooms and necessary dressing or sleeping areas to assure privacy between sexes.

### **IV. DAVIS-BACON AND RELATED ACT PROVISIONS**

This section is applicable to all Federal-aid construction projects exceeding \$2,000 and to all related subcontracts and lower-tier subcontracts (regardless of subcontract size). The requirements apply to all projects located within the right-of-way of a roadway that is functionally classified as Federal-aid highway. This excludes roadways functionally classified as local roads or rural minor collectors, which are exempt. Contracting agencies may elect to apply these requirements to other projects.

The following provisions are from the U.S. Department of Labor regulations in 29 CFR 5.5 "Contract provisions and related matters" with minor revisions to conform to the FHWA-1273 format and FHWA program requirements.

#### **1. Minimum wages**

a. All laborers and mechanics employed or working upon the site of the work, will be paid unconditionally and not less often than once a week, and without subsequent deduction or rebate on any account (except such payroll deductions as are permitted by regulations issued by the Secretary of Labor under the Copeland Act (29 CFR part 3)), the full amount of wages and bona fide fringe benefits (or cash equivalents thereof) due at time of payment computed at rates not less than those contained in the wage determination of the Secretary of Labor which is attached hereto and made a part hereof, regardless of any contractual relationship which may be alleged to exist between the contractor and such laborers and mechanics.

Contributions made or costs reasonably anticipated for bona fide fringe benefits under section 1(b)(2) of the Davis-Bacon Act on behalf of laborers or mechanics are considered wages paid to such laborers or mechanics, subject to the provisions of paragraph 1.d. of this section; also, regular contributions made or costs incurred for more than a weekly period (but not less often than quarterly) under plans, funds, or programs which cover the particular weekly period, are deemed to be constructively made or incurred during such weekly period. Such laborers and mechanics shall be paid the appropriate wage rate and fringe benefits on the wage determination for the classification of work actually performed, without regard to skill, except as provided in 29 CFR 5.5(a)(4). Laborers or mechanics performing work in more than one classification may be compensated at the rate specified for each

classification for the time actually worked therein: Provided, That the employer's payroll records accurately set forth the time spent in each classification in which work is performed. The wage determination (including any additional classification and wage rates conformed under paragraph 1.b. of this section) and the Davis-Bacon poster (WH-1321) shall be posted at all times by the contractor and its subcontractors at the site of the work in a prominent and accessible place where it can be easily seen by the workers.

b. (1) The contracting officer shall require that any class of laborers or mechanics, including helpers, which is not listed in the wage determination and which is to be employed under the contract shall be classified in conformance with the wage determination. The contracting officer shall approve an additional classification and wage rate and fringe benefits therefore only when the following criteria have been met:

(i) The work to be performed by the classification requested is not performed by a classification in the wage determination; and

(ii) The classification is utilized in the area by the construction industry; and

(iii) The proposed wage rate, including any bona fide fringe benefits, bears a reasonable relationship to the wage rates contained in the wage determination.

(2) If the contractor and the laborers and mechanics to be employed in the classification (if known), or their representatives, and the contracting officer agree on the classification and wage rate (including the amount designated for fringe benefits where appropriate), a report of the action taken shall be sent by the contracting officer to the Administrator of the Wage and Hour Division, Employment Standards Administration, U.S. Department of Labor, Washington, DC 20210. The Administrator, or an authorized representative, will approve, modify, or disapprove every additional classification action within 30 days of receipt and so advise the contracting officer or will notify the contracting officer within the 30-day period that additional time is necessary.

(3) In the event the contractor, the laborers or mechanics to be employed in the classification or their representatives, and the contracting officer do not agree on the proposed classification and wage rate (including the amount designated for fringe benefits, where appropriate), the contracting officer shall refer the questions, including the views of all interested parties and the recommendation of the contracting officer, to the Wage and Hour Administrator for determination. The Wage and Hour Administrator, or an authorized representative, will issue a determination within 30 days of receipt and so advise the contracting officer or will notify the contracting officer within the 30-day period that additional time is necessary.

(4) The wage rate (including fringe benefits where appropriate) determined pursuant to paragraphs 1.b.(2) or 1.b.(3) of this section, shall be paid to all workers performing work in the classification under this contract from the first day on which work is performed in the classification.

c. Whenever the minimum wage rate prescribed in the contract for a class of laborers or mechanics includes a fringe benefit which is not expressed as an hourly rate, the contractor shall either pay the benefit as stated in the wage determination or shall pay another bona fide fringe benefit or an hourly cash equivalent thereof.

d. If the contractor does not make payments to a trustee or other third person, the contractor may consider as part of the wages of any laborer or mechanic the amount of any costs reasonably anticipated in providing bona fide fringe benefits under a plan or program, Provided, That the Secretary of Labor has found, upon the written request of the contractor, that the applicable standards of the Davis-Bacon Act have been met. The Secretary of Labor may require the contractor to set aside in a

separate account assets for the meeting of obligations under the plan or program.

## 2. Withholding

The contracting agency shall upon its own action or upon written request of an authorized representative of the Department of Labor, withhold or cause to be withheld from the contractor under this contract, or any other Federal contract with the same prime contractor, or any other federally-assisted contract subject to Davis-Bacon prevailing wage requirements, which is held by the same prime contractor, so much of the accrued payments or advances as may be considered necessary to pay laborers and mechanics, including apprentices, trainees, and helpers, employed by the contractor or any subcontractor the full amount of wages required by the contract. In the event of failure to pay any laborer or mechanic, including any apprentice, trainee, or helper, employed or working on the site of the work, all or part of the wages required by the contract, the contracting agency may, after written notice to the contractor, take such action as may be necessary to cause the suspension of any further payment, advance, or guarantee of funds until such violations have ceased.

## 3. Payrolls and basic records

a. Payrolls and basic records relating thereto shall be maintained by the contractor during the course of the work and preserved for a period of three years thereafter for all laborers and mechanics working at the site of the work. Such records shall contain the name, address, and social security number of each such worker, his or her correct classification, hourly rates of wages paid (including rates of contributions or costs anticipated for bona fide fringe benefits or cash equivalents thereof of the types described in section 1(b)(2)(B) of the Davis-Bacon Act), daily and weekly number of hours worked, deductions made and actual wages paid. Whenever the Secretary of Labor has found under 29 CFR 5.5(a)(1)(iv) that the wages of any laborer or mechanic include the amount of any costs reasonably anticipated in providing benefits under a plan or program described in section 1(b)(2)(B) of the Davis-Bacon Act, the contractor shall maintain records which show that the commitment to provide such benefits is enforceable, that the plan or program is financially responsible, and that the plan or program has been communicated in writing to the laborers or mechanics affected, and records which show the costs anticipated or the actual cost incurred in providing such benefits. Contractors employing apprentices or trainees under approved programs shall maintain written evidence of the registration of apprenticeship programs and certification of trainee programs, the registration of the apprentices and trainees, and the ratios and wage rates prescribed in the applicable programs.

b. (1) The contractor shall submit weekly for each week in which any contract work is performed a copy of all payrolls to the contracting agency. The payrolls submitted shall set out accurately and completely all of the information required to be maintained under 29 CFR 5.5(a)(3)(i), except that full social security numbers and home addresses shall not be included on weekly transmittals. Instead the payrolls shall only need to include an individually identifying number for each employee ( e.g. , the last four digits of the employee's social security number). The required weekly payroll information may be submitted in any form desired. Optional Form WH-347 is available for this purpose from the Wage and Hour Division Web site at <http://www.dol.gov/esa/whd/forms/wh347instr.htm> or its successor site. The prime contractor is responsible for the submission of copies of payrolls by all subcontractors. Contractors and subcontractors shall maintain the full social security number and current address of each covered worker, and shall provide them upon request to the contracting agency for transmission to the State DOT, the FHWA or the Wage and Hour Division of the Department of Labor for purposes of an investigation or audit of compliance with prevailing wage requirements. It is not a violation of this section for a prime contractor to require a subcontractor to provide addresses and social security numbers to the prime contractor for its own records, without weekly submission to the contracting agency..

(2) Each payroll submitted shall be accompanied by a "Statement of Compliance," signed by the contractor or subcontractor or his or her agent who pays or supervises the payment of the persons employed under the contract and shall certify the following:

(i) That the payroll for the payroll period contains the information required to be provided under §5.5 (a)(3)(ii) of Regulations, 29 CFR part 5, the appropriate information is being maintained under §5.5 (a)(3)(i) of Regulations, 29 CFR part 5, and that such information is correct and complete;

(ii) That each laborer or mechanic (including each helper, apprentice, and trainee) employed on the contract during the payroll period has been paid the full weekly wages earned, without rebate, either directly or indirectly, and that no deductions have been made either directly or indirectly from the full wages earned, other than permissible deductions as set forth in Regulations, 29 CFR part 3;

(iii) That each laborer or mechanic has been paid not less than the applicable wage rates and fringe benefits or cash equivalents for the classification of work performed, as specified in the applicable wage determination incorporated into the contract.

(3) The weekly submission of a properly executed certification set forth on the reverse side of Optional Form WH-347 shall satisfy the requirement for submission of the "Statement of Compliance" required by paragraph 3.b.(2) of this section.

(4) The falsification of any of the above certifications may subject the contractor or subcontractor to civil or criminal prosecution under section 1001 of title 18 and section 231 of title 31 of the United States Code.

c. The contractor or subcontractor shall make the records required under paragraph 3.a. of this section available for inspection, copying, or transcription by authorized representatives of the contracting agency, the State DOT, the FHWA, or the Department of Labor, and shall permit such representatives to interview employees during working hours on the job. If the contractor or subcontractor fails to submit the required records or to make them available, the FHWA may, after written notice to the contractor, the contracting agency or the State DOT, take such action as may be necessary to cause the suspension of any further payment, advance, or guarantee of funds. Furthermore, failure to submit the required records upon request or to make such records available may be grounds for debarment action pursuant to 29 CFR 5.12.

#### 4. Apprentices and trainees

##### a. Apprentices (programs of the USDOL).

Apprentices will be permitted to work at less than the predetermined rate for the work they performed when they are employed pursuant to and individually registered in a bona fide apprenticeship program registered with the U.S. Department of Labor, Employment and Training Administration, Office of Apprenticeship Training, Employer and Labor Services, or with a State Apprenticeship Agency recognized by the Office, or if a person is employed in his or her first 90 days of probationary employment as an apprentice in such an apprenticeship program, who is not individually registered in the program, but who has been certified by the Office of Apprenticeship Training, Employer and Labor Services or a State Apprenticeship Agency (where appropriate) to be eligible for probationary employment as an apprentice.

The allowable ratio of apprentices to journeymen on the job site in any craft classification shall not be greater than the ratio permitted to the contractor as to the entire work force under the registered program. Any worker listed on a payroll at an apprentice wage rate, who is not registered or otherwise employed as stated above, shall be paid not less than the applicable wage rate on the wage determination for the classification of work actually performed. In addition, any apprentice

performing work on the job site in excess of the ratio permitted under the registered program shall be paid not less than the applicable wage rate on the wage determination for the work actually performed. Where a contractor is performing construction on a project in a locality other than that in which its program is registered, the ratios and wage rates (expressed in percentages of the journeyman's hourly rate) specified in the contractor's or subcontractor's registered program shall be observed.

Every apprentice must be paid at not less than the rate specified in the registered program for the apprentice's level of progress, expressed as a percentage of the journeymen hourly rate specified in the applicable wage determination. Apprentices shall be paid fringe benefits in accordance with the provisions of the apprenticeship program. If the apprenticeship program does not specify fringe benefits, apprentices must be paid the full amount of fringe benefits listed on the wage determination for the applicable classification. If the Administrator determines that a different practice prevails for the applicable apprentice classification, fringes shall be paid in accordance with that determination.

In the event the Office of Apprenticeship Training, Employer and Labor Services, or a State Apprenticeship Agency recognized by the Office, withdraws approval of an apprenticeship program, the contractor will no longer be permitted to utilize apprentices at less than the applicable predetermined rate for the work performed until an acceptable program is approved.

##### b. Trainees (programs of the USDOL).

Except as provided in 29 CFR 5.16, trainees will not be permitted to work at less than the predetermined rate for the work performed unless they are employed pursuant to and individually registered in a program which has received prior approval, evidenced by formal certification by the U.S. Department of Labor, Employment and Training Administration.

The ratio of trainees to journeymen on the job site shall not be greater than permitted under the plan approved by the Employment and Training Administration.

Every trainee must be paid at not less than the rate specified in the approved program for the trainee's level of progress, expressed as a percentage of the journeyman hourly rate specified in the applicable wage determination. Trainees shall be paid fringe benefits in accordance with the provisions of the trainee program. If the trainee program does not mention fringe benefits, trainees shall be paid the full amount of fringe benefits listed on the wage determination unless the Administrator of the Wage and Hour Division determines that there is an apprenticeship program associated with the corresponding journeyman wage rate on the wage determination which provides for less than full fringe benefits for apprentices. Any employee listed on the payroll at a trainee rate who is not registered and participating in a training plan approved by the Employment and Training Administration shall be paid not less than the applicable wage rate on the wage determination for the classification of work actually performed. In addition, any trainee performing work on the job site in excess of the ratio permitted under the registered program shall be paid not less than the applicable wage rate on the wage determination for the work actually performed.

In the event the Employment and Training Administration withdraws approval of a training program, the contractor will no longer be permitted to utilize trainees at less than the applicable predetermined rate for the work performed until an acceptable program is approved.

c. Equal employment opportunity. The utilization of apprentices, trainees and journeymen under this part shall be in conformity with the equal employment opportunity requirements of Executive Order 11246, as amended, and 29 CFR part 30.

##### d. Apprentices and Trainees (programs of the U.S. DOT).

Apprentices and trainees working under apprenticeship and skill training programs which have been certified by the Secretary of Transportation as promoting EEO in connection with Federal-aid highway construction programs are not subject to the requirements of paragraph 4 of this Section IV. The straight time hourly wage rates for apprentices and trainees under such programs will be established by the particular programs. The ratio of apprentices and trainees to journeymen shall not be greater than permitted by the terms of the particular program.

**5. Compliance with Copeland Act requirements.** The contractor shall comply with the requirements of 29 CFR part 3, which are incorporated by reference in this contract.

**6. Subcontracts.** The contractor or subcontractor shall insert Form FHWA-1273 in any subcontracts and also require the subcontractors to include Form FHWA-1273 in any lower tier subcontracts. The prime contractor shall be responsible for the compliance by any subcontractor or lower tier subcontractor with all the contract clauses in 29 CFR 5.5.

**7. Contract termination: debarment.** A breach of the contract clauses in 29 CFR 5.5 may be grounds for termination of the contract, and for debarment as a contractor and a subcontractor as provided in 29 CFR 5.12.

**8. Compliance with Davis-Bacon and Related Act requirements.** All rulings and interpretations of the Davis-Bacon and Related Acts contained in 29 CFR parts 1, 3, and 5 are herein incorporated by reference in this contract.

**9. Disputes concerning labor standards.** Disputes arising out of the labor standards provisions of this contract shall not be subject to the general disputes clause of this contract. Such disputes shall be resolved in accordance with the procedures of the Department of Labor set forth in 29 CFR parts 5, 6, and 7. Disputes within the meaning of this clause include disputes between the contractor (or any of its subcontractors) and the contracting agency, the U.S. Department of Labor, or the employees or their representatives.

#### **10. Certification of eligibility.**

a. By entering into this contract, the contractor certifies that neither it (nor he or she) nor any person or firm who has an interest in the contractor's firm is a person or firm ineligible to be awarded Government contracts by virtue of section 3(a) of the Davis-Bacon Act or 29 CFR 5.12(a)(1).

b. No part of this contract shall be subcontracted to any person or firm ineligible for award of a Government contract by virtue of section 3(a) of the Davis-Bacon Act or 29 CFR 5.12(a)(1).

c. The penalty for making false statements is prescribed in the U.S. Criminal Code, 18 U.S.C. 1001.

### **V. CONTRACT WORK HOURS AND SAFETY STANDARDS ACT**

The following clauses apply to any Federal-aid construction contract in an amount in excess of \$100,000 and subject to the overtime provisions of the Contract Work Hours and Safety Standards Act. These clauses shall be inserted in addition to the clauses required by 29 CFR 5.5(a) or 29 CFR 4.6. As used in this paragraph, the terms laborers and mechanics include watchmen and guards.

**1. Overtime requirements.** No contractor or subcontractor contracting for any part of the contract work which may require or involve the employment of laborers or mechanics shall require or permit any such laborer or mechanic in any workweek in which he or she is employed on such work to work in excess of forty hours in such workweek unless such laborer or mechanic receives compensation at a rate not less than one

and one-half times the basic rate of pay for all hours worked in excess of forty hours in such workweek.

**2. Violation; liability for unpaid wages; liquidated damages.** In the event of any violation of the clause set forth in paragraph (1.) of this section, the contractor and any subcontractor responsible therefor shall be liable for the unpaid wages. In addition, such contractor and subcontractor shall be liable to the United States (in the case of work done under contract for the District of Columbia or a territory, to such District or to such territory), for liquidated damages. Such liquidated damages shall be computed with respect to each individual laborer or mechanic, including watchmen and guards, employed in violation of the clause set forth in paragraph (1.) of this section, in the sum of \$10 for each calendar day on which such individual was required or permitted to work in excess of the standard workweek of forty hours without payment of the overtime wages required by the clause set forth in paragraph (1.) of this section.

**3. Withholding for unpaid wages and liquidated damages.** The FHWA or the contracting agency shall upon its own action or upon written request of an authorized representative of the Department of Labor withhold or cause to be withheld, from any moneys payable on account of work performed by the contractor or subcontractor under any such contract or any other Federal contract with the same prime contractor, or any other federally-assisted contract subject to the Contract Work Hours and Safety Standards Act, which is held by the same prime contractor, such sums as may be determined to be necessary to satisfy any liabilities of such contractor or subcontractor for unpaid wages and liquidated damages as provided in the clause set forth in paragraph (2.) of this section.

**4. Subcontracts.** The contractor or subcontractor shall insert in any subcontracts the clauses set forth in paragraph (1.) through (4.) of this section and also a clause requiring the subcontractors to include these clauses in any lower tier subcontracts. The prime contractor shall be responsible for compliance by any subcontractor or lower tier subcontractor with the clauses set forth in paragraphs (1.) through (4.) of this section.

### **VI. SUBLETTING OR ASSIGNING THE CONTRACT**

This provision is applicable to all Federal-aid construction contracts on the National Highway System.

1. The contractor shall perform with its own organization contract work amounting to not less than 30 percent (or a greater percentage if specified elsewhere in the contract) of the total original contract price, excluding any specialty items designated by the contracting agency. Specialty items may be performed by subcontract and the amount of any such specialty items performed may be deducted from the total original contract price before computing the amount of work required to be performed by the contractor's own organization (23 CFR 635.116).

a. The term "perform work with its own organization" refers to workers employed or leased by the prime contractor, and equipment owned or rented by the prime contractor, with or without operators. Such term does not include employees or equipment of a subcontractor or lower tier subcontractor, agents of the prime contractor, or any other assignees. The term may include payments for the costs of hiring leased employees from an employee leasing firm meeting all relevant Federal and State regulatory requirements. Leased employees may only be included in this term if the prime contractor meets all of the following conditions:

(1) the prime contractor maintains control over the supervision of the day-to-day activities of the leased employees;

(2) the prime contractor remains responsible for the quality of the work of the leased employees;

(3) the prime contractor retains all power to accept or exclude individual employees from work on the project; and

(4) the prime contractor remains ultimately responsible for the payment of predetermined minimum wages, the submission of payrolls, statements of compliance and all other Federal regulatory requirements.

b. "Specialty Items" shall be construed to be limited to work that requires highly specialized knowledge, abilities, or equipment not ordinarily available in the type of contracting organizations qualified and expected to bid or propose on the contract as a whole and in general are to be limited to minor components of the overall contract.

2. The contract amount upon which the requirements set forth in paragraph (1) of Section VI is computed includes the cost of material and manufactured products which are to be purchased or produced by the contractor under the contract provisions.

3. The contractor shall furnish (a) a competent superintendent or supervisor who is employed by the firm, has full authority to direct performance of the work in accordance with the contract requirements, and is in charge of all construction operations (regardless of who performs the work) and (b) such other of its own organizational resources (supervision, management, and engineering services) as the contracting officer determines is necessary to assure the performance of the contract.

4. No portion of the contract shall be sublet, assigned or otherwise disposed of except with the written consent of the contracting officer, or authorized representative, and such consent when given shall not be construed to relieve the contractor of any responsibility for the fulfillment of the contract. Written consent will be given only after the contracting agency has assured that each subcontract is evidenced in writing and that it contains all pertinent provisions and requirements of the prime contract.

5. The 30% self-performance requirement of paragraph (1) is not applicable to design-build contracts; however, contracting agencies may establish their own self-performance requirements.

## VII. SAFETY: ACCIDENT PREVENTION

This provision is applicable to all Federal-aid construction contracts and to all related subcontracts.

1. In the performance of this contract the contractor shall comply with all applicable Federal, State, and local laws governing safety, health, and sanitation (23 CFR 635). The contractor shall provide all safeguards, safety devices and protective equipment and take any other needed actions as it determines, or as the contracting officer may determine, to be reasonably necessary to protect the life and health of employees on the job and the safety of the public and to protect property in connection with the performance of the work covered by the contract.

2. It is a condition of this contract, and shall be made a condition of each subcontract, which the contractor enters into pursuant to this contract, that the contractor and any subcontractor shall not permit any employee, in performance of the contract, to work in surroundings or under conditions which are unsanitary, hazardous or dangerous to his/her health or safety, as determined under construction safety and health standards (29 CFR 1926) promulgated by the Secretary of Labor, in accordance with Section 107 of the Contract Work Hours and Safety Standards Act (40 U.S.C. 3704).

3. Pursuant to 29 CFR 1926.3, it is a condition of this contract that the Secretary of Labor or authorized representative thereof, shall have right of entry to any site of contract performance to inspect or investigate the matter of compliance with the construction safety and health standards and to carry out the duties of the Secretary under Section 107 of the Contract Work Hours and Safety Standards Act (40 U.S.C.3704).

## VIII. FALSE STATEMENTS CONCERNING HIGHWAY PROJECTS

This provision is applicable to all Federal-aid construction contracts and to all related subcontracts.

In order to assure high quality and durable construction in conformity with approved plans and specifications and a high degree of reliability on statements and representations made by engineers, contractors, suppliers, and workers on Federal-aid highway projects, it is essential that all persons concerned with the project perform their functions as carefully, thoroughly, and honestly as possible. Willful falsification, distortion, or misrepresentation with respect to any facts related to the project is a violation of Federal law. To prevent any misunderstanding regarding the seriousness of these and similar acts, Form FHWA-1022 shall be posted on each Federal-aid highway project (23 CFR 635) in one or more places where it is readily available to all persons concerned with the project:

18 U.S.C. 1020 reads as follows:

"Whoever, being an officer, agent, or employee of the United States, or of any State or Territory, or whoever, whether a person, association, firm, or corporation, knowingly makes any false statement, false representation, or false report as to the character, quality, quantity, or cost of the material used or to be used, or the quantity or quality of the work performed or to be performed, or the cost thereof in connection with the submission of plans, maps, specifications, contracts, or costs of construction on any highway or related project submitted for approval to the Secretary of Transportation; or

Whoever knowingly makes any false statement, false representation, false report or false claim with respect to the character, quality, quantity, or cost of any work performed or to be performed, or materials furnished or to be furnished, in connection with the construction of any highway or related project approved by the Secretary of Transportation; or

Whoever knowingly makes any false statement or false representation as to material fact in any statement, certificate, or report submitted pursuant to provisions of the Federal-aid Roads Act approved July 1, 1916, (39 Stat. 355), as amended and supplemented;

Shall be fined under this title or imprisoned not more than 5 years or both."

## IX. IMPLEMENTATION OF CLEAN AIR ACT AND FEDERAL WATER POLLUTION CONTROL ACT

This provision is applicable to all Federal-aid construction contracts and to all related subcontracts.

By submission of this bid/proposal or the execution of this contract, or subcontract, as appropriate, the bidder, proposer, Federal-aid construction contractor, or subcontractor, as appropriate, will be deemed to have stipulated as follows:

1. That any person who is or will be utilized in the performance of this contract is not prohibited from receiving an award due to a violation of Section 508 of the Clean Water Act or Section 306 of the Clean Air Act.

2. That the contractor agrees to include or cause to be included the requirements of paragraph (1) of this Section X in every subcontract, and further agrees to take such action as the contracting agency may direct as a means of enforcing such requirements.

## X. CERTIFICATION REGARDING DEBARMENT, SUSPENSION, INELIGIBILITY AND VOLUNTARY EXCLUSION

This provision is applicable to all Federal-aid construction contracts, design-build contracts, subcontracts, lower-tier subcontracts, purchase orders, lease agreements, consultant contracts or any other covered transaction requiring FHWA approval or that is estimated to cost \$25,000 or more – as defined in 2 CFR Parts 180 and 1200.

### 1. Instructions for Certification – First Tier Participants:

a. By signing and submitting this proposal, the prospective first tier participant is providing the certification set out below.

b. The inability of a person to provide the certification set out below will not necessarily result in denial of participation in this covered transaction. The prospective first tier participant shall submit an explanation of why it cannot provide the certification set out below. The certification or explanation will be considered in connection with the department or agency's determination whether to enter into this transaction. However, failure of the prospective first tier participant to furnish a certification or an explanation shall disqualify such a person from participation in this transaction.

c. The certification in this clause is a material representation of fact upon which reliance was placed when the contracting agency determined to enter into this transaction. If it is later determined that the prospective participant knowingly rendered an erroneous certification, in addition to other remedies available to the Federal Government, the contracting agency may terminate this transaction for cause of default.

d. The prospective first tier participant shall provide immediate written notice to the contracting agency to whom this proposal is submitted if any time the prospective first tier participant learns that its certification was erroneous when submitted or has become erroneous by reason of changed circumstances.

e. The terms "covered transaction," "debarred," "suspended," "ineligible," "participant," "person," "principal," and "voluntarily excluded," as used in this clause, are defined in 2 CFR Parts 180 and 1200. "First Tier Covered Transactions" refers to any covered transaction between a grantee or subgrantee of Federal funds and a participant (such as the prime or general contract). "Lower Tier Covered Transactions" refers to any covered transaction under a First Tier Covered Transaction (such as subcontracts). "First Tier Participant" refers to the participant who has entered into a covered transaction with a grantee or subgrantee of Federal funds (such as the prime or general contractor). "Lower Tier Participant" refers any participant who has entered into a covered transaction with a First Tier Participant or other Lower Tier Participants (such as subcontractors and suppliers).

f. The prospective first tier participant agrees by submitting this proposal that, should the proposed covered transaction be entered into, it shall not knowingly enter into any lower tier covered transaction with a person who is debarred, suspended, declared ineligible, or voluntarily excluded from participation in this covered transaction, unless authorized by the department or agency entering into this transaction.

g. The prospective first tier participant further agrees by submitting this proposal that it will include the clause titled "Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion-Lower Tier Covered Transactions," provided by the department or contracting agency, entering into this covered transaction, without modification, in all lower tier covered transactions and in all solicitations for lower tier covered transactions exceeding the \$25,000 threshold.

h. A participant in a covered transaction may rely upon a certification of a prospective participant in a lower tier covered transaction that is not debarred, suspended, ineligible, or voluntarily excluded from the covered transaction, unless it knows that the certification is erroneous. A participant is responsible for ensuring that its principals are not suspended, debarred, or otherwise ineligible to participate in covered transactions. To verify the eligibility of its principals, as well as the eligibility of any lower tier prospective participants, each participant may, but is not required to, check the Excluded Parties List System website (<https://www.epls.gov/>), which is compiled by the General Services Administration.

i. Nothing contained in the foregoing shall be construed to require the establishment of a system of records in order to render in good faith the certification required by this clause. The knowledge and information of the prospective participant is not required to exceed that which is normally possessed by a prudent person in the ordinary course of business dealings.

j. Except for transactions authorized under paragraph (f) of these instructions, if a participant in a covered transaction knowingly enters into a lower tier covered transaction with a person who is suspended, debarred, ineligible, or voluntarily excluded from participation in this transaction, in addition to other remedies available to the Federal Government, the department or agency may terminate this transaction for cause or default.

\* \* \* \* \*

## **2. Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion – First Tier Participants:**

a. The prospective first tier participant certifies to the best of its knowledge and belief, that it and its principals:

(1) Are not presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from participating in covered transactions by any Federal department or agency;

(2) Have not within a three-year period preceding this proposal been convicted of or had a civil judgment rendered against them for commission of fraud or a criminal offense in connection with obtaining, attempting to obtain, or performing a public (Federal, State or local) transaction or contract under a public transaction; violation of Federal or State antitrust statutes or commission of embezzlement, theft, forgery, bribery, falsification or destruction of records, making false statements, or receiving stolen property;

(3) Are not presently indicted for or otherwise criminally or civilly charged by a governmental entity (Federal, State or local) with commission of any of the offenses enumerated in paragraph (a)(2) of this certification; and

(4) Have not within a three-year period preceding this application/proposal had one or more public transactions (Federal, State or local) terminated for cause or default.

b. Where the prospective participant is unable to certify to any of the statements in this certification, such prospective participant shall attach an explanation to this proposal.

## **2. Instructions for Certification - Lower Tier Participants:**

(Applicable to all subcontracts, purchase orders and other lower tier transactions requiring prior FHWA approval or estimated to cost \$25,000 or more - 2 CFR Parts 180 and 1200)

a. By signing and submitting this proposal, the prospective lower tier is providing the certification set out below.

b. The certification in this clause is a material representation of fact upon which reliance was placed when this transaction was entered into. If it is later determined that the prospective lower tier participant knowingly rendered an erroneous certification, in addition to other remedies available to the Federal Government, the department, or agency with which this transaction originated may pursue available remedies, including suspension and/or debarment.

c. The prospective lower tier participant shall provide immediate written notice to the person to which this proposal is submitted if at any time the prospective lower tier participant learns that its certification was erroneous by reason of changed circumstances.

d. The terms "covered transaction," "debarred," "suspended," "ineligible," "participant," "person," "principal," and "voluntarily excluded," as used in this clause, are defined in 2 CFR Parts 180 and 1200. You may contact the person to which this proposal is submitted for assistance in obtaining a copy of those regulations. "First Tier Covered Transactions" refers to any covered transaction between a grantee or subgrantee of Federal funds and a participant (such as the prime or general contract). "Lower Tier Covered Transactions" refers to any covered transaction under a First Tier Covered Transaction (such as subcontracts). "First Tier Participant" refers to the participant who has entered into a covered transaction with a grantee or subgrantee of

Federal funds (such as the prime or general contractor). "Lower Tier Participant" refers any participant who has entered into a covered transaction with a First Tier Participant or other Lower Tier Participants (such as subcontractors and suppliers).

e. The prospective lower tier participant agrees by submitting this proposal that, should the proposed covered transaction be entered into, it shall not knowingly enter into any lower tier covered transaction with a person who is debarred, suspended, declared ineligible, or voluntarily excluded from participation in this covered transaction, unless authorized by the department or agency with which this transaction originated.

f. The prospective lower tier participant further agrees by submitting this proposal that it will include this clause titled "Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion-Lower Tier Covered Transaction," without modification, in all lower tier covered transactions and in all solicitations for lower tier covered transactions exceeding the \$25,000 threshold.

g. A participant in a covered transaction may rely upon a certification of a prospective participant in a lower tier covered transaction that is not debarred, suspended, ineligible, or voluntarily excluded from the covered transaction, unless it knows that the certification is erroneous. A participant is responsible for ensuring that its principals are not suspended, debarred, or otherwise ineligible to participate in covered transactions. To verify the eligibility of its principals, as well as the eligibility of any lower tier prospective participants, each participant may, but is not required to, check the Excluded Parties List System website (<https://www.epls.gov/>), which is compiled by the General Services Administration.

h. Nothing contained in the foregoing shall be construed to require establishment of a system of records in order to render in good faith the certification required by this clause. The knowledge and information of participant is not required to exceed that which is normally possessed by a prudent person in the ordinary course of business dealings.

i. Except for transactions authorized under paragraph e of these instructions, if a participant in a covered transaction knowingly enters into a lower tier covered transaction with a person who is suspended, debarred, ineligible, or voluntarily excluded from participation in this transaction, in addition to other remedies available to the Federal Government, the department or agency with which this transaction originated may pursue available remedies, including suspension and/or debarment.

\* \* \* \* \*

#### **Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion--Lower Tier Participants:**

1. The prospective lower tier participant certifies, by submission of this proposal, that neither it nor its principals is presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from participating in covered transactions by any Federal department or agency.

2. Where the prospective lower tier participant is unable to certify to any of the statements in this certification, such prospective participant shall attach an explanation to this proposal.

\* \* \* \* \*

#### **XI. CERTIFICATION REGARDING USE OF CONTRACT FUNDS FOR LOBBYING**

This provision is applicable to all Federal-aid construction contracts and to all related subcontracts which exceed \$100,000 (49 CFR 20).

1. The prospective participant certifies, by signing and submitting this bid or proposal, to the best of his or her knowledge and belief, that:

a. No Federal appropriated funds have been paid or will be paid, by or on behalf of the undersigned, to any person for influencing or attempting to influence an officer or employee of any Federal agency, a Member of

Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with the awarding of any Federal contract, the making of any Federal grant, the making of any Federal loan, the entering into of any cooperative agreement, and the extension, continuation, renewal, amendment, or modification of any Federal contract, grant, loan, or cooperative agreement.

b. If any funds other than Federal appropriated funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any Federal agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with this Federal contract, grant, loan, or cooperative agreement, the undersigned shall complete and submit Standard Form-LLL, "Disclosure Form to Report Lobbying," in accordance with its instructions.

2. This certification is a material representation of fact upon which reliance was placed when this transaction was made or entered into. Submission of this certification is a prerequisite for making or entering into this transaction imposed by 31 U.S.C. 1352. Any person who fails to file the required certification shall be subject to a civil penalty of not less than \$10,000 and not more than \$100,000 for each such failure.

3. The prospective participant also agrees by submitting its bid or proposal that the participant shall require that the language of this certification be included in all lower tier subcontracts, which exceed \$100,000 and that all such recipients shall certify and disclose accordingly.



**ATTACHMENT A - EMPLOYMENT AND MATERIALS PREFERENCE FOR APPALACHIAN DEVELOPMENT HIGHWAY SYSTEM OR APPALACHIAN LOCAL ACCESS ROAD CONTRACTS**

This provision is applicable to all Federal-aid projects funded under the Appalachian Regional Development Act of 1965.

1. During the performance of this contract, the contractor undertaking to do work which is, or reasonably may be, done as on-site work, shall give preference to qualified persons who regularly reside in the labor area as designated by the DOL wherein the contract work is situated, or the subregion, or the Appalachian counties of the State wherein the contract work is situated, except:

a. To the extent that qualified persons regularly residing in the area are not available.

b. For the reasonable needs of the contractor to employ supervisory or specially experienced personnel necessary to assure an efficient execution of the contract work.

c. For the obligation of the contractor to offer employment to present or former employees as the result of a lawful collective bargaining contract, provided that the number of nonresident persons employed under this subparagraph (1c) shall not exceed 20 percent of the total number of employees employed by the contractor on the contract work, except as provided in subparagraph (4) below.

2. The contractor shall place a job order with the State Employment Service indicating (a) the classifications of the laborers, mechanics and other employees required to perform the contract work, (b) the number of employees required in each classification, (c) the date on which the participant estimates such employees will be required, and (d) any other pertinent information required by the State Employment Service to complete the job order form. The job order may be placed with the State Employment Service in writing or by telephone. If during the course of the contract work, the information submitted by the contractor in the original job order is substantially modified, the participant shall promptly notify the State Employment Service.

3. The contractor shall give full consideration to all qualified job applicants referred to him by the State Employment Service. The contractor is not required to grant employment to any job applicants who, in his opinion, are not qualified to perform the classification of work required.

4. If, within one week following the placing of a job order by the contractor with the State Employment Service, the State Employment Service is unable to refer any qualified job applicants to the contractor, or less than the number requested, the State Employment Service will forward a certificate to the contractor indicating the unavailability of applicants. Such certificate shall be made a part of the contractor's permanent project records. Upon receipt of this certificate, the contractor may employ persons who do not normally reside in the labor area to fill positions covered by the certificate, notwithstanding the provisions of subparagraph (1c) above.

5. The provisions of 23 CFR 633.207(e) allow the contracting agency to provide a contractual preference for the use of mineral resource materials native to the Appalachian region.

6. The contractor shall include the provisions of Sections 1 through 4 of this Attachment A in every subcontract for work which is, or reasonably may be, done as on-site work.

## Contract Provision - Cargo Preference Requirements

In accordance with Title 46 CFR § 381.7 (b), the contractor agrees—

“(1) To utilize privately owned United States-flag commercial vessels to ship at least 50 percent of the gross tonnage (computed separately for dry bulk carriers, dry cargo liners, and tankers) involved, whenever shipping any equipment, material, or commodities pursuant to this contract, to the extent such vessels are available at fair and reasonable rates for United States-flag commercial vessels.

(2) To furnish within 20 days following the date of loading for shipments originating within the United States or within 30 working days following the date of loading for shipments originating outside the United States, a legible copy of a rated, ‘on-board’ commercial ocean bill-of-lading in English for each shipment of cargo described in paragraph (b) (1) of this section to both the Contracting Officer (through the prime contractor in the case of subcontractor bills-of-lading) and to the Division of National Cargo, Office of Market Development, Maritime Administration, Washington, DC 20590.

(3) To insert the substance of the provisions of this clause in all subcontracts issued pursuant to this contract.”

Provisions (1) and (2) apply to materials or equipment that are acquired solely for the project. The two provisions do not apply to goods or materials that come into inventories independent of the project, such as shipments of Portland cement, asphalt cement, or aggregates, when industry suppliers and contractors use these materials to replenish existing inventories.

**MINIMUM WAGES FOR FEDERAL AND FEDERALLY  
ASSISTED CONSTRUCTION CONTRACTS**

This project is funded, in part, with Federal-aid funds and, as such, is subject to the provisions of the Davis-Bacon Act of March 3, 1931, as amended (46 Sta. 1494, as amended, 40 U.S.C. 276a) and of other Federal statutes referred to in a 29 CFR Part 1, Appendix A, as well as such additional statutes as may from time to time be enacted containing provisions for the payment of wages determined to be prevailing by the Secretary of Labor in accordance with the Davis-Bacon Act and pursuant to the provisions of 29 CFR Part 1. The prevailing rates and fringe benefits shown in the General Wage Determination Decisions issued by the U.S. Department of Labor shall, in accordance with the provisions of the foregoing statutes, constitute the minimum wages payable on Federal and federally assisted construction projects to laborers and mechanics of the specified classes engaged on contract work of the character and in the localities described therein.

General Wage Determination Decisions, modifications and supersedes decisions thereto are to be used in accordance with the provisions of 29 CFR Parts 1 and 5. Accordingly, the applicable decision, together with any modifications issued, must be made a part of every contract for performance of the described work within the geographic area indicated as required by an applicable DBRA Federal prevailing wage law and 29 CFR Part 5. The wage rates and fringe benefits contained in the General Wage Determination Decision shall be the minimum paid by contractors and subcontractors to laborers and mechanics.